Office of Information

and Technology

# VA Interoperability Maturity Self-Assessment

Veterans Affairs Interoperability Leadership

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## VA Interoperability Maturity Self-Assessment Survey

VA **Interoperability Organizational Framework** establishes an **enterprise-wide understanding of interoperability**. The Framework lists 28 specific elements across VA’s three framework pillars: Business (13), Data and Information (9), and Systems and Technology (6). Interoperability Foundational Elements support interoperability in the three framework pillars and leverages an Interoperability Maturity Assessment process to evaluate the interoperability posture of a **business workflow**.

**How to use this survey:** Start with mapping out your business workflow and identifying the current state of your business outcomes. Identify and consider all the business aspects, data, and systems that are part of the workflow. Complete an assessment for all the 28 elements on a scale starting from 0 (none) to five (optimized). The score should reflect the lowest scoring aspect of the workflow (e.g., poorest performing system).

### Business Context

Consists of the elements of a Veteran's environment from legislative, regulatory, health care, and community, where IT systems need to be deployed to improve delivery of business value. This requires agreement on key organizational concepts such as roles, policies, and processes as well as capture of relevant organizational patterns such as legislative compliance, governance, and change management.

#### Access and Authorization:

Access provides an individual the ability to perform a specific task on a protected resource. Access data supports the management, oversight and control of enterprise trusted identities and their authoritative credentials to VA’s protected resources. VA’s protected resources include enterprise data, electronic files, computer systems, and physical resources (buildings, floors, and data centers). Authorization is the function of specifying access rights and privileges to resources, which is related to information security and computer security in general and to access control in particular. How is access and user authorization managed to ensure consistent and ongoing information sharing in this workflow?

**Level 0:** We have not yet considered access and authorization processes.

**Level 1:** We require coordination between stakeholders for access governance and user authorization.

**Level 2:** We are developing common onboarding requirements and documentation to define access authorities.

**Level 3:** We have documented access and authorization policies and procedures, including access requests and updates. We are considering automating this process.

**Level 4:** We have established and responsive access and authorization governance, ensuring consistent implementation of policies and procedures. We share data between stakeholders involved in access and authorization issuance, and we have started the automation of the process.

**Level 5:** We have an adaptive and automated access and authorization system in place. We also have in place a process to continually improve the processes and systems. It includes a mechanism to capture user demographic information, such as biometric identification, and facilitates requesting and changing access.

#### Capability and Services:

Capability is a higher-level function that typically spans multiple services or features. Services or features fulfill stakeholder needs. Each capability and service include a benefit hypothesis and acceptance criteria. Currently, how well do the capabilities and services support meeting business requirements in this workflow?

**Level 0:** We have not yet considered what business capabilities and services support are needed to meet business requirements.

**Level 1:** Our skills, personnel, and systems are not defined, and knowledge assets are still emerging. Common approaches are based on individual initiatives, and hiring practices are inconsistent.

**Level 2:** We have defined minimum skills for critical roles, and training is provided informally on-the-job. Knowledge assets are emerging, and common approaches are starting to emerge, although hiring practices may still be inconsistent.

**Level 3:** Our capabilities and services align with documented scope, roles, and skill requirements. We have a formal and accessible training plan in place, and we have subject matter experts available to assess fit-for-purpose and provide workarounds when needed.

**Level 4:** We have formal training plans in place, and we encourage industry certification where applicable. We consistently measure staff productivity and output, which helps improve training effectiveness. We have a community of practice that fosters knowledge sharing among our staff.

**Level 5:** External experts regularly review our knowledge-based systems to ensure content delivery follows industry best practices. Our training and support tools are designed to match each employee's learning style and seamlessly integrate into the workflow. We conduct regular assessments to optimize the effectiveness of our tools and training.

#### Cultural and Social Values:

Cultural and social values are a set of beliefs, customs, or ideas that society (organizations, people) upholds as important. Social values are a set of principles that are morally acceptable by society. Currently, how are cultural and social values aligned with VA's values to support the exchange of information needed to meet VA’s mission in this workflow?

**Level 0:** We have not yet considered the topic of how our cultural and social values may impact information exchange.

**Level 1:** Our cultural and social values that support information exchange are unclear.

**Level 2:** We have begun documenting some cultural and social values that support information exchange.

**Level 3:** Our cultural and social values are documented and aligned with the organization's mission and vision.

**Level 4:** We have established adaptive cultural and social values that support information exchange and foster positive cultural outcomes.

**Level 5:** We have established a continuous process improvement feedback loop with the community to ensure that our cultural and social values consistently support information exchange.

#### Governance and Change Management:

Governance is the establishment of policies and continuous monitoring of their proper implementation by members of the governing body of an organization. Change management is a collective term for all approaches to prepare, support and help individuals, teams, and organizations and their products make organizational change. What governance and change management processes are in place to support the change management lifecycle in this workflow?

**Level 0:** We have not yet considered any governance and communication process nor the need for formal change management.

**Level 1:** We have informal governance and communication processes in place, and we recognize the need for formal change management.

**Level 2:** We have emerging communication processes that enable the identification, escalation, and resolution of internal issues. Change management processes are in place, and reporting is starting to emerge.

**Level 3:** We have documented governance, communication, and change management processes that address stakeholder and governance responsibilities. Our processes include the management of interaction, issues, escalation, a change control board, and adherence to budget, scope, and quality standards.

**Level 4:** All stakeholders consistently apply well-understood governance and change management processes. We use common tools to manage the process and generate reports for all stakeholders, especially for major changes.

**Level 5:** We have a mature rolling plan that incorporates best practices, standards, and customer workflows. We actively leverage organizational 360-degree feedback from staff and stakeholders.

#### Laws, Regulations, and Policies:

Laws are any rule or collection of rules prescribed under the authority of the state or nation. Regulations are policies, rules, or other orders prescribed by a person or organization, to regulate conduct. Policy is a course or principle of action adopted or proposed by a government, party, business, or individual. Currently, how is adherence to laws, regulations, and policies related to information exchange, privacy, and security ensured in this workflow?

**Level 0:** We have not yet assessed policies, standards, and guidelines that impact interoperability.

**Level 1:** Our policies, standards, and guidelines are ad hoc and do not consider organizational interoperability policies.

**Level 2:** We are in the process of defining policies, standards, and guidelines, although their repeatability is limited. We are starting to develop knowledge of available enterprise policies, standards, and guidelines related to interoperability.

**Level 3:** We have established policies, standards, and guidelines in place that align with applicable laws and regulations. We have documented business compliance, and we are in the process of developing processes to identify interoperability related policies, standards, and guidelines.

**Level 4:** Our policies, standards, and guidelines processes are repeatable and under change control. Senior leadership regularly reviews policies, standards, and guidelines.

**Level 5:** Our policies, standards, and guidelines are supported and managed by event, ensuring continuous alignment with laws, regulations, and policies.

#### Metrics Analytics Reporting:

Metrics are measures of quantitative assessment used for assessing, comparing, and tracking performance or production related to Veterans experiences. Key metrics are identified as key performance indicators and are rolled into key performance indicators dashboards. Analytics are the scientific processes of discovering and communicating meaningful patterns found in data. Reporting is the ad hoc or recurring process to analyze and assess key performance indicators and analytics presented to a team or leadership. Currently, how are metrics, analytics, and reports affected by business outcomes managed in this workflow?

**Level 0:** We have not considered how we would develop outcome metrics for our business goals.

**Level 1:** Our business goals are unclear or undefined, and there is no formal or operational demand for reporting or analytics.

**Level 2:** We occasionally set goals and forecast progress at the functional level. Ad hoc metrics reporting begins to emerge.

**Level 3:** We have defined metrics and analytics that are used to measure performance relative to our goals. Our reporting requirements are consistently documented and fulfilled.

**Level 4:** We actively monitor performance measures and indicators, linking efficiency and effectiveness to stakeholder needs. We are in the process of making continuous improvements and developing scorecard structures for performance management.

**Level 5:** We have an integrated performance management system in place, linking performance and goals at all levels. Continuous improvement, along with exception management, is a normal operational behavior.

#### Mission Goals and Objectives:

The mission is a general statement of how you will achieve what you want to accomplish. Goals are statements of what needs to be accomplished to implement the mission. Objectives are specific actions and timelines for achieving goals. Does the mission statement contain goals and objectives that consider information-sharing needs tied to the mission in this workflow?

**Level 0:** We have not started to consider how our mission statement’s goals and objectives support information-sharing needs necessary to achieve it.

**Level 1:** We have an unclear understanding of the scope and requirements necessary for enabling interoperability and information exchange. We lack an understanding of what information sharing points are required to meet the overall mission and craft relevant goals and objectives.

**Level 2:** We are familiar with the stakeholders, namely the customers and the primary authorities overseeing the mission's objectives, especially in terms of information sharing. However, these objectives have yet to be officially articulated and recorded. As we draft our business strategies, it's clear that there's more work to be done to ensure alignment with the broader enterprise vision. Efforts are currently underway to create comprehensive documentation detailing the products and outcomes required to achieve our goals in information sharing and interoperability.

**Level 3:** We've adopted a S.M.A.R.T. (Specific, Measurable, Achievable, and Relevant) goal-setting approach, anchoring our information sharing objectives directly to our mission and vision. Our customers and stakeholders are clearly identified, and the significance of interoperability in reaching our goals, along with potential obstacles, is documented. Our budget mirrors these mission-driven requirements.

**Level 4:** We fully understand our customer needs and have a consensus among stakeholders about our roles, products, and outcomes. The alignment between our mission, goals, and strategy is well-documented, and we consistently track our progress toward meeting them.

**Level 5:** We have robust, documented processes guiding our collaboration with responsible agencies (owner) for continuous improvement. We champion ongoing enhancement and routinely update our strategies based on results, evolving responsibilities, and current factors.

#### Monitoring and Auditing:

Monitoring is continual checking, supervising, critically observing, or determining status to identify changes from the performance level required or expected. Auditing is independent review and examination of records and activities to assess the adequacy of system controls to ensure compliance with established policies and operational procedures. Currently, how is monitoring and auditing of performance and goals managed in this workflow?

**Level 0:** We have not considered how we will be managing monitoring and auditing of performance and goals.

**Level 1:** We currently have ad hoc monitoring or auditing in place, with no well-defined service level agreements or key performance indicators.

**Level 2:** We are in the process of defining service level agreements or key performance indicators, and our processes for monitoring and auditing are starting to emerge. We are working towards aligning our goals for monitoring and auditing processes.

**Level 3:** We have fully defined service level agreements and key performance indicators, and we measure and report on them. We have an established process to monitor and audit performance relative to our goals.

**Level 4:** We consistently monitor controls, service level agreements, key performance indicators, and conduct audits relative to our goals. We have a strategy in place to address issues discovered through monitoring, and we are increasing transparency of measurement outcomes.

**Level 5:** We have implemented responsive and adaptive monitoring and auditing practices. We prioritize alerting only actionable events to decision-makers, ensuring efficient and effective decision-making based on the monitored data.

#### Processes and Workflows:

Process is a series of structured actions to accomplish results. Workflows are a series of tasks and activities involving the organization in the provision of more complex objectives based on agreed procedural rules. How do current business processes and workflows support mission delivery by sharing relevant information with minimal human intervention in this workflow?

**Level 0:** We have not considered business process or workflow at this point.

**Level 1:** Our processes and workflows are ad hoc, lacking definition and documentation. We do not have alignment between stakeholder needs and our processes and workflows.

**Level 2:** We are in the process of identifying process owners. We are developing process and workflow definitions, including the identification of accountable parties. We have a basic understanding of stakeholder needs in relation to our current products and deliverables.

**Level 3:** We have documented processes and workflows that support our products and deliverables. These include responsible process owners. We ensure that forecasting is connected to stakeholder needs, and we have a formal agreement for responsible and accountable parties and products and deliverables.

**Level 4:** We have an established and consistent forecasting process that considers and responds to stakeholder needs. We use automated workflows and gather feedback on existing workflows to support an improvement process.

**Level 5:** We have proactively implemented automated and adaptive processes and workflows. These processes and workflows continuously self-optimize to support mission delivery with minimal human intervention.

#### Requirements:

Requirements are conditions or capabilities that must be met or possessed by a system or system element to satisfy a contract, service level agreement, standard, specification, or other formally imposed documents. Business requirements describe the business needs, provide insight into the "as-is" and "to-be" business areas, in the context of laws, regulations, policies and directives, identify stakeholders and profile primary and secondary user communities. Requirements identify capabilities stakeholders and target users need and why these needs exist. Requirements provide a focused overview of the needs, constraints and IT options considered. Currently, how do business requirements address information sharing in this workflow?

**Level 0:** We have not considered business requirements that focus on information sharing at this point.

**Level 1:** We have ad hoc or underdefined business requirements across our existing products and deliverables that do not align with stakeholder needs.

**Level 2:** We are in the process of developing a requirement gathering process to define and document business requirements that address information sharing.

**Level 3:** We have documented and defined business requirements in place, which address information sharing concerns. Our requirements are sufficiently expressed, and we follow a change management process that includes an internal review board for managing changes to requirements.

**Level 4:** All of our stakeholders actively participate in defining requirements that trace to deliverables. We have well-documented and well-understood requirements, and we utilize an automated requirements management tool that promotes collaboration among stakeholders.

**Level 5:** We have developed responsive and adaptive business requirements that lay the groundwork for our interoperability development processes, supporting relevant delivery approaches. We consistently use requirements management tools across our entire enterprise.

#### Roles, Authorities, and Responsibilities:

Roles are the functions assumed or parts delivered by a person or thing in a situation. Authority is the ability to make binding decisions. Responsibility is the commitment to achieve specific results. Currently, how are roles, responsibilities, and authorities managed to make key decisions and changes to policies and practices that support and enable information sharing in this workflow?

**Level 0:** We have not considered roles, authorities and responsibilities that are needed to support and enable information sharing at this point.

**Level 1:** Our roles, authorities, and responsibilities are ad hoc, and we recognize the need to document and establish a clear understanding of our stakeholder roles and responsibilities. Currently, we lack accountability to established policies, standards, and guidelines.

**Level 2:** We have identified a few common roles, authorities, and responsibilities to support our information-sharing efforts. However, we still need to define our key stakeholders and clarify our specific roles, responsibilities, and authorities.

**Level 3:** We have documented the stakeholders involved in our program, project, or acquisition, along with their roles and responsibilities. We demonstrate staff and organizational accountability to the established policies, standards, and guidelines.

**Level 4:** Our roles, authorities, and responsibilities have been thoroughly documented, and we have a comprehensive understanding of them. We routinely review and confirm these roles, authorities, and responsibilities with senior leadership and stakeholders. We maintain a publicly available RACI (Responsible, Accountable, Consulted, Informed) matrix that includes position descriptions and performance criteria.

**Level 5:** We actively engage stakeholders in refining our roles, authorities, and responsibilities through an automated interface that provides an optimal user experience. Our processes are designed to continuously improve and enhance stakeholder engagement.

#### Risk Management:

Risk management is the framework that provides governance, communications, training, processes, and tools to effectively identify, assess, respond to and monitor risks and helps VA leadership make informed decisions and focus priorities to better serve Veterans. What risk management processes are currently being used to support the identification and management of risks, including traceability in this workflow?

**Level 0:** We have not considered our approach for risk management and traceability at this point.

**Level 1:** Our current state of risk is undefined, and the existing processes to manage risk are ad hoc.

**Level 2:** We are in the process of defining elements of a risk management process, including risk identification, reporting, assessment, traceability, and mitigation. We are identifying and documenting areas of risk.

**Level 3:** We have implemented a risk management process that includes risk identification, assessment, identified areas of risk, and the state of risk. Interoperability is an area of concern, and we are working to fully formalize the risk process.

**Level 4:** We have an established risk management process that is consistently used. It includes interoperability-related risk events, and we have defined measures to demonstrate consistent use and adherence to risk management policies and procedures. We share this information with external stakeholders who depend on us.

**Level 5:** Our risk management process is used proactively to detect and prevent risk, with a strong focus on continuous improvement.

#### Usability and Performance:

Usability is "the extent to which a product is used to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" [[ISO9241]](https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.iso.org%2Fstandard%2F63500.html&data=05%7C02%7C%7C4917d0bff9a74baadacd08dc4cc5211b%7Ce95f1b23abaf45ee821db7ab251ab3bf%7C0%7C0%7C638469656741658891%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=5TPNs6UbloZAO9nYaj1pjnF0JLK%2Ft0Uk5XiwjpzrekM%3D&reserved=0). Performance is the ability to achieve a predefined or relative metric for the accomplishment of one or more tasks. Usability is measured relative to users' performance on a given set of tasks. The most basic measures are based on the definition of usability as a quality metric: success rate (whether users can perform the task at all), the time a task requires, users' subjective satisfaction. Currently, how is usability achieved, and how is usability performance measured to enable information sharing in this workflow?

**Level 0:** We have not considered usability at this point.

**Level 1:** We currently do not have formal usability requirements, and we have limited understanding of the role of usability-related performance goals and key performance indicators within our program, project, or acquisition.

**Level 2:** We are in the process of developing usability requirements, including a process to assess our user experience against performance goals and key performance indicators. However, we have limited traceability of these requirements to our business requirements.

**Level 3:** We have established a process for evaluating our user experience against usability performance goals and key performance indicators. Our business requirements comprehensively document usability and performance expectations. We have identified usability-related performance key performance indicators for our user-supporting products and services.

**Level 4:** Our usability requirements are regularly validated, reviewed, and revised by stakeholders based on our past implementation experience. We actively measure usability outcomes and adjust our usability-related key performance indicators based on the insights we gain.

**Level 5:** We have defined usability outcome metrics and consistently review them to assess their effectiveness and impact. Our usability-related key performance indicators align with industry norms and best practices.

### Data and Information

Data and information is how functional, administrative, or statistical information can be represented and interpreted. Information is any kind of knowledge that is exchanged among users, about things, facts, concepts and so on, in a Universe of Discourse [[ISO/IEC10746-2]](https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.iso.org%2Fstandard%2F55723.html&data=05%7C02%7C%7C4917d0bff9a74baadacd08dc4cc5211b%7Ce95f1b23abaf45ee821db7ab251ab3bf%7C0%7C0%7C638469656741667570%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=a7eJRw6TIsXHZJ%2ByCKgy%2FNCnJyGWva5BlLkMmK6GCAk%3D&reserved=0). This requires agreement on a core set of information concepts, such as information components and relationships between components, as well as capture of relevant information patterns such as information rights, information quality, and scope of application.

#### Data Architecture:

Data architecture is the framework for organizing data into manageable logical groupings. Data architecture provides a business view of the data needed by an enterprise that is independent of systems where the data is located, or whether the data is in flight or at rest. It is a set of rules, policies, standards, and models that define data by providing business and technical views of the data needed by an enterprise. It comprises rules, policies, standards, models, and metadata that describe VA data. Information architecture is the structural design syntax of shared information environments. Information architecture is a component of enterprise architecture that deals with the information component within an enterprise architecture. Currently, how is the data architecture designed and managed to support interoperability and data exchange in this workflow?

**Level 0:** We have not considered the data architecture at this point.

**Level 1:** We have a limited understanding of data and information architecture principles, patterns, and data exchange requirements.

**Level 2:** We are starting to become aware of data exchange requirements and VA enterprise architecture principles and patterns that enable data exchange and make information accessible and supportive of end users.

**Level 3:** We have defined and documented data architecture requirements that support interoperable data exchange. Individual initiatives incorporate VA enterprise architecture principles and patterns to enable data exchange and make information accessible and supportive of end users.

**Level 4:** Our shared data architecture incorporates VA enterprise architecture principles and patterns that enable interoperable data exchange using documented data standards. Our shared information architecture also incorporates VA enterprise architecture principles and patterns that make information accessible and supportive of end users.

**Level 5:** Our shared data and information architectures are fully integrated with VA enterprise architecture to support interoperability. We regularly monitor and reassess both architectures to ensure continued alignment and optimization.

#### Authoritative Sources:

Authoritative data sources are the source of data or information designated and recognized as official, that is trusted, timely, secure, and used within VA’s information environment in support of VA business processes. VA Administration and Staff Offices designate these sources within domains for which they are the stewards. Currently, how is the exchanged data source identified, verified, and documented in this workflow?

**Level 0:** We have not considered authoritative data sources at this point.

**Level 1:** We do not have an agreement or process in place to verify an authoritative data source for the exchanged data.

**Level 2:** We document data sets for assessed domains that we consider authoritative. We are aware that external authoritative sources exist, and we are developing an emerging process to verify these sources.

**Level 3:** We document authoritative sources and implement processes to verify them. We strive to maintain consistency with the catalog of approved authoritative data sources.

**Level 4:** We include all authoritative data sources in the catalog of approved authoritative data sources. We have mechanisms in place to ensure that our processes align with the enterprise guidelines.

**Level 5:** We have a process in place to monitor issues related to the verification of external authoritative sources, supporting our continuous improvement efforts.

#### Cleaning and Harmonization:

Data cleaning is the process of detecting and correcting or removing corrupt or inaccurate records from a record set, table, or database. It refers to identifying incomplete, incorrect, inaccurate, or irrelevant parts of the data and then replacing, modifying, or deleting the dirty or coarse data. Data harmonization is the process to combine data from assorted sources into integrated, consistent, and unambiguous information products. Currently, how is data mapped, cleaned, and harmonized to permit interoperability and data exchange in this workflow?

**Level 0:** We have not considered our approach to cleaning and harmonization of our data at this point.

**Level 1:** Our data mapping, cleaning, and harmonization efforts are incomplete or error prone. When data moves between systems, we may introduce mapping errors.

**Level 2:** The data we exchange is mapped to a shared data model based on standards derived from our local requirements, allowing for data harmonization. We use terminology extensions as needed. We are starting to use normalization techniques to eliminate mapping errors.

**Level 3:** The data we exchange is mapped to a shared data model based on standards derived from our enterprise requirements. As a result, data moves between our enterprise systems without introducing mapping errors.

**Level 4:** The data we exchange is harmonized to an enterprise-managed data model that aligns with our enterprise requirements. Our cleaning and harmonization efforts mainly focus on data received from outside the enterprise.

**Level 5:** We have documented data cleaning and harmonization processes that enable continuous improvement. We monitor and automate these processes to ensure that the data we use is fit for its intended purpose.

#### Consistent Semantics Across Syntactic Variation:

Information exchanged across semantic boundaries can be consistently interpreted and stored without loss in the meaning. Currently, how is information exchanged across semantic boundaries to ensure consistent interpretation and storage without losing meaning in this workflow?

**Level 0:** We have not considered consistent semantics across syntactic variation of our data at this point.

**Level 1:** We have limited awareness and understanding of industry terminology standards and information semantics.

**Level 2:** We have defined and specified value sets and terminology, but the data granularity and adoption of terminology are uneven. We use localized information semantics, and when we reuse data, there may be some loss of semantics.

**Level 3:** We have documented the use of industry terminology standards. Our information semantics, including extensions, are understandable across semantic domains. We manage value sets, terminology, and semantics in a common Master Terminology Knowledgebase, although its use for interpreting information from other systems is still emerging.

**Level 4:** We consistently use an enterprise-managed Master Terminology Knowledgebase to interpret information received from other systems. We maintain value sets, terminology, and references to local extensions within the Master Terminology Knowledgebase.

**Level 5:** We have a continuous improvement process that incorporates monitoring of standards and development with respect to process and content. This ensures further refinement and optimization of our information exchange practices.

#### Context and Provenance:

Context is the frame that surrounds an event and provides resources for its appropriate interpretation. Context is a relative concept, only definable with respect to some focal event within a frame, not independently of that frame. Information and data context applies the business context workflow and process, identifying the information and data flows, and semantic constructs. Provenance describes the who, what, when, where, and how of the activities that led to the creation of a set of resources. What methods or processes are currently being used to manage information context and provenance for interoperability and data exchange in this workflow?

**Level 0:** We have not considered our approach to maintain context and provenance of data at this point.

**Level 1:** We have no requirement for providing or annotating data with provenance, and we lack computable provenance capabilities. We do not fully understand the information context in support of local requirements, and human intervention is needed to distinguish local from external data.

**Level 2:** We are driven by local requirements to develop computable provenance capabilities that distinguish internal data from external data. The methods for managing information context and provenance are emerging, although they may be incomplete. We strive to make the semantics understandable across semantic domains.

**Level 3:** We have documented processes and methods for managing information context and computable provenance capabilities, driven by local requirements. However, we are still in the process of aligning them with enterprise requirements. The information context documented for the data we send aligns with industry or organizational standards, and we are starting to align it with enterprise requirements.

**Level 4:** Our data models align with enterprise requirements, enabling us to send, receive, and store context and provenance across semantic boundaries. This ensures consistent information consumption across our organization. Our computable provenance capabilities are aligned with enterprise requirements.

**Level 5:** Our context and provenance capabilities not only support the primary use of data but also enable the secondary use of data. We continuously evolve our provenance artifacts to ensure alignment with industry best practices.

#### Curation and Management:

Data curation is the organization and integration of data collected from various sources. It involves annotation, publication, and presentation of the data so the value of the data is maintained over time, and the data remains available for reuse and preservation. Data management is the process of developing policies and procedures to effectively manage the information lifecycle needs of an enterprise. This includes identifying how data is acquired, validated, stored, mapped, protected, and processed. Data management policies should cover the entire lifecycle of the data, from creation to deletion. Sometimes the term “data” is replaced by “information’ or even “knowledge” in a non-technical context, which obscures raw data processing, such as data cleaning and curation. Currently, what systems and processes are used to organize and integrate data from multiple sources in this workflow?

**Level 0:** We have not considered how we will address curation and management of our data at this point.

**Level 1:** We understand the need for curation and management of data. However, we have not yet defined rules for data normalization, and data is not available in a normalized form for retrieval or analysis.

**Level 2:** We have emerging processes for aggregating data, maintaining provenance and context, and data curation and management. Some subsets of data are normalized and integrated across multiple sources, and we have documented system-specific rules for data normalization.

**Level 3:** We have established and documented processes for aggregating data, maintaining provenance and context, and curation and management. All processes for data normalization are documented, repeatable, and consistent.

**Level 4:** We have implemented enterprise-level data normalization, maintenance of provenance and context, and curation and management processes. We also plan to share our curation and management processes to contribute to improving industry practices.

**Level 5:** Our data normalization processes are optimized based on experience and aligned with changing requirements. We actively monitor our curation and management processes to obtain outcomes that inform a continuous improvement process and contribute to improving industry practices.

#### Knowledge and Reasoning:

Knowledge is a familiarity, awareness, or understanding of someone or something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering, or learning. Reason is the capacity of consciously making sense of things, establishing, and verifying facts, applying logic, and adapting or justifying practices, institutions, and beliefs based on new or existing information. Currently, how is knowledge represented to enable automated decision support and quality measures in this workflow?

**Level 0:** We have not considered how we will approach knowledge representation needed to enable automated decision support at this point.

**Level 1:** Our understanding of the need for knowledge-based decision support is not supported, resulting in inconsistent knowledge representations.

**Level 2:** We have defined some human-driven decision support rules, supported by terminology, statements, assertions, and procedural knowledge. We have started versioning knowledge sources such as value sets and coding systems.

**Level 3:** We normalize data across systems to support reasoning, and we version knowledge sources locally. We have implemented decision support with minimal human intervention, using locally managed and validated rules based on documented terminology, statements, assertions, and procedural knowledge. Our rule definitions are coupled with the rule execution environment.

**Level 4:** We add and manage knowledge sources in the enterprise-managed knowledgebase. We have automated decision support based on normalized data, utilizing enterprise-managed knowledge artifacts, and developing learning system capabilities. Our rule definitions are independent of the execution environment.

**Level 5:** We provide real-time decision support based on enterprise-managed knowledge artifacts and normalized data. Our knowledge artifacts can be shared between enterprises, and our learning system is aligned with enterprise expectations.

#### Data Quality:

Data quality is the ability of a given data set to serve an intended purpose and the ability of the data to meet business objectives. All systems must comply with the Data Governance Council data quality requirements. Data quality is also the degree to which data is accurate, complete, timely, consistent with all requirements and business rules and relevant for a given use. VA has established seven quality dimensions to frame stakeholder data quality needs which are: accuracy, completeness, consistency, timeliness, traceability, uniqueness, and validity. Each of these dimensions describes a feature of data that can be measured and assessed against a standard to determine the quality of data. Data mapping is the process of creating data element correspondence between two distinct data models and is used as a first step for a wide variety of data integration tasks, including data transformation or data mediation between a data source and a destination. Currently, how is data that is entered, processed, stored, and exchanged evaluated and managed to maintain accuracy, completeness, relevancy, consistency, and timeliness, ensuring that business needs are met in this workflow?

**Level 0:** We have not considered how data quality will be addressed at this point.

**Level 1:** We have some awareness of industry-standard data quality guidelines, but we review and assess data quality manually, requiring human subject matter expert-level intervention.

**Level 2:** We are in the process of developing an approach to align with industry-standard data quality guidelines. Our systems that produce, display, and compute data can automatically evaluate quality against locally defined criteria.

**Level 3:** Our data quality processes are documented, and we adhere to industry-standard data quality guidelines. We manage data quality at the system level using enterprise requirements. We have established processes to assess data quality for inbound and outbound data exchanges and data at rest. We are in the process of aligning data quality criteria with enterprise guidelines. We have a documented and implemented data audit process to track data quality.

**Level 4:** We manage data quality at the enterprise level to promote measurable quality improvements and highlight data quality issues across the organization. We have documented enterprise-level standards governing data quality. We share data quality issues and resolutions to improve enterprise practices.

**Level 5:** We have automated monitoring processes that produce quality outcomes, informing a continuous improvement process. Lessons learned from data quality issues influence our enterprise best practices, and we actively share our enterprise best practices to influence industry approaches to data quality. We evaluate data quality in real-time, and we have metrics in place to enable strong data governance.

#### Variable Syntax:

Syntax is data format or pre-established layout for data, such as a Clinical Documentation Architecture template or Fast Healthcare Interoperability Resource. Data syntax may vary, depending on the data's intended use or transport mechanism. Currently, how is the structure and layout of the data used for exchanges specified in this workflow?

**Level 0:** We have not considered how data exchange will be addressed at this point.

**Level 1:** We base data exchanges on agreed-upon local system data structures.

**Level 2:** We base data exchanges on standard data structure specifications using national guidelines (e.g., Meaningful Use, Cures Act, eHealth exchange, Fast Healthcare Interoperability Resources).

**Level 3:** We base data exchanges on standard data structure specifications according to our enterprise requirements, although they are still emerging.

**Level 4:** We base data exchanges on standard data structure specifications according to our enterprise requirements.

**Level 5:** We share data structure specification requirements with the enterprise for incorporation within industry standards, contributing to improving industry practices. We actively monitor data structure specification standards and developments to inform a continuous improvement process within the industry.

### Systems and Technology

VA’s Systems and Technology Pillar is about the technical functionality for delivering interoperability. This requires agreement on a core set of technical concepts, such as technical service, interface, technical components, and interactions, as well as capture of relevant technical patterns such as styles of component interactions and technical architecture styles.

#### Architecture:

Systems architecture is a set of related physical and logical representations, or views of a system or a solution. The architecture shows system and solution elements, interconnections, relationships, and behavior at different levels of abstractions and with different scopes. Application architecture describes the layout of an application’s deployment such as partitioned application logic and deployment to application server engines. Application architectures rely less on specific tool or language technology than on standardized middleware options, communications protocols, data gateways and platform infrastructures such as Component Object Model, JavaBeans, and Common Object Request Broker Architecture. The application architecture includes specifics required for deployment implementation. Currently, how is adherence to VA enterprise architecture required for structured data exchange and interoperability between systems established in this workflow?

**Level 0:** We have not considered VA enterprise architecture at this point.

**Level 1:** Our approach to systems and applications architecture that considers requirements for interoperability is ad hoc.

**Level 2:** We have an emerging awareness of Interoperability Principles, VA enterprise architecture principles, and enterprise design patterns in our systems and applications architecture.

**Level 3:** We adhere to the Interoperability Principles, VA enterprise architecture principles, and enterprise design patterns based on individual initiatives. We have documented alignment with the VA enterprise architecture to support interoperability.

**Level 4:** We have established adherence to VA enterprise architecture that supports interoperability. It is documented and aligned with our systems and applications architecture.

**Level 5:** VA enterprise architecture that supports interoperability is fully integrated across all relevant initiatives. We actively monitor and reassess it to ensure continued alignment and optimization.

#### Interfaces and Exchanges:

An interface is a shared boundary across two or more separate components of a system exchange information. Exchange is the data and information shared among systems. Currently, how are interfaces and exchanges managed to enhance interoperability in this workflow?

**Level 0:** We have not considered how we will approach interfaces and exchanges in a way to optimize interoperability at this point.

**Level 1:** We are aware of interoperability, but we have not yet defined exchange formats, interfaces, and behaviors to best support it.

**Level 2:** We are in the process of defining emerging exchange formats, interfaces, and behaviors, and we consider interoperability in our requirements.

**Level 3:** We have documented exchange formats, interfaces, and behaviors. We are working towards adhering to enterprise standards-based messaging protocols, and we are gradually establishing accountability for adhering to interoperable interface standards.

**Level 4:** Our interfaces are aligned with our business needs and VA enterprise architecture guidance. We have operationalized standardized reusable interfaces and consistently apply best practices for interoperable interface standards. We maintain consistent adherence to enterprise standards-based messaging protocols.

**Level 5:** Our interfaces adhere to industry standards, and we frequently automate essential processes. We uphold best practices for interoperable standards, monitor compliance with enterprise messaging protocols, and proactively develop new standards to bridge any gaps.

#### Performance:

Performance is defined as the total effectiveness of a system via throughput, response time, or availability. Currently, how are throughput, response time, and system availability required for business operations managed in this workflow?

**Level 0:** We have not considered how performance measures (e.g., how throughput, response time, and system availability) required for business operations will be addressed at this point.

**Level 1:** We collect performance measures for some individual projects.

**Level 2:** We have performance measurements based on our individual initiatives. We are in the process of establishing system performance requirements in individual Service Level Agreements. We are actively working on developing documented processes for failure escalation and mitigation.

**Level 3:** We have documented requirements for system performance that are reflected in Service Level Agreements. We actively monitor Service Level Agreements for compliance, and we have an established process for failure escalation and mitigation.

**Level 4:** We have an established process in place to address failures, including escalation and mitigation. We have automated measurements of system performance indicators that align with our enterprise approach. Our processes ensure compliance with performance requirements stated in Service Level Agreements.

**Level 5:** We have proactive capacity planning and system performance optimization processes in place. We monitor performance based on established Service Level Agreements and perform performance monitoring at the workflow level, encompassing multiple systems or applications.

#### Privacy and Security:

Privacy is defined as restricting systems and applications access to subscribers or relying party information in accordance with federal law, agency policy and program and dataset policy. Security is defined as a condition that results from the establishment and maintenance of protective measures that permit VA to perform its mission or critical functions despite risks posed by threats to its use of information systems. Protective measures may involve a combination of deterrence, avoidance, prevention, detection, recovery, and correction methods that should form part of the enterprise’s risk management approach. Currently, how is the privacy and security of data and information managed with increased connectivity in this workflow?

**Level 0:** We have not considered how privacy and security practices will be addressed at this point.

**Level 1:** We manage privacy and security practices mostly based on individual initiatives, and our performance depends on our individual knowledge and effort.

**Level 2:** We are aware of the expectations for privacy and security controls and tailor them to meet requirements based on our individual initiatives. We have an emerging compliance requirement that aligns with industry-leading practices and patterns. We may have dedicated cybersecurity roles or small teams.

**Level 3:** We have documented our local privacy and security specializations. Our privacy and security practices are generally considered "audit ready," and we have an acceptable level of evidence to demonstrate due diligence. We adhere to VA enterprise architecture design principles and technical reference models. We have assigned a Privacy and Security Officer and Chief Information Security Officer.

**Level 4:** We utilize privacy and security performance measures to improve our privacy and security practices. Our documented work products adhere to enterprise privacy and security frameworks, and we have IT staff that includes privacy and security specialists working with business stakeholders.

**Level 5:** We have ongoing process improvement efforts that routinely enhance our privacy and security practices. We have established quantitative performance goals, and we proactively emphasize privacy and security policies within the industry.

#### Systems and Applications:

Systems are a class of software that provide services to other software such as automation, transactions, data processing and integration. Applications are a class of software that are primarily designed to be used by people. Currently, how are systems and applications employed to support interoperability in this workflow?

**Level 0:** We have not considered how interoperability will be integrated into the systems and applications at this point.

**Level 1:** We are becoming aware of guidelines for systems and their benefits, and we recognize the need for a plan to ensure compliance with VA enterprise architecture standards.

**Level 2:** We are in the process of developing plans for system requirements to comply with VA enterprise architecture guidance. We may have project and process workarounds that exist, and we are starting to document them.

**Level 3:** We have established a documented standard systems practice, and we are documenting any existing process workarounds. Our technical artifacts are beginning to comply with VA enterprise architecture, including the procurement and development of products.

**Level 4:** Through our continuous process improvement efforts, we have significantly reduced project workarounds. Our development and procurement processes are guided by VA enterprise architecture. Our technical artifacts and requirements adhere to interoperability guidelines and are well-documented.

**Level 5:** We have eliminated project workarounds using a documented continuous process improvement plan. Our tooling and processes are entirely driven by stakeholder needs.

#### Transport and Network:

Transport is the data exchange protocols which permits data and information sharing among systems, which may be organized into a network. Protocol is a set of rules, formats, and procedures VA uses to implement and control communication among systems. The network is a group of computer systems and other computing hardware devices that are linked together through communication channels to facilitate sharing of information and resources. Networks are commonly categorized based on their characteristics. Currently, how are packet-level data exchange protocols, formats, and information sharing between systems managed in this workflow?

**Level 0:** We have not considered transport and network at this point.

**Level 1:** Our focus is on point-to-point exchange, and we may lack awareness of existing information flow, which can lead to possible duplications. We do not have formalized base practices, and the effectiveness depends on the skills of project members.

**Level 2:** Our efforts are primarily focused on individual initiatives driven by the skills of project members. While there is some recognition of standards, we are in the process of developing a formalized common approach to interface documentation, measurements, compliance, and best practices to adhere to enterprise transport standards.

**Level 3:** We monitor response times and system availability to ensure compliance and address any required mitigation as specified in the interface documentation. Adherence to transport standards is still emerging.

**Level 4:** We have documented our adherence to transport standards, and we integrate and automate measurements based on established network performance indicators. This is done using common transport and network methods following an enterprise approach.

**Level 5:** We strictly adhere to enterprise standards-based messaging protocols, and we consistently measure and monitor our compliance with these standards. Our network and transport practices have a significant influence on the industry, contributing to the development and improvement of standards.