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VA EA Architecture Development Methodology

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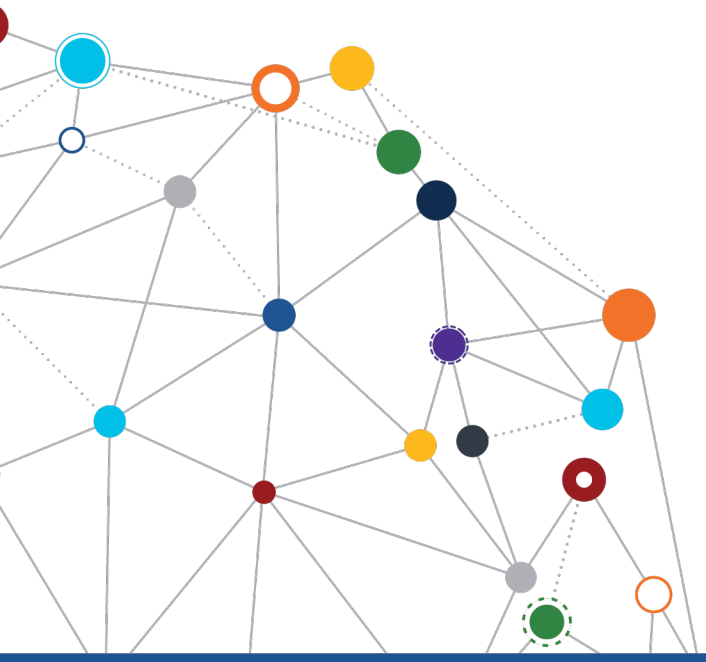

VA | U.S. Department of Veterans Affairs
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Revision History

Date of Change	Team/Individual Making Change	Description of Change
11/4/2015	VA EA Team	Initial version
11/4/2015	VA EA Team	Added VASI User Guide
12/4/2015	VA EA Team	Addressed comments from internal review
5/26/2017	VA EA Team	Major update to capture changes since 2015
4/5/2018	VA EA Team	Updates to capture changes since 2017
7/9/2018	VA EA Team	Updated VASI System Owner to VASI Information Owner
4/12/2019	VA EA Team	Annual review and update
5/15/2020	VA EA Team	Major update to capture changes driven by priority to support Portfolio and Product Line Architecture Management
6/28/2021	VA EA Team	Annual review and update to make any modifications warranted by changes in strategic direction and AES' move to the Account Management Office.
9/27/2021	VA EA Team	Updated to provide new outline to enable focus on potential new direction fr enterprise architecture. Placeholders for methods for customer engagement as well as operational guidance for architects are added. The detailed content will be added in the next revision of the deliverable.
05/31/2022	VA EA Team	Updated to reflect latest EA principles and include detailed text to address methodology for using architecture to address Customer-driven analyses.

Approval (Not applicable for this version)

Governance Body	Signature	Date
Standards & Architecture Council		
Architecture & Data Management Committee		

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1 Executive Summary

The purpose of the Architecture Development Methodology (ADM) is to communicate the definition, value, and process of architectural analyses as part of the overall enterprise architecture (EA) at Department of Veterans Affairs (VA). The core principle of the VA ADM is that the target architecture developed through this process must result in improved service to the Veteran or beneficiary or the VA stakeholder who supports benefits delivery. The ADM, therefore, provides a standardized and repeatable process to develop architectures (e.g., Enterprise, Segment) consisting of a current state, a target state and transition plans. It also provides a process for using architecture to perform analyses to address customer-driven priorities that impact the VA enterprise.

EA is a management practice focused on performance improvement through the alignment of strategic objectives, business needs, and information technology capabilities. EA helps VA identify whether its resources are properly aligned to the agency's mission and strategic goals and objectives. This document further defines EA and how it is used to make better informed business decisions that enable more effective and efficient agency performance.

An architecture development initiative is a planning and analysis effort that may result in recommendations in performance, business, data, application, infrastructure, and security improvements to be achieved in the target state. Architectures are scoped based on size, complexity, intended outcome(s) and intended uses of the resultant data and artifacts.

In addition, this document describes the methodology for conducting an architectural engagement at any level, enterprise, segment[1] or solution level. This methodology is a repeatable three-sprint process that is iterative as additional areas of the business are analyzed.

The ADM also provides a line of sight showing the relationships between the architectural layers and objects in VA. This line of sight is used to identify potential gaps, redundancies and opportunities in the business area being analyzed. Addressing these performance improvement opportunities through specific target state recommendations (epics) leads to performance and process improvements, and improved mission performance to our stakeholders.

Finally, this ADM provides guidance for using the results of the architecture efforts as well as offering "next steps" following the completion of the analysis. The epics are collaboratively managed in a portfolio-level product line backlog by the business sponsor and product line team. Target state epics are prioritized by the product line stakeholders during program

[1] There are three types of segments: 1) A core mission area segment represents a unique service area defining the mission or purpose of the agency; 2) A business service segment includes common or shared business services supporting the core mission areas; 3) An enterprise service segment includes common or shared information technology (IT) services supporting core mission areas and business services.

increments and then moved into the VA capital planning and budgeting process for funding and implementation.

2 Enterprise Architecture Background

2.1 Enterprise Architecture Definition and Value

Enterprise Architecture (EA) is a management discipline focused on performance improvement through the alignment of strategic objectives, business needs and information technology capabilities. EA facilitates the consensus and definition of the organizational future state. EA helps an organization identify whether its resources are properly aligned to the mission and strategic goals and objectives. EA is used to inform decisions about the information technology (IT) investment portfolio.[2]

The business and technical advantages that result from an enterprise architecture bring important business benefits that are clearly visible in the bottom line:

» Improved organizational performance:
  - Alignment and achievement of VA and Office of Information and Technology (OIT) strategic objectives
  - Identification of strategic, tactical, and operational performance needs
  - Providing a framework to analyze the relationships and common business needs across functional organizations
» Better return on existing investment, reduced risk for future investment:
  - Reduced complexity
  - Leverage of existing platforms and services for cost efficiency
  - Reduced overall risk

VA understands that the effective management of information is achieved through integrated teams of IT and the business. An Enterprise Architecture addresses this need, by providing a strategic context for the evolution of the IT environment in response to the constantly changing needs of the business environment.[3] Enterprise Architecture delivers value to the VA by:

» Describing the current and future state of the VA
» Identifying specific performance improvement results for VA
» Assisting in determing what resources are used to achieve measurable performance improvements for VA's core mission areas and common or shared services

[2] Office of Management and Budget (OMB), *FEA Practice Guidance*, November 2007, 1-5. https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/fea_docs/FEA_Practice_Guidance_Nov_2007.pdf
[3] OMB, *FEA Practice Guidance*, 1-5.

» Leveraging business and information management resources across the agency
» Assisting in development of a transition strategy to achieve strategic goals, objectives, and target performance improvements

2.2 Enterprise Architecture Principles

- Provide an introduction to the Architecture Principles
- Summarize the importance of the Principles
- Summarize the use within "Gateways" to achieve the intended value

VA Architecture Principles

1. **Demonstrate Strategic Alignment** – Business and IT investments must align to the strategic direction of the Department as described in the VA and OIT Strategic Plans
2. **Maximize Benefit to the Veteran and VA** – Information technology management decisions are made to provide maximum benefit to the Veteran and VA.
3. **Deploy Enterprise Systems** –Leveraging VA systems minimizes the cost of provisioning duplicative capabilities that are expensive and lead to unnecessary complexity and the proliferation of conflicting data.
4. **Control Technical Diversity** – Technical diversity increases the cost of acquisition, maintenance, maintaining expertise in and connectivity between multiple technology products and environments.
5. **Use Enterprise Services** – Utilize VA approved high performance/highly scalable services and reusable components that provide common functionality needed by services.
6. **Connect with Loosely Coupled Architectures** – Loose coupling improves interoperability, lowers maintenance costs and enables greater reuse and extensibility.
7. **Treat Data as an Enterprise Asset** – Ensure VA data is Protected, Accessible and Shared; Authorized users need to have easy access to the data necessary to perform their duties; therefore, data is made accessible and is appropriately shared across VA functions and organizations.
8. **Incorporate Decision Intelligence** – VA organizations must increase the foundational awareness of the current and emerging digital technologies that can impact an organization—including cyber security, predictive analytics, artificial intelligence (AI), social media, online collaboration, and work from home technology.*

* Ryan Kehr, "Digital Intelligence Series Part One: A New Kind of Intelligence," Harvard Business School Publishing Corporate Learning, November 19, 2020, https://www.harvardbusiness.org/digital-intelligence-series-part-one-a-new-kind-of-intelligence/.

Figure 1: EA Principles

An EA also ensures that the target state is aligned with VA's business and technology strategic direction. It is used before any specific technology solutions are considered or funded for procurement actions or in the Capital Planning and Investment Control (CPIC) processes. The

Portfolio Backlog[4] is worked actively by the Product Line Manager with assistance from the assigned AES Product Line Lead. This backlog may require additional budgeting and procurement actions prior to implementation of the backlog item. Analyses of Alternatives are conducted prior to the acquisition action.

2.3 VA ADM Methodology and Federal Alignment

To assist organizations in successfully developing, maintaining, and using an EA, the Government Accountability Office (GAO) issued an Enterprise Architecture Management Maturity Framework. The framework is composed of seven hierarchical stages of EA management maturity that are at the core of an EA program. Each of the seven maturity stages reflects those EA management conditions that an enterprise should meet to logically build on the capability established at the preceding stage. As such, the stages provide an analytical framework to systematically mature and or evolve an organization's capacity to manage an EA and deliver business results that improve organizational performance.[5] In alignment with the GAO Enterprise Architecture Management Maturity Model, ADMs fall under Level 3 (Developing Initial EA Versions) and Level 4 (Completing and Using an Initial EA Version for Targeted Results) of the seven maturity stages.[6]

The ADM also aligns with Federal Enterprise Architecture Framework (FEAF) v2 Consolidated Reference Models and defines the VA ADM for conducting research and analysis to produce recommendations and architectural deliverables. The ADM aligns with the Office of Management and Budget's (OMB's) *Collaborative Planning Methodology* (CPM) that is intended to account for the full lifecycle of analysis at all levels of scope as defined in *The Common Approach to Federal Enterprise Architecture* (CAFEA).

3 Introduction

VA's ADM leverages federal and industry best practices and aligns with OMB's Architect-Invest-Implement paradigm, as shown below in Figure 2. The ADM is used to integrate strategic drivers, business requirements, and technology solutions to support planning, decision-making, and strategic goal achievement.

[4] SAFe recommends WSJF (Weighted Shorted Job First), an assessment tool that allows the team to objectively identify which initiatives need to implemented first: https://www.scaledagileframework.com/wsjf/. This is used in the prioritization of features and use cases.
[5] U.S. Government Accountability Office, GAO-10-846G Executive Guide—Organizational Transformation: A Framework for Assessing and Improving Enterprise Architecture Management (Version 2.0), August 2010, http://www.gao.gov/assets/80/77233.pdf.
[6] Ibid.

Figure 2: OMB's Architect-Invest-Implement Paradigm

A **Segment Architecture (SA)** is a planning, research, and analysis effort resulting in recommendations for specific target state improvements to be achieved in the target state. The SA establishes a common approach for conducting architectural analyses. The SA provides guidance for architecture analyses that support the definition of a current state, target state, performance improvement, prioritization, investment, and planning decisions. Through collaborative workshops, the SA establishes or confirms the alignment of these decisions to VA's business plans and strategic goals. The methodology may be tailored in terms of process, roles, and deliverables based on size, complexity, and scope of the analysis efforts to ensure the analysis goals are accomplished. VA recognizes that "segments" can be defined at different levels (e.g., enterprise, Portfolio, Product Line/Sub-Portfolio). Additionally, analyses will be done using data and information collected at the aforementioned levels as well as at the product or solution level. The methodology provides detailed guidance for conducting these types of architectural analyses and the differences between them:

» **Portfolio Architecture:** A Portfolio Architecture is a planning effort to produce a holistic view of a business area (e.g., Benefits and Memorial Services) from an architectural perspective. The architectural perspective may address elements of strategy, performance, business, data, applications, infrastructure, and security of a given domain.
» **Product Line Architecture (PLA):** A Product Line Architecture is a focused research or planning effort where the scope can be smaller than a full product line or the full product line architecture has been completed and needs only additional details. The PLA is designed to meet the investment owners' specific technical or budget planning goals for architectural analyses of all sizes.
» **Product Analysis:** A Product or Systems Analysis is a limited-scale effort where goals, objectives, weaknesses, and opportunities are known. The Product Analysis follows the same general guidelines and principles for a PLA except some activities and deliverables may be removed due to the decreased size and complexity of the analysis scope.

4 Architect-Invest-Implement Paradigm

ADM development is a collaborative process forming a bridge between enterprise-level planning and the development and implementation of solution architecture. This process is a critical element of an integrated lifecycle process to define stakeholder requirements, drive investment, and implement business and information management solutions.

As illustrated in Table 1, below, the ADM Standard is a part of the "Architect" sprint of OMB's *Architect-Invest-Implement* paradigm. This paradigm provides the foundation for sound IT management practices, end-to-end governance of IT investments, and the alignment of IT

investments with VA's strategic goals.[7] Table 1 further illustrates the processes included in each sprint of the paradigm as well as the processes included in the transition between sprints.

Table 1: Architect-Invest-Implement Paradigm Processes[8]

Sprint	Processes
Architect from Strategic Themes and Portfolio Vision	• Develop and maintain the EA as the shared view of the current and future state of VA • Define and prioritize segments as part of the EA transition strategy defining the sequencing of SAs
	• Develop architectures to provide a bridge between the enterprise vision (EA and EA transition strategy) and the investment in, and implementation of, individual business and information management solutions
Invest – with Lean Budgets	• Define the implementation and funding strategy for solutions identified in the product line transition strategy and described in the Segment Target Architecture
	• Update the VA OMB Major Business Cases to ensure funding is requested and approved for those backlog items not funded with available funds
Implement – from Portfolio Backlog	• Execute projects according to the defined VA Development Security Operations (DevSecOps) processes • Measure performance to determine how well the implemented solutions achieve the desired results and mission outcomes and provide feedback into the enterprise and product line architecture development processes

SA work products describe detailed results-oriented architecture and a transition plan for core mission areas, business services, and enterprise services. They also drive investment planning and resource allocation for a core mission area or common or shared service. Sufficient resources are identified and justified to execute the SA recommendations and achieve measurable performance improvements.

5 Architecture Line of Sight

VA EA applies the best features of architectural frameworks including the Federal Enterprise Architecture Framework (FEAF), The Open Group Architecture Forum (TOGAF), and the Department of Defense Architectural Framework (DoDAF). TOGAF is used as a guide in the architectural development process in building the VA EA, while DoDAF is used as the guidance for building visualizations and FEAF reference models provide the taxonomy to categorize

[7] OMB, *FEA Practice Guidance*, 1-1.
[8] OMB, *FEA Practice Guidance*, Table 1-1.

enterprise assets. The FEAF architectural layers provide the basis for developing the VA enterprise architecture line of sight. Figure 3 shows a line of sight that depicts where relationships exist between the different architectural layers within VA. These layers include Strategy and Performance, Business, Data and Information, Applications, Infrastructure, and Security. Developing this line of sight is a key activity in the SA process.

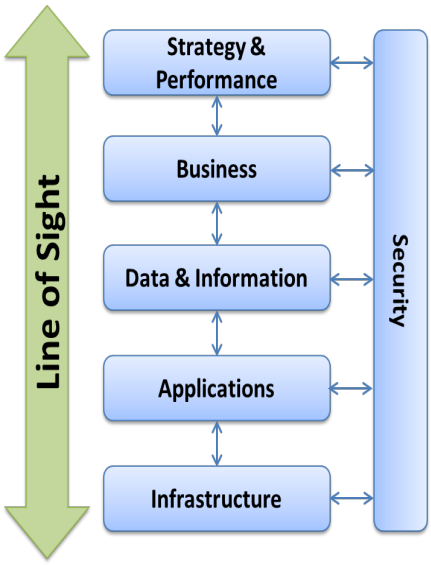

Figure 3: ADM Line of Sight

A break in the line of sight may indicate a gap potentially impacting performance, quality, or strategic goal achievement. Multiple items in one relationship may indicate overlap or redundancies. These gaps and redundancies reveal opportunities to improve or develop business capabilities that achieve strategic goals or change technology services helping VA become more effective or efficient. Managing the elements of each layer and all the dependencies which are the foundation for the line of sight is a significant endeavor requiring the support of its own information system. The system used by the VA is the VA Enterprise Architecture Management Suite (VEAMS).

6 ADM Success Factors

One of the key contributors to the success of an SA is to have a simple and concise vision for the SA defined and understand how it relates to VA's overall vision and strategic goals. Performance goals should also be defined, and progress should be monitored. The following success factors reflect VA best practices and are applied to enhance the effectiveness of the SA:

» Identify key business questions the SA should address
» Develop work products to support business questions
» Focus work product development on priority business questions

» Evaluate opportunities to increase agency and government-wide collaboration and reuse
» Monitor progress, measure performance, and verify outcomes[9]

7 Roles and Responsibilities

One of the key components to a successful SA effort is to have a clear understanding of roles and responsibilities of all the participants. Not all roles are required for each type of SA (Table 2, below) but must be considered as potential participants by the SA executive sponsor and federal AES lead when preparing for an analysis. In all analyses, the SA executive sponsor and federal AES lead work together to determine the Core Architecture Team (CAT) members required for each SA.

Table 2: SA Team Roles and Responsibilities

Role	Description	Responsibilities
Executive/ Senior Management	Senior management at VA sets agency/department and/or business strategic goals and priorities.	• Define the strategic themes, portfolio vision, business drivers, business issues, and performance goals for the agency
Segment/ Portfolio/ Product Line Sponsor/ Manager	The senior VA federal employee who identifies and secures the time of subject matter experts (SME), business, and technical personnel (including contractors) and funding for the analysis. These roles may include any combination of the following: • Business manager(s) • Department director(s) • Investment owner(s) • Program manager(s)	• Confirm CAT members and alternates • Define change drivers and business and information management requirements for SA • Identify goals, objectives, and performance measures • Alert CAT and AES to Inspector General (IG) findings, Plans of Action and Milestones (POAMs) or other concerns • Accept CAT recommendations • Executive stakeholders receive updates during regularly scheduled update meetings • Apply SA recommendations and maintain a line of sight from programs and projects to VA strategic goals and objectives

[9] OMB, *FEA Practice Guidance*, 2-6.

Role	Description	Responsibilities
Segment/ Product Line Manager and Product Line Lead	The persons assigned to manage the analysis from start to finish. These individuals are the points of contact for all other participants in the analysis. There is typically one business and one IT (EA) federal employee that co-lead the project.	• Provide leadership to guide the CAT • Provide project management support • Assist with any administrative support required from the analysis • Serve as liaison and inform respective executives and department directors
Core Architecture Team (CAT)	The team assigned to provide guidance and knowledge, to perform research and analysis, and to produce the agreed-upon deliverables. The CAT includes representatives from at least the following departments (this may change depending on the goal of the effort): • Business representatives (dependent on impacted Portfolios and Product Lines) • Account Management Office (AMO) • Product Engineering (PE) • Software Product Management (SPM) • Solution Delivery (SD) • Office of Information Security (OIS) • Office of Chief Technology Officer (OCTO) • Architecture & Engineering Service (AES)	• Share knowledge and information and serve as advocate for architecture development and implementation within VA • Support the governance structure and help promote the use of common technologies, standards, and services • Identify new performance improvement opportunities and opportunities to increase collaboration and reuse • Advocate common goals and objectives in AES and define and institutionalize sound architectural development processes • Facilitate architecture process and communications • Perform and participate in interviews and discovery • Perform analysis • Develop documentation • Provide guidance based on knowledge of overall organization • Identify stakeholders and SMEs • Represent business interests and provides subject matter expertise • Alert AES of concerns throughout analysis • Make decisions on recommendations • Communicate progress • Attend workshops and final executive briefing

Role	Description	Responsibilities
SME and Administrative Staff	Business personnel and supporting contractor staff who perform business processes, maintain IT systems, or participate in any other way in the value streams within the scope of the architecture analysis	• Participate in SME interviews and answer follow-up questions • Provide relevant subject matter expertise and documentation

Throughout the SA effort, hybrid visualizations may need to be created to accurately and succinctly portray the information desired when no core visualization will suffice. When such artifacts are necessary, the draft item will be created and passed to AES leadership for approval and use. Upon approval, a template with instructions and examples will be created and stored in VEAMS. At the appropriate forum, the use case and approved template will be briefed to AES architects. Additionally, visualizations that can be automatically generated from information stored in VEAMS will follow the templates used for that effort. If standardization of other core or non-core artifacts is warranted, proposals for standardization will be presented to the VEAMS governance entity for approval and adoption. All visualizations will include the existing legend used for the core visualizations, which is centered at the lower edge along with the explanation call-out box which is located at the upper right corner. Both the legend and the call-out box contain standard and customizable information the architects are responsible to enter. These standard information blocks will be on each visualization.

8 VA Architecture Development Methodology

The VA ADM is an adaptable process that employs architecture principles, practices, and analysis techniques to yield business-outcome-driven EA. Business-outcome-driven EA is a significantly more consultative and collaborative approach focused on delivering business value and increased business and IT agility[10]. The ADM does this by focusing on understanding the ultimate goals and objectives of the architecture efforts and identifying and continuously collaborating with the effort's stakeholders (i.e., roles as listed in Table 2: SA Team Roles and Responsibilities). The methodology supports three types of architecture efforts: Segment Architecture (SA) Development, Customer-Driven Analyses/Architecture, and Enterprise Architecture Development. SA development includes three sprints which are described in detail in the subsequent sections. Customer-driven analysis and development is very similar to SA development as it includes similar sprints and reuses many of the SA practices and products, but usually in support of smaller scoped efforts. The overall EA development process emphasizes cross-portfolio needs and "builds out" the EA as a by-product of leveraging the

[10] Gartner, Inc | G00344141 Build a World-Class Discipline for 2018

information and artifacts generated via the Segment and customer-driven architecture efforts. Figure 4 ADM: 3 Adaptable Methods in One displays the adaptable process and its variations in support of the three different types of architecture efforts.

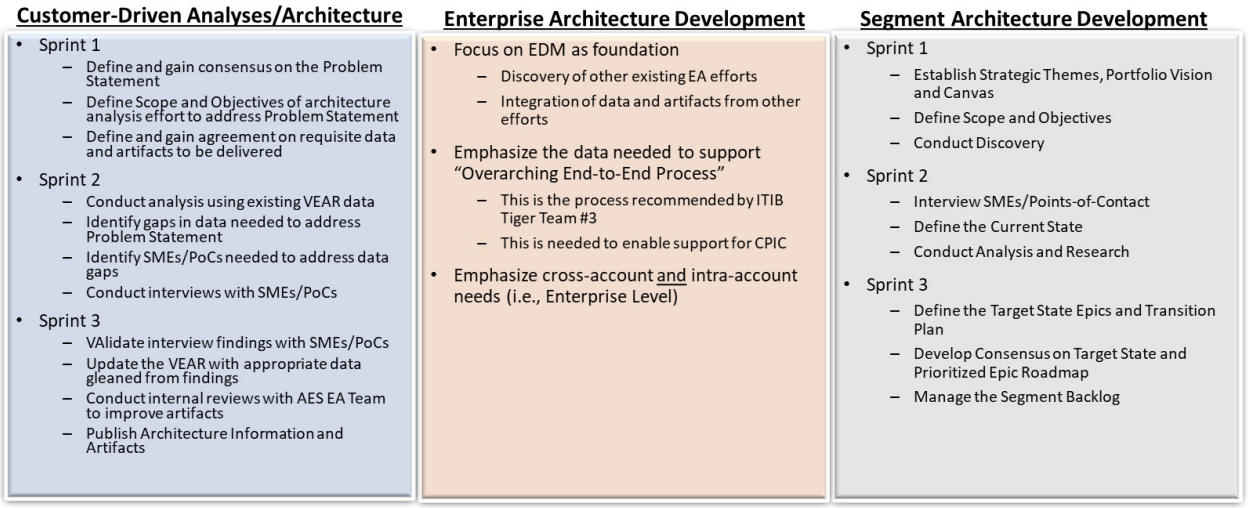

Figure 4 ADM: 3 Adaptable Methods in One

The ADM helps improve the VA EA program's maturity and effectiveness in developing solutions to strategic and tactical business needs that support planning, decision-making and organizational performance improvement. The role of AES is to "provide facilitation and integration to enable this collaborative planning discipline, and work with business and IT subject matter experts from these planning groups in order to formulate a plan of action that not only meets needs, but is also implementable within financial and organizational constraints."[11]

The VA EA Repository (VEAR) is used throughout an architecture project, as both a source for information and as a repository for data generated during the analysis. A common repository ensures consistent naming of enterprise assets and objects between architecture projects and a consistent look and feel to the artifacts produced. The consistency makes for a more efficient consumption of enterprise architecture information for all stakeholders.

9 Scaled Agile Framework (SAFe) and Enterprise Architecture

Scaled Agile Framework (SAFe) enables business agility and improving business outcomes for organizations of all sizes. SAFe has produced improvements in time to market, employee

[11] Office of Management and Budget (OMB), *The Common Approach to Federal Enterprise Architecture (CAFEA)*, May 2, 2012, 15. https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/egov_docs/common_approach_to_federal_ea.pdf.

engagement, higher quality, higher customer satisfaction, and overall improved economic outcomes and mission effectiveness for organizations that implement it successfully. These are the same outcomes that enterprise architecture defines through the ADM process. The VA ADM has leveraged the SAFe framework to guide development of segment future states that encompass both value streams and solutions.

In SAFe, the enterprise architect collaboratively establishes a technology strategy and roadmap that enables a portfolio and product lines to support current and future business capabilities. They drive design, engineering, reuse, and application of patterns, and create enabler epics for the architectures that comprise the solutions in a portfolio. Relying on continuous feedback through the agile team approach, the architects foster adaptive design, and engineering practices, and drive programs and teams to rally around a shared technical vision. This is accomplished through a collaborative and consultative process described in the ADM. The enterprise architect must work closely with all stakeholders of a given product line or analysis area to develop the target state that is defined in epics.

10 Methodology for Conducting a Segment Architecture Analysis

As shown in Figure 5: Three Sprints of SA Methodology, there are three sprints within the SA development methodology. The following subsections describe the high-level purpose, goals, and activities associated with each of the three sprints.

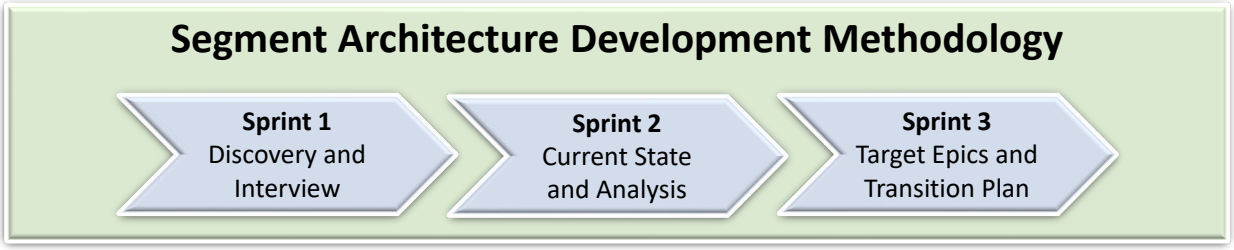

Figure 5: Three Sprints of SA Methodology

10.1 Sprint 1: Discovery and Interview

The **Discovery and Interview Sprint** contains the first three steps of the methodology, and ensures "leadership, stakeholder, and customer needs and the operational requirements are validated so that ultimately, all stakeholder groups are working towards the same, well understood, validated outcome".[12]

[12] OMB, *CAFEA*, 17.

Step 1: Establish Strategic Themes, Portfolio Vision and Canvas

The Segment Leads, in collaboration with Portfolio and Product Line Managers and other stakeholders, start with the strategic themes identified by Executive or Senior Management. The strategic themes should connect the segment to the VA enterprise and OIT strategies. Strategic themes are specific, differentiated business goals that communicate aspects of strategic intent from the enterprise to the segment. Then based on the strategic themes, the Segment Leads with the Portfolio and Product Line Managers formulate the Segment vision. The segment vision describes the future state of the segment in areas of people, process, and technology.

Portfolio Canvas is a type of Business Model Canvas that has been adapted to describe the structure and purpose of a SAFe portfolio. The portfolio canvas describes how a portfolio of solutions creates, delivers, and captures value for an organization. It also helps define and align the portfolio's value streams and solutions to the goals of the enterprise.

The portfolio canvas (Figure 5) defines the value streams, the value propositions, and the solutions they deliver, the customers they serve, the people who play the primary roles in Lean Portfolio Management (LPM), the budgets allocated to each value stream, and other key activities and events that occur at the portfolio level. It helps streamline planning, development, and execution across the portfolio, aligning everyone's objectives and facilitates team communication and the exchange of new ideas.

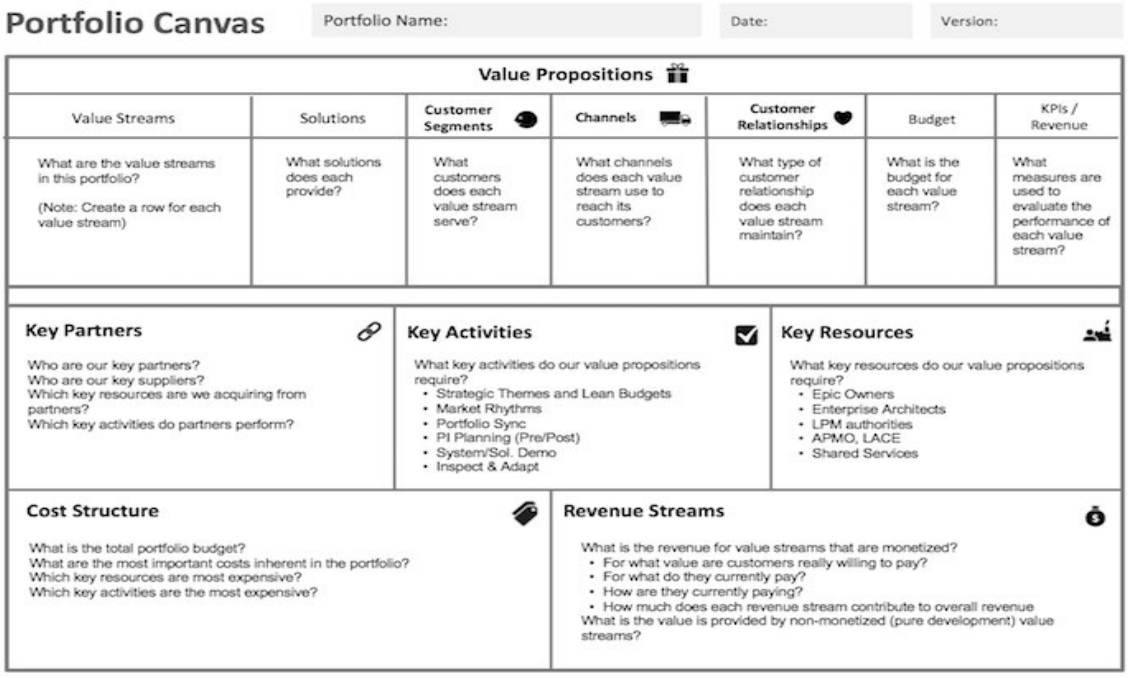

Figure 6: Portfolio Canvas

The data in the canvas are considered "primitives" in the Zachman EA framework. Once the data is collected, models can be built that represent the high-level operational view of the portfolio or product line. The canvas by itself is not a current state. Additional data gathering,

modeling and analysis is required to create current and target architectural states that drive the description of epics.

Step 2: Define Scope and Objectives

The purpose of this step is to provide a foundation for all upcoming portfolio SAFe activities in the product line analysis and gain approval of the high-level goals, scope, and deliverables for the scoped effort. During Step 2, the CAT prepares, conducts, and follows up on all tasks related to the first workshop (Workshop #1), which is considered the kickoff meeting.

Prior to the kickoff meeting, with the assistance from the SA Executive Sponsors, the SA Leads identify the scope of the architectural analysis to be conducted. Will it encompass the entire portfolio, a product line or portion thereof, a specific product, value stream or be more systems oriented? The SA Leads and sponsors also identify CAT members (business and OIT representatives) who will support the SA. The SA Leads also develop the kickoff presentation that includes information about objectives, scope, roles and responsibilities, and a high-level timeline. Once the CAT members are identified, the CAT works to socialize the approach with executives from OIT and the business product line(s) involved in the analysis to ensure buy-in on the objective, approach and resulting deliverables. The CAT also researches previous applicable analyses, including known opportunities and issues, and the status of the recommendations to ensure organizational elements substantially impacted by the effort are represented within the effort. During the SAFe Overview meeting, the CAT validates the information such as the strategic themes, portfolio vision, and portfolio canvas.

After the kickoff meeting, Workshop #1, the CAT is responsible for all the follow-up activities, including collecting contact information for the overall SA Team members, back-up alternate(s) information, and black-out dates; updating the timeline based on the outcome of the kickoff meeting; and uploading all the post-kickoff deliverables to a designated CAT collaboration space.

Key questions addressed within this process step include:

» Who is the executive sponsor(s) and key stakeholders?
» Who is on the CAT? Are these the right people?
» Are upstream and downstream departments, stakeholders identified and represented?
» Are there external stakeholders involved?
» Who is the customer(s) served within the scope of the product line under analysis?
» What are the frequency and dates of the CAT meetings? Executive sponsor briefings?
» Who are the relevant SMEs to interview to further understand the product line?

VEAR Integration:
The SA Leads will query VEAR for existing information prior to kickoff. Queries will vary depending on SA type but will generally follow line of sight from the topic in focus to impacted organizations, business processes, data, and applications. Some queries are in the form of predefined reports. To date, OV-1s and SV-1s have been completed for each product line. These are simply the start of the data gathering required to perform architectural analyses. The SA Leads may also use VEAR ad hoc query capabilities. The SA Leads will review the VEAR data to

help frame the scope and identify CAT members. This information is shared with the CAT to understand the current state and develop interview questions and data gaps that need to be gathered.

Deliverables: SAFe Overview Kickoff Presentation: Articulates the scope and issues that the product line architecture will address. Guides the CAT in the development of the product line architecture. Includes CAT roster, stakeholders, project milestones and dates, executive sponsor briefings. At the kickoff meeting the SA Leads gather the SME names and availability to enable interviews as quickly as possible. Provide any additional information at the kickoff meeting to ensure stakeholders have data for review as early as possible.

Step 3: Conduct Discovery

The purpose of the Discovery step is for the CAT to discover and review relevant data and documents necessary for the current state analysis and validate the information with the SA Executives and Leads during the kickoff meeting. This enables the definition of the current state of the business area under analysis in future steps.

During Step 3, the CAT reviews all relevant data and documentation as well as federal and industry best practices. The team creates an inventory of reviewed deliverables for tracking purposes. Basic architectural information that may be gathered include:

» VA and IT Strategic Goal Alignment
» Portfolio Strategic Themes
» Performance measures
» Business functions and processes
» Roles, policies, and directives
» Cost and cost drivers
» Systems
» Data and Information
» Infrastructure and network
» Information security
» Other human, technical and financial resources
» External drivers and stakeholders
» Political, Economic, Social and Technological (PEST) Analysis

Also, during this step, relevant information regarding emerging technologies, external business trends, and business models are identified and gathered. As part of this step, the CAT may identify external organizations and service providers that may have already met, or are currently facing needs similar to the ones identified in Sprint 1, and then analyze their experiences and results to determine if they can be applied and leveraged or if a partnership can be formed to address the needs together."

Relationships between the gathered data will be developed in the following steps.

10.2 Sprint 2: Current State and Analysis

Step 4: Interview

The purpose of the Interview step is to validate, clarify and elaborate on data gathered in Step 3 and gain a thorough understanding of products, solutions, services, performance, business processes, supporting technology, data interfaces, security, and infrastructure resources that will identify and confirm the relationships between the data points in the architectural layers. Most of the interviewees are identified by the SA Leads and representatives from the OIT pillars **are always** interviewed for each SA.

During Step 4, the CAT:

» Prepares interview questionnaires
» Finalizes the SME interviewee list
» Identifies deliverables that may be impacted
» Schedules interviews

The SME interviews, in conjunction with the information gathered during the Conduct Discovery Step 3, help the CAT gain a holistic assessment of the current architecture, including insights into challenges and benefits pertaining to the way the business currently functions. They also help determine any performance gaps and/or business needs to support development of a Current State Observations Report.

During this step, the CAT engages with key stakeholders to produce and gather data about the current state and strategic improvement opportunities for the product line. Key questions addressed within this process step include:

» Who are the segment (process, application, data) stakeholders and what are their needs or pain points?
» What performance issues, if any, are exhibited in process, value streams, systems, or data?
» Does this existing technology infrastructure support the current business needs well?
» How does this product line align to the corporate strategy? How does it impact the corporate strategic performance, if at all?
» What are the known strategic improvement opportunities and gaps?
» What are the major common and mission functions and services associated with the segment?
» What are the business processes under review? Is there process documentation?
» What are the process actual and target performance measurements?
» How many employees and contractors are involved in these processes?
» What information systems or applications support these processes?
» How do these applications share information? How does data flow throughout the business process(es)?
» What are the internal and external policies, directives and standard operating procedures that impact the product line?

- What are the product line current investments, systems, projects, and resources? How do these align to strategy and process?
- What is the state of the underlying technology infrastructure of the product line's applications and systems? What are the components of each application?
- What data is exchanged by the in-scope applications, and how?
- What are the deficiencies or inhibitors to success within the segment?
- Are there any documented findings, critical deficiencies, or POAMs related to this segment?
- What is the target state vision for the segment?
- What is the performance architecture for achieving the target state vision?
- Are there any technologies that are obsolete or processes that are not supported by technology? Are there technologies that are in use in the segment that are not in an approved status on the VA Technical Reference Model (TRM)?

VEAR Integration:
The SA data gathered in the previous step is used to formulate interview questions and identify data gaps that need to be gathered during the interview step. Interview notes are kept outside of VEAR to protect interviewee anonymity.

Deliverables: Approved Interview Questionnaire(s), Transcripts, and aggregated interview responses with response analysis.

Step 5: Define the Current State

The purpose of Step 5 is to review documentation; identify gaps, redundancies, and opportunities; complete the development of the current state architecture; and validate all previous documentation with the SA Leads. This should be done within a workshop forum, Workshop #2. During Step 5, the CAT completes the current state architecture. The current state architecture includes the relationships between the architectural data gathered. As the gaps, opportunities and redundancies are documented, the CAT continues to perform research and apply industry and federal best practices, emerging and state-of-the-practice technologies, and emerging business models and trends for application in the VA environment. Alignment of business requirements to corporate and IT strategic plans is also conducted during this step.

This current state relationship description creates an objective, fact-based model of the current state environment. This model is analyzed by the team to identify gaps, redundancies, and opportunities to improve performance. The CAT identifies high-level gaps in business processes, performance, data, technology, and security areas and, in some cases, may identify preliminary areas of process improvement that may include technology enhancements and any security considerations. When the recommendation is to apply process improvements or information technology to existing or new business processes, the as-is and the to-be process states must be documented with relevant aspects of actual and target performance criteria. The places where technology is applied and the integration points with up-and downstream processes must also be documented.

When business processes are considered or redesigned, the CAT must ensure that the internal controls that govern the process are also considered, analyzed, redesigned, and automated as necessary. Questions that may be answered during this step include:

» To what extent do the product line value streams, processes and systems have a measurable contribution to strategic goals?
» Which value streams and business process have documented workflows?
» Does the business area in question have their own strategic or tactical plan?
» What are the strategic goals of the organization, portfolio or product line under analysis?

Once current-state architecture diagrams are created, a workshop (Workshop #3) is held to validate stakeholder understanding, answer any questions, and collect feedback. At the conclusion of Workshop #3, all stakeholders should have a clear understanding of the current state and an idea of what may be leveraged in preparation for developing the Target State Architecture. The CAT then incorporates any feedback for the final validated Current State Architecture Diagrams.

VEAR Integration:
VEAR reports and visualizations are used to identify gaps and ambiguities in the data from the previous step. They are used as tools when the CAT seeks clarification from SMEs. Feedback is continually recorded in VEAR until the current state is ready to be presented in Workshop #3. The updated Current State Architecture Diagrams and other information is created from VEAR for use in the workshop presentation.

Prospective Deliverables: Current State Architecture. The current state may include the following:

» **Segment architecture vision summary**: Summarizes the purpose, scope, mission, and target vision for the product line, in text and visual forms.
» **Segment performance goals and objectives**: Establishes the key performance indicators, measures and metrics that will be used to measure the achievement of product line goals and vision.
» **Strategic improvement opportunities**: Identifies internal and external factors that affect the achievement of the product line purpose statement. Prioritizes performance improvement opportunities and aligns them with the business needs of the organization.
» **Common/mission services target maturity levels**: Establishes the target maturity levels required to achieve the product line vision according to product line strategic performance goals and objectives.
» **Performance scorecard:** Includes strategic, business, program and product line performance data.
» **Performance gaps**: Identifies current state performance gaps to facilitate prioritization of performance improvement opportunities.
» **Risks and impacts**: Identify potential high-level risks and impacts associated with the product line scope and context, including risks not addressed optimally by the current environment.
» **Current state business value chain**: Identifies the high-level logical ordering of the chain of processes that deliver value.

- **Current state business function models**: Identifies the business functions that will be affected by potential process improvements. Ensures that processes are analyzed in context with the correct business functions and that appropriate mappings to the VA Business Reference Model (BRM) are established.
- **Current state business process models**: Defines processes that may require process optimization. Assists in determining high-level information and information security requirements.
- **Current state business process swim lane diagram**: Defines processes that may require process optimization. Assists in determining high-level information and information security requirements.
- **Current state key information sources and qualitative assessment**: Documents the sources of information in the current state and determines the most trusted sources of data by information class and data entity.
- **Business and data architecture adjustment profiles**: Groups related opportunities and formally documents the limitations of the current state, desired characteristics of the target state, how the target state will help achieve strategic improvement opportunities, and risk and cost considerations.
- **As-Is system and services scoring:** Determines where adjustments to the product line systems and services architecture should be investigated.
- **As-Is conceptual solution architecture:** Shows the existing systems and services in the as-is state and identifies the relationships between them. May also include an overlay to show the boundaries of key business functions and external organizational interfaces.

Once the current state is completed a series of analytic techniques is applied to determine opportunities for performance improvements that are used to inform the target state.

Step 6: Conduct Analysis and Research

The purpose of the Conduct Analysis and Research step is to solidify the understanding of the current state to inform the desired outcomes of the target state (e.g., performance improvements).

During Step 6, the CAT:

- Organizes the information that was gathered
- Reviews interview transcripts and information provided by interviewees
- Maps information and relationships to the architectural layers (e.g., performance, business)

The CAT leverages the guidance in this process step to engage with key stakeholders to analyze the product line business and information environments and determine the business and information improvement opportunities that will achieve the target architecture. Within this step, the architect begins by developing a broad, holistic view of the overall business and information requirements associated with the strategic improvement opportunities identified in the previous step. Information requirements may include the information exchanges that relate to the critical business processes associated with the performance improvement opportunities. The business and data architectures are derived from these requirements. The business and data architectures developed at the end of this step may include the specification

of business and information services, respectively, and should be sufficiently complete and actionable to result in more efficient processes and allocation of resources. Key questions addressed within this step include:

» How well does the current business and information environment meet the needs of the segment stakeholders?
» What are the known business process and technology issues?
» Have the segment's goals and performance objectives been translated into actionable and realistic target business and data architectures expressed within business functions, business processes, and information requirements?
» Have the business and information requirements been analyzed and documented to the lowest level of detail necessary to form actionable recommendations?
» How should the target business and information environment be designed?
» Did the business and information analysis provide a synchronized and cohesive set of recommendations?
» Does the CAT understand the adjustments that are required for the current business and information environments to fulfill the target performance architecture?

After completing a detailed analysis of the observations, the CAT then prepares for Workshop #4, where they introduce architecture concepts and alignment to architectural layers (including performance, people, process, data, security, and technology), and present the interview findings and information mapping of the data gathered to the architectural layers.

10.3 Analytic Techniques

A variety of different techniques may be applied in analyzing the current state to develop target state epics. Below are some of the techniques the CAT may choose to apply.

» **SWOT**
SWOT analysis is a compilation of an organization's strengths, weaknesses, opportunities, and threats. The primary objective of a SWOT analysis is to help organizations develop a full awareness of all the factors involved in making a business decision. This is applied at the segment level.

» **SIPOC**
SIPOC stands for Supplies, Inputs, Process, Outputs and Customers and is a tool that summarizes the inputs and outputs of one or more processes in table form. This is applied at the value stream level.

» **A3 Lean**
A3 problem solving is a structured problem-solving and continuous-improvement approach, first employed at Toyota Motor Corporation and typically used by lean manufacturing practitioners. It provides a simple procedure that guides problem solving by workers. The approach typically uses a single sheet of International Organization of Standardization (ISO) A3-size paper, which is the source of its name. This is applied at the value stream level.

» **Maturity Models**
A maturity model is a tool that helps people assess the current effectiveness of a person or group and supports figuring out what capabilities they need to acquire next to improve their performance. This is applied at the segment level.

» **Benchmarks**
Benchmarking is the practice of comparing business processes and performance metrics to industry bests and best practices from other companies. Dimensions typically measured are quality, time, and cost. Benchmarking is used to measure performance using a specific indicator (cost per unit of measure, productivity per unit of measure, cycle time of x per unit of measure, or defects per unit of measure) resulting in a metric of performance that is then compared to others.

» **Value Stream Mapping**
The Portfolio/Product Line Canvas feeds the Value Stream Map, and the Value Stream Map feeds the creation of the Agile Release Train. Value stream mapping is a lean enterprise technique used to document, analyze, and improve the flow of information or materials required to produce a product or service for a customer. A value stream map (i.e., end-to-end system map) considers not only the activity of the product, but the management and information systems that support the basic process. This is useful when working to reduce cycle time, because you gain insight into the decision-making flow in addition to the process flow.

» **VEAR Integration:**
Data gathered during the interviews and analysis is updated in VEAR[13]. This results in a continually updated draft of the current state architecture data in VEAR. VEAR is then used to produce current state views.

Deliverables: Current state perspectives.

10.4 Sprint 3: Epics and Transition Plan

Step 7: Define the Epics and Transition Plan

The purpose of this step is to begin development of the target state and Transition Plan and validate these documents with the SA Leads at Workshop #5. On this step, the CAT presents a suggested prioritization of target state (SA) recommendations to the SA Executive Manager and Leads. In addition, the CAT identifies which target state recommendations require an alternatives analysis and rough order of magnitude (low and high bounds) on potential implementation costs, if possible. SA recommendations may address the people, process or

[13] This statement applies to only the data for which the VEAR is the authoritative source. In many cases, Architects will have to collect information from additional sources which means that updates to these sources may also have to be made by the appropriate owners of the sources.

technology areas. Business unit stakeholders and business program managers need to schedule and fund non-IT related SA recommendations that focus purely on people and process.

Roadmaps consist of the high-level product line themes or analysis areas activities and key milestones to be accomplished overtime, identified with specific start and end dates of key or critical path target state recommendations. Roadmaps must also illustrate dependencies within the given segment and to external drivers and projects.

Once the Target Architecture artifacts and Modernization Roadmap are complete, Workshop #5 is held to validate the CAT's understanding, answer any questions, and collect feedback. During Workshop #5, the CAT helps the SA Leads build consensus and facilitates the approval of the target architecture and its recommendations. [14]Upon approval, a supporting narrative, including performance measures and success criteria, is added to finalize the Target Epics and the Transition Plan.

The CAT leverages the guidance in this process step to engage with key stakeholders to produce the segment target architecture. The segment target architecture is an integrated view of the combined performance, processes, systems, services, and technology architectures that support the target performance, business, and data architectures developed in the preceding process steps. The segment target architecture produced at the end of this step is of benefit to executives and business managers, solution architects, as well as to downstream capital planning and budget personnel. Key questions addressed within this step include, but are not limited to, the following:

» How should the conceptual target architecture be designed to fulfill the target performance architecture?
» Are the selected target systems, components, and services reusable?
» Does the target segment architecture support the target performance, business and data architectures developed in prior steps?
» Have the dependencies, constraints, risks, and issues associated with the transition been analyzed to identify alternatives to be considered?
» Are there existing external services (e.g., federal shared services) that could be leveraged in the target architecture?

VEAR Integration:
The draft target architecture is modeled and updated in VEAR as a set of related new and existing objects. New objects (including relationships) are marked as tentative and planned, as they are expressions of a future state and not yet approved.

[14] The existing governance construct identifies the Standards & Architecure Council (SAC) as the entity that approves the VA EA and thus the target architecture described therein. This may change in the near-term due to the Architecture & Engineering Service's (AES) placement under the VA Office of the Chief Technology Officer (OCTO).

Replacement relationships are created between target objects and current state objects that are intended to be replaced. This allows for architecture evolution views.

Relationships are created between target objects and the recommendations recorded in the Analysis step. This allows for a line-of-sight report that ties issues, recommendations, and the target state architecture, thus providing traceability that validates the target state.

Prospective Deliverables: Workshop #5 Presentation, Target State Architecture, Epics and Transition Plan.

Target state deliverables may include:

» **Target state business value chain diagram**: Identifies differences in the processes that are currently being provided between the current and target states. Helps determine where new processes are required and where existing processes may no longer be necessary.
» **Target state business function models**: Identifies the business functions that will be affected by potential process improvements. Ensures that processes are analyzed in context with the correct business functions and that appropriate mappings to the Federal Enterprise Architecture (FEA) BRM are established.
» **Target state key business process models**: Defines optimized processes as required to achieve product line performance objectives. Assists in determining high-level information and information security requirements.
» **Target business process swim lane diagram**: Defines optimized processes as required to achieve product line performance objectives. Assists in determining high-level information and information security requirements.
» **Target state conceptual data model**: Provides the structure and terminology for information and data in the target environment. Includes subject areas, information classes, key entity types, and relationships.
» **Target data steward assignments**: Identifies the organization responsible for the creation, maintenance, and quality of each information class appropriate to support business activities in the target environment.
» **Target state business data mapped to key business processes (Create, Read, Update, Delete, or CRUD)**: Helps identify candidate information services, including new authoritative data sources, and producers and consumers of information.
» **Target state information sharing matrix**: Assists in discovery of opportunities for reuse of information in the form of information-sharing services, within and between product lines or business units.
» **Target state Information Flow Diagram**: Assists in discovery of opportunities for reuse of information in the form of information-sharing services, within and between product lines or business units.
» **Target State Technical Architecture**: Shows the future state of technology components that support service delivery for each service component. The Target State Technical Architecture comprises but may not be limited to the following:
  - **Target state conceptual solution architecture**: Shows the proposed systems and services in the target state and identifies the relationships between them. May also include an

overlay to show the boundaries of key business functions and external organizational interfaces.
  - **Target State Service Component Architecture**: Describes service components and the mechanisms for providing service delivery to customers. Provides a framework and vocabulary for guiding discussions between service providers and consumers.
  - **Target Platforms**: Describes the different platforms [15]that have been deemed the standard or preferred technologies to be used in new solutions or to modernize existing solutions.
- **Integrated service component and technology model**: Shows the service-to-service interaction, supporting technical components, and information flows associated with each service component.
- **Epic Sequencing Roadmap**: The single, consolidated diagram that shows the transition recommendation sequencing milestones for an implementation alternative.
- **Reuse Summary**: Describes segment reuse of business, system, and service components from other product lines and by other segments.
- **Data Reuse**: Describes segment reuse of information exchange packages and data entities from other segments and by other product lines.

Step 8: Develop Consensus on Target State and Prioritized Epic Roadmap

The purpose of this step is to ensure there is agreement on the segment epics and the sequencing plan to implement the epics. The SA Leads share these deliverables with the CAT and collect feedback and iterate on the quality of the deliverables.

During Step 8, the CAT facilitates a meeting with the Executive Sponsors, which introduces the Executive Briefing presentation and the Recommendations Report. This step is optional if the Executive Sponsors have been briefed throughout this process and agree with the epics and proposed sequencing. The Executive Sponsor Briefing provides an overview of the baseline, identifies gaps and pain-points, defines benefits related to modernization, and highlights recommendations and key next steps. Note that epics in the Target State Transition Plan typically span a strategic time horizon on the order of three to five years, though each CAT needs to determine the appropriate time frame for their segment. During this step, the SA Leads and CAT conduct practice sessions or dry-runs for the Executive Briefing presentation to improve the value of the presentation and increase the probability of success of the effort.

Key questions addressed within this step may include, but may not be limited, the following:

- Have the strategic improvement opportunities been supported in the analysis, recommendations, and transition planning?
- Have the findings from the previous process steps been identified, categorized, and prioritized?

[15] Examples of current platforms are Health Data and Analytics Platform (HDAP), AWS Analytics, Palantir, Salesforce, ServiceNow, Microsoft Dynamics

» Have the transition options been analyzed for costs, benefits, and risks to develop recommendations for implementation?
» Are the recommendations clearly described in the segment architecture analysis document?
» Has the Product Line Architecture analysis document and transition plan been reviewed and approved by the executive sponsor, business owner(s), and SA Leads?

VEAR Integration:
Reports and visualizations, such as issue and recommendation lists, as well as Current and Target State Architecture Diagrams, are generated for use in the briefing. Once approved by the Executive Sponsors.

Deliverables: Recommendations Report, Target Narrative and Executive Sponsor Briefing. Additional work products may include:

» **Segment architecture blueprint document** (includes transition plan): Narrative description of the overall product line transition plan that is focused on implementation of the business transformation recommendation. Contains descriptions of some of the key analysis performed in prior process steps.
» **Proposed implementation recommendations:** Comprises the set of implementation recommendations that are used to develop the recommended high-level implementation plan.
» **Recommendation implementation sequencing plan:** Sequencing plan that includes all tasks associated with the overall transition of business processes, systems, and services to achieve the target state. Identifies internal and external dependencies as milestones or predecessor tasks.
» **Transition Plan Milestones:** Provides the implementation and performance improvement milestones for the segment transition plan.
» **Analysis of cost, value, and risk for transition options:** Informs the prioritization (selection and sequencing) of transition options to formulate a set of implementation recommendations.
» **Feedback tracking document and feedback action report**: A log used to record feedback and document and track follow-up actions.

Present to Segment Sponsors (Optional)

The purpose of the Present to Segment Sponsors step is to help facilitate the Segment Executive Briefing and collect signatures from SA Leads and SA Executive Sponsors. If the Executive Sponsors have been briefed throughout this process and agree with the epics, then the meeting may not be necessary.

The CAT members from the business unit facilitate practice sessions with the entire CAT, including one-on-one preparation sessions with CAT members (as needed), and provide any additional support that is needed. Once all documents have been approved by the CAT, the SA Executive Sponsor/Owner and the Federal Lead provide a pre-briefing to the Executive Sponsor and key stakeholders to highlight the results of the analysis. The Portfolio Executive Briefing is then conducted, and if applicable, security aspects of the target architecture will be briefed by

the security team member of the CAT. Following the Segment Executive Briefing, the CAT delivers the final Recommendations Report to the SA Executive Sponsor and other executives for formal acceptance and signoff. The review period for the Executive Briefing will depend on the size and scope of the effort.

VEAR Integration:
Reports and visualizations, such as issue and recommendation lists, as well as current and target state architecture diagrams are generated for use in presentations.

Step 9: Manage the Segment Backlog

The Segment Backlog is part of the Segment Kanban Board and provides an online management area for upcoming business and enabler epics intended to create and evolve a comprehensive set of recommendations that realize the target state. Segment epics are developed, managed, and made visible through the Portfolio Kanban. Approved segment epics move to the Segment Backlog where they await implementation.

The Segment Backlog holds epics that have been approved and prioritized for implementation. Due to their scope and typically crosscutting nature, segment epics usually require substantial investment and have a considerable impact on both the development programs and business outcomes. Therefore, segment epics are analyzed in the portfolio Kanban to establish feasibility, a Lean business case, and a Minimum Viable Product (MVP). Not all epics result in software development. Some epics may be focused on business process improvement, data, security or other non-system or solution related requirements.

Once an SA is finalized and approved by the SA members, the recommendations are provided to the business owner for prioritization, budgeting, and implementation.

SA recommendations are owned by the business unit that sponsored the analysis or the business unit(s) identified that has already agreed to own the recommendation. SA recommendations are planned, prioritized, and funded by the owning business unit in conjunction with the appropriate IT Portfolio Manager(s) through the annual IT Program Plan Prioritization and Budget process. The business owner and business program manager should consult with the associated IT program manager(s) and Procurement Department in obtaining budgetary quotes to facilitate the IT budget process through the appropriate IT governance entity[16].

Each year business program managers must plan funding for and prioritize SA recommendations associated with their IT Program Plan.

Any prioritization or reprioritization of the recommendations made by business owners or sponsors should be communicated to EA for documentation and tracking purposes. EA

[16] The OIT Governance structure is being revised as of the time of this deliverable. For example, this function would fall within the scope of the Program & Acquisition Review Council (PARC) and its supporting committees. The appropriate council and committee will be inserted once the governance structure is finalized.

conducts an annual review of the recommendations with the business owners to assist them with a status check as well as any necessary realignment to the SA.

Lessons Learned
The purpose of this step is to conduct a lessons learned session with the CAT members.

The SA Leads communicate the positive aspects and improvement areas and solicit feedback from the CAT. At the conclusion of the analysis, all approved deliverables will be posted to the appropriate VA-wide collaboration location (electronic and/or hard copy). A lessons learned session is conducted with the CAT members to identify whether the product line objectives were met, what went well, what can be improved for the future.

Deliverables: Lessons learned document; lessons learned added to AES Lessons Learned Repository; approved target state narrative and Executive Sponsor presentation added to the SA Library page on the EA intranet.

11 Methodology for Conducting Customer-Driven Analysis/Architecture

Customer-driven analyses and architecture efforts are performed to address more specific problem spaces as identified by the organization or role requesting the support. This type of effort may be conducted to support enterprise initiatives identified by the PDAS and C-level roles (e.g., SAH/SHA - Special Adapted Housing / Special Housing Adaptation) or lower-level priorities that may be identified by Portfolio Directors, Product Line Managers, or business customers (e.g., HR Standard Onboarding Process). The methodology for addressing this type of effort also comprises three sprints and reuses many of the analysis techniques and artifacts used within the SA methodology. Figure 7: Three Sprint Customer-Driven Analysis Methodology displays the methodology followed by summaries of the different activities performed within each sprint. Areas where the activities parallel the SA methodology are referenced as such and not repeated.

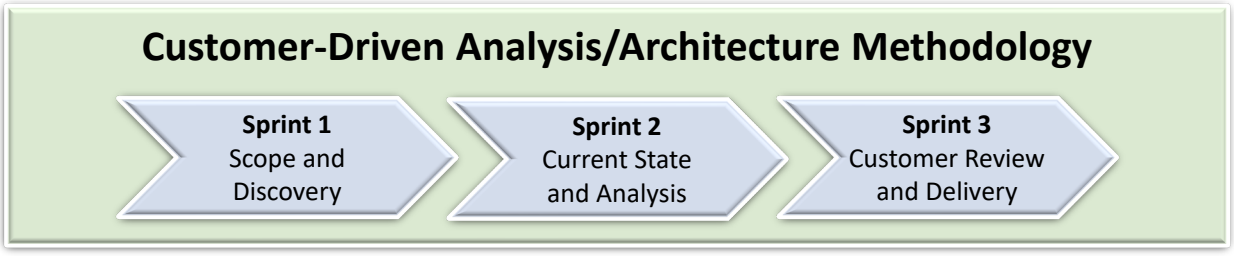

Figure 7: Three Sprint Customer-Driven Analysis Methodology

11.1 Sprint 1: Scope and Discovery

The Scope and Discovery sprint comprises the first three steps of this method. Much like the first sprint of the SA methodology, it focuses on ensuring the problem space is thoroughly and accurately defined and that leadership, stakeholder needs, and customer needs are validated and commonly understood. Sprint 1 requires a kick-off meeting with the customer to set the stage and accomplish the three steps outlined as part of the sprint. It assumes that pre-work has been done to ensure the meeting will yield the desired outcomes.

Step 1: Define Problem Statement

Definition of the Problem Statement is the first step in this process. The Lead Architect(s), in collaboration with the customer for whom the effort is undertaken, defines the business problem or issue that warrants an architectural analysis and solution. The solution may be an IT solution or a business solution such as a reengineered process, new operating model, additional or new skillsets, reorganization, or any combination thereof. Key questions addressed as part of this step include but may not be limited to the following.

» What is the business problem that this effort is supposed to address?
» Who is the executive sponsor(s)?
» Who is the customer(s) served within the scope of the product line under analysis?
» Are other departments and roles impacted?
» Are there external stakeholders involved?

Problem Statement must be described in business terms and must be validated by the customer.

Step 2 Define Scope and Objectives

The purpose of this step is to build on the Problem Statement by defining the boundaries of the effort and the desired outcomes. The Lead Architects collaborate with the customer to define the scope of the overall effort and identify the organizations and points-of-contact that must be engaged in the effort as part of the core architecture team (CAT). The architects examine the problem statement for context and use existing VEAR content such as the Business Reference Model (BRM), VASI, functional organization model (FOM) and portfolio/product line alignment as input to defining the scope. The Lead Architects work with the executive sponsor and customer to define the objectives to be achieved via use of the data, artifacts, and findings of the architecture effort. As part of this activity, the Lead Architects use the objectives to define the questions to be answered as a result of the architecture effort.

Key questions addressed as part of this step include but may not be limited to the following.

» Who is on the CAT? Are these the right people?
» What are the frequency and dates of the CAT meetings? Executive sponsor briefings?
» Who are the relevant SMEs to interview to further understand the product line?
» What are the questions that must be answered?

Step 3: Identify requisite data and artifacts

The purpose of this step is to build on the problem statement, scope, and objectives to identify the data needed to address the customer's needs. This step helps to mitigate the risk of "building architecture for architecture's sake" by ensuring that the artifacts capture and present the data that's needed to support the problem statement as agreed upon by the stakeholders. In this step, the Lead Architects use the questions defined as part of Step 2 to discern the data required to answer them. Once this is done, the data is the used to identify the artifacts to be developed to both capture the data as well as visualize the data. The Lead Architects use the complete data set to also determine which data is housed and managed via the VEAR and that which is stored in other sources.

Key questions addressed as part of this step include but may not be limited to the following.

» What data is required to answer the questions that address the problem statement?
» Of this data, what is actually stored in VEAR?
» For the data not stored in VEAR, what are the sources for the data?
» Who are the PoCs that must be contacted to get access to the data?
» What is the security classification of the data? Is there PII, PHI, PCI within the data set? Is there financial or budget data that may cause conflicts of interest?

11.2 Sprint 2: Current State Analysis

For Customer-driven analysis/architecture efforts, the second sprint is where the more in-depth analysis begins. This sprint combines aspects of the first and second sprints of the Segment architecture analysis method. For example, Step 3: Conduct Discovery of the SA Method is where the analysis of existing VEAR data and other current state information and artifacts is done. For the Customer-Driven Analysis/Architecture efforts, this analysis begins within the second sprint.

Step 1: Analyze Existing VEAR data

The purpose of the Analyze Existing VEAR Data step is for the CAT to discover and review relevant VA EA data and artifacts necessary for the current state analysis and validate the information with the customer. This enables the VA EA to be used as intended to jumpstart this type of project thus decreasing the amount of time necessary to complete the effort. Some of the VEAR data to be analyzed is as follows:

- Business Reference Model (BRM): Functional decomposition that describes "what" VA does.
- Functional Organization Model (FOM): Organizational decomposition which describes the organizations and supporting structures that execute the functions as described in the BRM
- VA Systems Inventory (VASI): Lists the systems existing within the VA IT environment and a core set of information describing the system. Lifecycle status and modernization strategy for each system is also included. Also includes interfaces between systems.

- Technical Reference Model (TRM): Lists the technologies used within the solutions deployed within the VA IT environment.
- Portfolios and Product Lines: Group systems according to multiple criteria such as the areas of the business they support and the organization supplying the funding.

The above information is integrated within the VEAR to form a core dataset that supports analyses to define the scope of a problem from business, organization, and systems perspectives. The above information also helps to identify the different stakeholders and points-of-contact that must be involved in the analysis effort. When coupled with other data as listed in the Conduct Discovery step of the SA architecture method some very fundamental questions that expedite findings in support of the analysis effort can be answered.

- Within what areas of the VA business must the analysis be focused?
- What systems must be considered as part of the effort?
- What additional PoCs must be involved in this effort?
- Do we have all the data needed to support the analysis effort and, if not, where do we need to go to get the data?

Although the questions are very similar to the ones answered in Sprint 1, the analysis performed within this sprint adds another level of detail that is necessary to achieve the outcomes as defined in Sprint 1.

Step 2: Address data gaps to Support Analyses

The purpose of the Address Data Gaps to Support Analyses step is to ensure that all the information needed to perform a thorough and complete analysis with valid findings and recommendations is available to the CAT. As part of this step, the Lead Architects reach out to the PoCs to collect information that has been identified as needed to address the problem statement but is not already captured within the VEAR.

The requests for information may be distributed in multiple ways; through data calls, a dedicated meeting or requested within one of the appropriate governance entities. For the best responses, it is recommended that the requests for information be made by the executive sponsor of the effort. Once received, the architects use the information to answer the questions that need to be answered as a result of the effort. The CAT documents the results of its analysis as draft findings, draft artifacts (e.g., mockups of dashboards or other custom visualizations) and additional questions that may need to be answered and combines this information with outputs generated as part of Sprint 1 to develop materials that will be used as input to PoC Interviews.

Step 3: Conduct PoC interviews

The purpose of the Conduct PoC Interviews step is to two-fold; 1) to answer any additional questions that have been identified by the CAT and 2) to serve as a preliminary validation of the findings and draft recommendations generated by the detailed analyses. As standard practice, the Lead Architects kick-off each interview by doing the following:

1. Reiterate the Problem Statement being used to drive the effort
2. Review the objectives of the effort

3. Summarize the scope of the effort
4. Clearly articulate the desired outcomes of the interview
5. Proceed to discuss findings, any draft recommendations and glean the information needed to create customer-ready products

Upon completion of each interview the Lead Architects update the findings, recommendations and architecture artifacts that have been developed. The Lead Architects also schedule internal AES reviews of the products to create the versions that are delivered to the customer for review and comment.

11.3 Sprint 3: Customer Review and Delivery

The purpose of the Customer Review and Delivery sprint is to gain approval from the customer on any findings and recommendations generated as a result of the effort as well as gain approval of the artifacts developed to address the problem statement.

Step 1: Validate findings

The purpose of the Validate Findings step is to review the discoveries made throughout the architecture analysis effort. The Lead Architects explain the findings and their relationships to the problem statement and objectives to enable the customer to easily assess their validity. The Lead Architects also review the data that's been captured and the artifacts used to both capture and present the data within the context of the questions answered via the information.

As standard practice, the Lead Architects construct a presentation that follows the following flow to guide the customer review.

1. Reiterate the Problem Statement being used to drive the effort
2. Review the objectives of the effort
3. Summarize the scope of the effort
4. Review the Findings and their relationship to the Problem Statement and Objectives
5. Review the questions to be answered and the data needed to answer the questions
6. Present the artifacts used to both capture and present the data required as part of the effort
7. Request approval of the findings and artifacts from the customer

It's important to note that continuous customer engagement is a standard practice within any sound architecture development methodology. This consistent collaboration with the customer mitigates the risk of a customer disapproving of the products being delivered. However, if the customer has not been able to be involved throughout the effort, they would need to be afforded ample time to review the findings and artifacts and either approve or provide comments that must be addressed.

Step 2: Update VEAR with Appropriate Data

The purpose of the Update VEAR with Appropriate Data step is to ensure that the VA EA consistently reflects the most accurate and current information. As part of this step, the Lead Architects analyze the complete data set captured and generated as part of the architecture analysis effort to make updates to data that currently exists within the VEAR, make

recommendations for new data to be managed within the VEAR and collaborate with stewards of the other data sources from which data was received to determine if updates must be made within those sources. Questions answered as part of this step include:

1. Of the complete dataset, what data was generated as a result of this effort and what was provided by existing sources?
2. Is the VEAR the authoritative source for the data? If yes, update accordingly.
3. If not, was the data provided from an existing authoritative source? If so, should this remain the authoritative source or is there a better source for the data?
4. For the newly created data, what is the recommended source for the data going forward?

This step of the methodology expands the scope of VA EA data while also supporting VA's strategic direction for enterprise data management by identifying sources of specific VA data and providing candidates for authoritative data sources.

Step 3: Perform Architecture Quality Reviews

The purpose of the Perform Architecture Quality Reviews step is to perform a final quality control check on all updates made within the VEAR as well as any updates made to the artifacts in order to gain approval by the customer. The Lead Architects notify other members of the AES Team that the architecture analysis effort is complete and VEAR data and artifacts are ready for review. The Lead Architects coordinate and schedule a meeting to provide an overview of the effort and summarize the VEAR updates and artifacts that must be reviewed. Items the review team may look for are driven by the instructions and rules documented within the Architecture Style Guide (ASG). All graphical artifacts must be reviewed for conformance to the Website Style Guide and for 508 compliance.

Step 4: Publish Architecture Information and Artifacts

The purpose of the Publish Architecture Information and Artifacts step is to formally deliver the final results of the architecture analysis effort. The Lead Architects collaborate with the VA EA Communications Team to post the architecture artifacts to the appropriate areas of the VA EA Website. At this time, updates made to the systems information within the VA Systems Inventory[17] are already reflected within the VEAR. The customer of the effort is notified that the information has been published and is available for public consumption. The customer is also provided the links to the specific location(s) where their information may be found.

12 Enterprise Architecture Development

The VA views its enterprise architecture as having three levels; Enterprise, Segment and Solution. The Enterprise level describes the VA from a cross-portfolio perspective with Segments equating to the individual portfolios or specific business areas within a portfolio (e.g.,

[17] It is important to note that the VA Systems Inventory (VASI) is a system-centric view of the integrated domains of data within the VEAR.

HR Onboarding). The Solution level describes the actual systems/products and services operating with the VA IT environment. One of the major lessons learned in EA is that taking a monolithic approach to building EA will ultimately end in failure because an organization has neither the time nor resources to describe, document and publish a product that describes it in its entirety. Additionally, the data and information needed to describe the complete EA either exist in different sources or may not exist at all and have to be created. These challenges necessitate a methodology that incrementally builds the EA as a result of addressing business needs while also focusing on ensuring the quality, availability and discovery of the resultant data and artifacts. Therefore, the VA EA Methodology builds the VA EA as a by-product of the segment and customer-driven architecture development/analysis efforts. The outputs of the efforts are integrated as part of a continuously growing VA EA data set.

The previously described Segment and Customer-Driven efforts emphasize the use of the core EA data (i.e., data stored and managed in the VEAR) and collaboration with other stakeholders to identify and access additional data that is needed to address a given initiative of problem space. This method of building the EA ensures that it is truly a business-outcome-driven architecture with consistently increasing value in support of the VA's strategic vision and supporting priority initiatives.

Appendix A Abbreviations

Abbreviation	Definition
ADM	Architecture Development Methodology
AES	Architecture and Engineering Service
AI	Artificial Intelligence
API	Application Program Interface
AT	Agile Team
BRM	Business Reference Model
CAFEA	Common Approach to Federal Enterprise Architecture
CAT	Core Architecture Team
CPIC	Capital Planning and Investment Control
CPM	Collaborative Planning Methodology
CRUD	Create, Read, Update, Delete
DevSecOps	Development Security Operations
DoDAF	Department of Defense Architectural Framework
EA	Enterprise Architecture
FEA	Federal Enterprise Architecture
FEAF	Federal Enterprise Architecture Framework
GAO	Government Accountability Office
IG	Inspector General
IO	Infrastructure Operations
ISO	International Organization of Standardization
ISSM	Information System Security Manager
ISSO	Information System Security Officer
IT	Information Technology
ITIL	Information Technology Infrastructure Library
ITOPS	Information Technology Operations and Services
LPM	Lean Portfolio Management
OCTO	Office of Chief Technology Officer
OIS	Office of Information Security
OIT	Office of Information and Technology
OMB	Office of Management and Budget
OV-1	Operational View
PARC	Program & Acquisition Review Council
PEST	Political, Economic, Social and Technological
PLA	Product Line Architecture
POAM	Plan of Action and Milestones

Abbreviation	Definition
SA	Segment Architecture
SAFe	Scaled Agile Framework
SIPOC	Supplies, Inputs, Process, Outputs and Customers
SME	Subject Matter Expert
SOA	Service-Oriented Architecture
SV-1	Systems View
SWOT	Strengths, Weaknesses, Opportunities and Threats
TOGAF	The Open Group Architecture Forum
TRM	VA Technical Reference Model
VA	Department of Veterans Affairs
VEAMS	VA Enterprise Architecture Management Suite
VEAR	VA Enterprise Architecture Repository
WSJF	Weighted Shortest Job First

Appendix B References

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Appendix C Enterprise Architecture Principles

Principles are general rules and guidelines intended for enduring use in an enterprise. They inform and support the way that an organization fulfills its mission. Architecture principles define the underlying general rules and guidelines for the use and deployment of all IT resources and assets across the enterprise. They reflect a consensus among the organizations of the enterprise and form the basis for making future IT decisions.

To obtain consistent behavior, VA has a framework of guiding principles to define what is most important to the enterprise. Guiding principles help to define the organization's strategy for certain business and technical functions. These principles help to filter decision-making, eliminating solutions that don't meet VA's objectives. This clarity of executive intent takes the guesswork out of implementation decisions. Clear, well-understood principles, combined with an executive commitment to enforce them, help drive consistent change across disparate departments and programs of VA. These principles are provided to the IT and business stakeholders of the VA enterprise architecture to inform and provide a basis for IT and business-related decisions.

These principles are just one element in a structured set of ideas that collectively define and guide VA, from values through to actions and results. Other guiding elements include IT standards and policies.

Architecture principles are used to capture the fundamental truths about how the enterprise will use and deploy IT resources and assets. The principles are used in several different ways:

» To provide a framework within which the enterprise can start to make conscious decisions about resources, investments, use and how it operates.
» As drivers for defining the functional requirements of the architecture.
» As an input to assessing both existing business systems and the future strategic portfolio, for compliance with the defined architectures. These assessments will provide valuable insights into the transition activities needed to implement an architecture, in support of business goals and priorities.
» To support the architectural governance activities in terms of:
  - Providing a "back-stop" for the standard compliance assessments where some interpretation is allowed or required.
  - Actively working to resolve anomalies within and between operating units.

When principles are in conflict, each principle must be considered in the context of "all other things being equal." The decision when one principle takes precedence over another will be documented.

Architectural principles may be used in the evaluation of investments. Although specific penalties are not prescribed, violations of principles generally cause operational problems and inhibit the ability of the organization to fulfill its mission.

Principle 1: Maximize Benefit to the Enterprise
Information technology management decisions are made to provide maximum benefit to the enterprise.

This principle embodies the concept of "service above self." Decisions made from an enterprise-wide perspective have greater long-term value than decisions made from any organizational perspective. Maximum return on investment requires information technology management decisions to adhere to enterprise-wide drivers and priorities. No individual stakeholder or groups of stakeholders shall detract from the benefit of the majority.

Implications:

» Achieving maximum enterprise-wide benefit will require changes in the way we plan and manage information and technology. Technology alone will not bring about this change.
» Some organizations may have to concede their own preferences for the greater benefit of the entire enterprise.
» Application development priorities must be established by the entire enterprise for the entire enterprise.
» Applications' components are to be shared across organizational boundaries.
» Information and technology management initiatives should be conducted in accordance with the enterprise target architecture. Individual organizations should pursue information technology management initiatives that conform to the target architecture and priorities established by the enterprise. The target will be changed as required by the business.
» As needs arise, priorities must be adjusted. Several forums already exist to raise and decide on these adjustments to priorities.

Principle 2. Design and Build with Service Orientation
Service orientation delivers enterprise agility and boundaryless information flow.

Implications:

» Service representation utilizes business descriptions to provide context (i.e., business process, value streams, goal, rule, policy, service interface, and service component) and implements services using service orchestration.
» Service orientation places unique requirements on the infrastructure, and implementations should use open standards to realize interoperability and geographical transparency.
» Strong governance of service representation and implementation is required.
» The term "services" in this usage does not imply web services or Service-Oriented Architecture (SOA), rather it connotes services in the general meaning of the term.

Principle 3. Control Technical Diversity
Technical diversity minimizes the nontrivial cost of maintaining expertise in and connectivity between multiple technology environments.

There is a real and significant cost of infrastructure required to support alternative technologies for processing environments. There are further infrastructure costs incurred to keep multiple processor constructs interconnected and maintained.

Limiting the number of supported components will simplify maintainability and reduce support and maintenance costs.

The business advantages of minimum technical diversity include standard packaging of components, predictable implementation impact, predictable valuations and returns, redefined testing, utility status, and increased flexibility to accommodate technological advancements. Common technology across the enterprise brings the benefits of economies of scale to the enterprise. Technical administration and support costs are better controlled when limited resources can focus on this shared set of technology.

Implications:

» Policies, standards, and procedures that govern acquisition of technology must be tied directly to this principle.
» This applies to system security as well. VA IT standards will be enhanced to cover all system security products to be used across VA.
» Technology choices will be constrained by the choices available within the VA IT Standards for the VA EA. The VA IT Standards will be enhanced as needed. Waivers will be provided on a case-by-case basis.
» The VA EA may allow procurement of additional vendor-based technology products as per their needs.
» Procedures for augmenting the acceptable technology are established.
» We are not freezing our technology baseline. We welcome and actively seek out technology advances and will change the VA IT Standards when compatibility with the current infrastructure, improvement in operational efficiency, or a required target capability need has been demonstrated.

Principle 4. Deploy Enterprise Applications
Using enterprise applications minimizes duplicative capabilities, which are expensive and lead to proliferation of conflicting data.

Implications:

» Organizations that depend on a capability that does not serve the entire enterprise must change over to the replacement enterprise-wide capability if it exists. This will require establishment of and adherence to a policy requiring this.
» Organizations will not be allowed to develop capabilities for their own use that are similar or duplicative of enterprise-wide capabilities. In this way, expenditures of scarce resources to develop essentially the same capability in marginally different ways will be reduced.
» Data and information used to support enterprise decision-making will be standardized to a much greater extent than previously. This is because the smaller, organizational capabilities that produced different data (which was not shared among other organizations) will be replaced by enterprise-wide capabilities. The impetus for adding to the set of enterprise-wide capabilities may be derived from an organization making a convincing business case for the value of the data/information previously produced by its organizational capability, but

the resulting capability will become part of the enterprise-wide system, and the data it produces will be shared across the enterprise.

Principle 5. Build Reusable Components
Reusable components lower cost and speed deployment of subsequent application development; however, they may be initially more expensive to build than single-use components.

Implication: Developers and organizations should create new components with reuse as a design consideration as part of the implementation of new functionality.

» The development of modular components and services is always favored, but not all components will or should be highly reusable.
» Reuse must be a design consideration for all enterprise architecture components.
» The EA team should provide service catalogs to promote/enable reusability at the project level.
» Investment, design, and implementation decisions favor reusable business and technology components wherever practical.
» Reuse before buy, buy before build.
» Develop and promote the use of common information systems and IT services.
» Put IT governance and EA processes in place to ensure reuse.
» Drive reusability of architecture models and best practices (SOA/Information Technology Infrastructure Library, or ITIL).
» Eliminate duplication and redundancy to reduce the Total Cost of Ownership.
» Standardize on business processes across business units and agency to so to allow for common information systems and IT services.
» Common shared enterprise systems opportunities need to be inventoried and communicated.

Principle 6. Connect with Loosely Coupled Interfaces
When interfaces between independently designed applications are tightly coupled, they are not reusable, but are more likely to result in undesired side effects when changes occur.

Implications: Loose coupling means that services (e.g., enterprise application program interfaces, or APIs) are designed with no affinity to any service consumer. Inside the service, nothing is assumed as to the nature of the consumer. Thus, a service is fully decoupled from a service consumer. However, the service consumer is dependent on the service (that is, it embeds literal references to service interfaces). The service is also responsible for exception handling. The result is a semi-coupled (or loosely coupled) architecture.

Every effort needs to be made to stay away from point-to-point application integration. Even though these may seem straightforward to implement, the sheer number of applications at VA greatly increases the complexity of the overall IT environment. Point-to-point integrations increase maintenance cost and limit flexibility and agility when changes are required.

Principle 7. Data is an Enterprise Asset That Needs To Be Accessible and Shared
Users need to have easy access to the data necessary to perform their duties; therefore, data is made accessible and is shared across enterprise functions and organizations.

Data is a valuable corporate resource; it has real, measurable value. In simple terms, the purpose of data is to aid decision-making. Accurate, timely data is critical to accurate, timely decisions. Most corporate assets are carefully managed, and data is no exception. Data is the foundation of our decision-making, so we must also carefully manage data to ensure that we know where it is, can rely upon its accuracy, and can obtain it when and where we need it.

Wide access to data leads to efficiency and effectiveness in decision-making and affords timely response to information requests and service delivery. Using information must be considered from an enterprise perspective to allow access by a wide variety of users.

It is less costly to maintain timely, accurate data in a single application, and then share it, than it is to maintain duplicative data in multiple applications. The enterprise holds a wealth of data, but it is stored in hundreds of incompatible stovepipe databases. The speed of data collection, creation, transfer, and assimilation is driven by the ability of the organization to efficiently share these islands of data across the organization.

Access to data does not necessarily grant the user access rights to modify or disclose the data. This will require an education process and a change in the organizational culture, which currently supports a belief in “ownership” of data by functional units.

Implications:

» Ensure that all organizations within the enterprise understand the relationship between the value of data, sharing of data, and accessibility to data.
» Stewards must have the authority and means to manage the data for which they are accountable.
» We must make the cultural transition from “organizational data ownership” thinking to “enterprise data stewardship” thinking.
» The role of data steward is critical because obsolete, incorrect, or inconsistent data could be passed to enterprise personnel and adversely affect decisions across the enterprise.
» Part of the role of data steward, who manages the data, is to ensure data quality. Procedures must be developed and used to prevent and correct errors in the information and to improve those processes that produce flawed information. Data quality will need to be measured and steps taken to improve data quality – it is probable that policy and procedures will need to be developed for this as well.
» Authoritative data sources must be identified and agreed to. Organizational owners of these authoritative data sources must be able to provide access to authoritative data as a service to the rest of the enterprise.
» Since data is an asset of value to the entire enterprise, data stewards accountable for properly managing the data must be assigned at the enterprise level.
» Accessibility involves the ease with which users obtain information.

- The way information is accessed and displayed must be sufficiently adaptable to meet a wide range of enterprise users and their corresponding methods of access.
- Access to data does not constitute understanding of the data. Personnel should take caution not to misinterpret information.
- Access to data does not necessarily grant the user access rights to modify or disclose the data. This will require an education process and a change in the organizational culture, which currently supports a belief in "ownership" of data by functional units.
- To enable data sharing we must develop and abide by a common set of policies, procedures, and standards governing data management and access for both the short and the long terms.
- For the short term, to preserve our significant investment in legacy systems, we must invest in software capable of migrating legacy system data into a shared data environment.
- We will also need to develop standard data models, data elements, and other metadata that defines this shared environment and develop a repository system for storing this metadata to make it accessible.
- Data sharing will require a significant cultural change.
- Increased data sharing will continually "bump up against" the principle of data security. Under no circumstances will the data sharing cause confidential data to be compromised.
- Data made available for sharing will have to be relied upon by all users to execute their respective tasks. This will ensure that only the most accurate and timely data is relied upon for decision-making. Shared data will become the enterprise-wide "virtual single source" of data.

Principle 8. Incorporate Decision Intelligence
Increase the foundational awareness of the current and emerging digital technologies that can impact an organization—including cyber security, predictive analytics, AI, social media, online collaboration, and work from home technology.[18]

Implications:

- Organizations must emphasize automation of manual processes. Automate business processes that are either totally manual or have heavy human intervention using modern capabilities (e.g., low-code/no-code platforms, UiPath, BluePrism, Pega Systems) to automate and/or optimize the supported business operations.
- VA prioritize digitization of VA information. Paper and electronic documents and other VA "records" should be converted into machine readable formats to maximize use of the resultant data within VA business operations (e.g., Investment Business Cases, Interface Control Documents).

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