VA EA Architecture Development Methodology
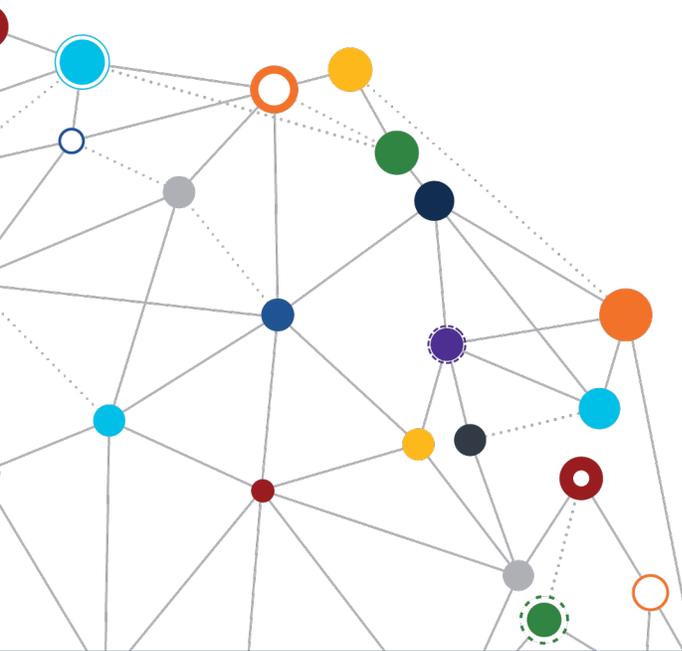
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Revision History

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

Approval

Governance Body	Signature	Date
Architecture Change Board		
DevOps Change Board		
Standards and Architecture Committee		

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1 Executive Summary

The purpose of the Department of Veterans Affairs (VA) Architecture Development Methodology (ADM) is to communicate the definition, value and process of architectural analyses as part of the overall enterprise architecture (EA) at VA. The core principle of the VA ADM is that the target architecture developed through this process must define how we improve service to the Veteran or to the VA stakeholder who supports the Veteran. The ADM provides a standardized and repeatable process to develop product line architectures (PLAs) that consist of a current state, a target state and transition plans.

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 drive business decisions toward a 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 of the effort.

In addition, this document describes the methodology for conducting an architectural engagement at the product line or portfolio level. This methodology is a repeatable three-sprint process that is iterative as additional product lines and products (value streams) are analyzed.

The ADM also provides for a line of sight (as shown in Figure 2: OMB's Architect-Invest-Implement Paradigm) that shows 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 PLAs as well as offering "next steps" following the completion of the analysis. These epics are collaboratively managed in a portfolio-level product line backlog by the business sponsor and product line team. PLA target state epics are prioritized by the product line stakeholders during program increments and then moved into the VA capital planning and budgeting process for funding and implementation.

2 Architecture Development Methodology Overview

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 drive decisions about the information technology (IT) investment portfolio.[1]

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 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.[2] Enterprise Architecture delivers value to the VA by:

» Describing the current and future state of the VA
» Identifying specific performance improvement results for VA
» Determining what resources are used to achieve measurable performance improvements for VA's core mission areas and common or shared services
» Leveraging business and information management resources across the agency

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[1] Office of Management and Budget (OMB), *FEA Practice Guidance*, November 2007, 1-5. https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/SDLC-non-secure/Enterprise-Architecture-Program-/Training/Docs/FEA_Practice_Guidance_Nov_2007.pdf.

[2] OMB, *FEA Practice Guidance*, 1-5.

» Developing a transition strategy to achieve strategic goals, objectives, and target performance improvements
» Measuring the value of EA products and services to inform decisions in other practice areas and support business results[3]

2.2   Architecture Definition and Value

In order to develop the current and target state architectures and a transition plan, VA uses an analysis approach that recommends business, security, technology and/or data improvements to be achieved in the target state. This planning effort is known as the **product line architecture (PLA)**.

The purpose of the PLA is to:

» Ensure a business need or performance gap is considered in the enterprise context and is factually based on analysis
» Facilitate deliberate planning, prioritization, and investment decision-making
» Establish/confirm alignment with VA and IT strategic goals, performance goals and priorities, and strategies
» Recommend the portfolio or product line target state with epics that achieve that target state
» Enable prioritization of architectural backlog for input into the IT capital planning and budgeting, alternatives analysis, and acquisition processes

PLAs define the roadmap for a core mission area, business service or enterprise service. They are driven by business needs and management, and deliver products that improve the delivery of services to VA staff and customers. From an investment perspective, PLAs drive decisions for a business case or group of business cases supporting a core mission area or a common or shared service. The primary stakeholders for PLAs are executives, senior leaders and their staff that run the business operations of VA.

The PLA is related to EA through three principles: structure, reuse and alignment. First, the PLA inherits the framework used by the EA, although it may be extended and specialized to meet the specific needs of a core mission area or common or shared service. Second, the ADM reuses important assets defined at the enterprise level including data; common business processes and investments; and applications and technologies. Third, the ADM aligns with elements defined at the enterprise level, such as business strategies, mandates, standards and performance goals.[4]

The PLAs are driven by the VA Strategic Plan and IT Strategic Plan that provide the framework to align IT resources with VA's strategies, describe the IT goals and objectives that support VA's

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[3] OMB, *FEA Practice Guidance*, 1-2.
[4] OMB, *FEA Practice Guidance*, 1-2.

strategic focus areas, and drive IT Portfolio Management decisions, and are intended for use by all VA departments that require an IT solution. PLAs are required in the following scenarios:

» A PLA has never been conducted.
» The previous PLA was completed three or more years ago.
» The previous PLA was completed within the last five years but requires a re-evaluation due to a shift in business or technology environment.

The ADM is facilitated by the Agile Team (AT) consisting of joint Federal Leads from the business, the Architecture and Engineering Service (AES) Lead and other team members assigned to perform research and analysis and produce the agreed-upon deliverables. All analyses must consider enterprise architectural principles (Figure 1). These principles leverage federal and industry best practices and guidance to inform planning and design decisions and are discussed further in Appendix C Enterprise Architecture Principles.

VA Architecture Principles

1. **Maximize Benefit to the Enterprise** – Information technology management decisions are made to provide maximum benefit to the Veteran and enterprise.
2. **Design and Build with Service Orientation** – Service orientation delivers enterprise agility and boundaryless information flow.
3. **Control Technical Diversity** – Technical diversity minimizes the nontrivial cost of maintaining expertise in and connectivity between multiple technology environments.
4. **Deploy Enterprise Applications** – Using enterprise applications minimizes duplicative capabilities, which are expensive and lead to proliferation of conflicting data.
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.
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.
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.

Figure 1: EA Principles

A PLA also ensures that the target state is aligned with VA's business and technology strategic direction. It occurs 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[5] 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. Analysis 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.[6] 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.[7]

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 Methodology 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 Architecture Development Methodology (ADM) leverages federal and industry best practices and aligns with the 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.

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[5] 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.

[6] 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.

[7] Ibid.

Architect	Invest	Implement
Design Performance Improvements	Investment Planning and Budgeting	Solution Implementation

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

A **Product Line Architecture (PLA)** is a planning, research and analysis effort that recommends specific target state improvements to be achieved in the target state. The PLA establishes a common approach to conducting architectural analyses. The PLA provides guidance for conducting architecture analyses that support the definition of a current and target state, performance improvement, prioritization, investment, and planning decisions. It also establishes or confirms the alignment of these decisions to VA's business plans and strategic goals through a series of workshops. 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 also uses two other architectural analysis efforts, **Portfolio Architecture** and **Product Analysis**. The methodology provides detailed guidance for conducting these types of architectural analyses and the differences between the three types are discussed below:

» **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 is 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 that 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.[8] 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[9]

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 product lines as part of the EA transition strategy that defines the sequencing of PLAs
	▪ 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 Product Line Target Architecture
	▪ Update the VA OMB Major Business Cases to ensure funding is request 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

PLA 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 PLA recommendations and achieve measurable performance improvements.

5 Architecture Line of Sight

VA EA applies the best features of architectural frameworks including the 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 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

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

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 PLA process.
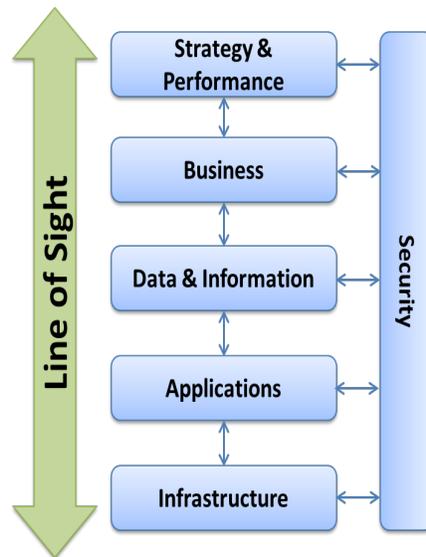

Figure 3: ADM Line of Sight

A break in the line of sight may indicate a potential gap that may impact 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 that will help VA become more effective or efficient.

Managing the elements of each layer and all the dependencies that are the foundation for the line of sight is a significant endeavor that requires the support of its own information system. The system used by AES is the VA Enterprise Architecture Repository (VEAR).

6 ADM Success Factors

One of the key contributors to the success of a PLA is to have a simple and concise vision for the PLA 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 PLA:

» Identify key business questions the PLA 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.[10]

7 Roles and Responsibilities

One of the key components to a successful PLA effort is to have a clear understanding of roles and responsibilities of all the participants. Not all roles are required for each type of PLA (see Table 2, below) but must be considered as potential participants by the PLA Executive Sponsor and Federal AES Lead when preparing for an analysis. In all analyses, the PLA Executive Sponsor and Federal AES Lead work together to determine the Core Agile Team (CAT) members who are required for each PLA.

Table 2: PLA Team Roles and Responsibilities

Role	Description	Responsibilities
Executive/ Senior Management	Senior Management at VA sets agency/department strategic goals and priorities.	▪ Define the strategic themes, portfolio vision, business drivers, business issues, and performance goals for the agency
Portfolio/ Product Line Sponsor / Manager/ Lead / Stakeholders	The senior VA federal employee who identifies and secures the time of subject matter expert (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 Core Agile Team (CAT) members and Alternates ▪ Define change drivers and business and information management requirements for PLA ▪ Identify goals and 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 Executive Sponsor Check-In Meetings ▪ Apply PLA recommendations and maintain a line of sight from programs and projects to VA strategic goals and objectives

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

Role	Description	Responsibilities
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 Agile Team ▪ Provide project management support ▪ Assist with any administrative support required from the analysis ▪ Serve as liaison and inform respective executives and department directors
Core Agile 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: ▪ Business representatives ▪ Enterprise Program Office ▪ Information Technology Operations and Services (ITOPS) ▪ Office of Information Security (OIS) ▪ AES ▪ Impacted Stakeholders ▪ Privacy ▪ Information System Security Officer (ISSO)/ Information System Security Manager (ISSM)/ Infrastructure Operations (IO)	▪ 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 & Final Executive Briefing
SME and Admin 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 answers follow-up questions ▪ Provide relevant subject matter expertise and documentation

8 VA Architecture Development Methodology

The **VA ADM** is a repeatable three-sprint process (Figure 4) that leads the CAT through a collaborative analysis effort of assessing the baseline, developing the desired state, and defining recommendations and transition plan to the target state. The methodology allows for flexible scope for different types of analyses and establishing a customizable set of required deliverables.

VA Architecture Development Methodology

| Sprint 1 Discovery and Interview | Sprint 2 Current State & Analysis | Sprint 3 Epics and Transition Plan |

Figure 4: VA ADM Sprints

The ADM ensures that VA's EA program is complete and effective in developing solutions to strategic and tactical business needs that support planning, decision-making and organizational performance improvement. AES's role 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]

VEAR is used throughout a PLA project, as both a source for information and as a repository for data made during the analysis. A common repository ensures consistent naming of enterprise assets and objects between PLA 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 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 adopted the SAFe framework to develop portfolio and product line future states that encompass both value streams and solutions.

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[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.

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, application of patterns, and create enabler epics for the architectures that comprise the solutions in a portfolio. Relying on continuous feedback, these 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 an Architectural Analysis

The following subsections describe the high-level purpose, goals, and activities associated with each of the three sprints of the VA ADM Methodology.

10.1 Sprint 1: Discovery and Interview

The **Discovery and Interview Sprint** contains the first three steps of the ADM, 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]

Step 1: Establish Strategic Themes, Portfolio Vision and Canvas

The Portfolio and Product Line Leads, in collaboration with the Portfolio and Product Line Managers and other stakeholders, start with the strategic themes identified by the portfolio manager. The strategic themes should connect the portfolio 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 portfolio. Then based on the strategic themes, the Portfolio and Product Line Leads with the Portfolio and Product Line Managers formulate the Portfolio vision. The portfolio vision describes the future state of the portfolio in areas of people, process and technology.

Lean 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

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[12] OMB, *CAFEA*, 17.

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 5: Portfolio Canvas

The portfolio canvas data is then modeled into a portfolio Operational View (OV-1) and Systems View (SV-1). These two deliverables provide a basis to conduct an analysis of the portfolio to determine performance improvements. The data in the portfolio (and product line) canvas are considered "primitives" in the Zachman EA framework. Once the data is collected, models can be built that represented 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 PLA Executive Sponsors, the PLA Leads identify the scope of the architectural analysis to be conducted. Will it encompass the entire product line, a specific product, value stream or be more systems oriented? The PLA Leads and sponsors also identify CAT members (business and OIT representatives) who will support the PLA. The PLA 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 PLA 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 are the executive sponsor(s) and key stakeholders?
» Who is on the Core Agile Team (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 is 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 PLA Leads will query VEAR for existing information prior to kickoff. Queries will vary depending on PLA 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-1 and SV-1 have been completed for each product line. These are simply the start of the data gathering required to perform architectural analyses. The PLA Leads may also use VEAR ad hoc query capabilities. The PLA 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 PLA 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[13]

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 PLA 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, information regarding emerging technologies, external business trends, and business models are identified and gathered. There are two ADM steps that "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 to 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."[14]

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.

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[13] This is the official time the Discover Step begins; however, the AES Lead and Core Agile Team are encouraged to begin pre-discovery work at any time.
[14] OMB, *CAFEA*, 18.

Most of the interviewees are identified by the PLA Leads and representatives from the OIT pillars **are always** interviewed for each PLA.

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 product line (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 product line?
» 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 is data exchanged by product line applications, and how?
» What are the deficiencies or inhibitors to success within the product line?
» Are there any documented findings, critical deficiencies, or POAMs related to this product line?
» What is the target state vision for the product line?

» 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 product line that are not in an approved status on the VA Technical Reference Model (TRM)?

VEAR Integration:
The VEAR 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 in order 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 PLA 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 the validated Current State Architecture Diagram.

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 Diagram 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:

» **Product line architecture vision summary**: Summarizes the purpose, scope, mission and target vision for the product line, in text and visual forms.
» **Product line 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 in order 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 Federal Enterprise Architecture (FEA) 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 in order 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 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 product line stakeholders?
» What are the known business process and technology issues?

» Have the product line'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 portfolio or product line 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 in order to improve their performance. This is applied at the portfolio or product line 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, 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. This results in a continually updated draft of the current state architecture data in VEAR. VEAR is then used to product 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 PLA Leads at Workshop #5. On this step, the CAT presents a suggested prioritization of target state (PLA) recommendations to the PLA Executive Manager and Leads. In addition, the CAT identifies which target state recommendations require an alternatives analysis and provide rough order of magnitude (low and high bounds) on potential implementation costs, if possible. PLA recommendations may address the people, process or technology areas. Business unit stakeholders and business program managers need to schedule and fund non-IT related PLA 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 subject area and to external drivers and projects.

Once the Target Architecture Diagram 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 PLA Leads build consensus and facilitates the approval of the target architecture and its recommendations. Upon approval, 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 product line target architecture. The product line 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 conceptual product line 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:

» 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 conceptual solution 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.

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 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 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 State Technical Architecture**: Shows the future state of technology components that support service delivery for each service component.
- » **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 Plan**: Describes a recommended transition alternative. May include intermediate milestones, target states and alternative recommendations based on multiple funding levels.
- » **Epic Sequencing Roadmap**: The single, consolidated diagram that shows the transition recommendation sequencing milestones for an implementation alternative.
- » **Reuse Summary**: Describes product line reuse of business, system, and service components from other product lines and by other product lines.
- » **Data Reuse**: Describes product line reuse of information exchange packages and data entities from other product lines 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 portfolio or product line epics and the sequenced plan to implement the epics. The PLA 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 product line. During this step, the PLA Leads and CAT conduct practice sessions 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 include:

- » 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?
- » Have the transition options been analyzed for costs, benefits and risks in order to develop recommendations for implementation?
- » Are the recommendations clearly described in the product line 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 PLA 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

- » **Product line 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 product line 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 Portfolio Sponsors (Optional)

The purpose of the Present to Portfolio Sponsors step is to help facilitate the Portfolio Executive Briefing and collect signatures from PLA Leads and PLA 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 provides any additional support that is needed. Once all documents have been approved by the CAT, the PLA Executive Sponsor/Owner and the Federal Lead provide a prebriefing to the Executive Sponsor and key stakeholders in order 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 Portfolio Executive Briefing, the CAT delivers the final Recommendations Report to the PLA 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 Portfolio Backlog

The Portfolio Backlog is the highest-level backlog in SAFe. It is part of the Portfolio/Product Line 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. Portfolio epics are made visible, developed, and managed through the Portfolio Kanban. Approved portfolio epics move to the Portfolio Backlog where they await implementation.

The portfolio backlog holds epics that have been approved and prioritized for implementation. Due to their scope and typically crosscutting nature, portfolio epics usually require substantial investment and have a considerable impact on both the development programs and business outcomes. Therefore, portfolio 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 fused on business process improvement, data, security or other nonsystem or solution related requirements.

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

PLA 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. PLA 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 IT Portfolio Review Board.

Each year business program managers must plan funding for and prioritize PLA 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 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 PLA.

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

The PLA Leads communicate the positive aspects and improvement areas and solicits 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 if 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 PLA Library page on the EA intranet.

Appendix A   Abbreviations

Abbreviation	Definition
ADM	Architecture Development Methodology
AES	Architecture and Engineering Service
API	Application Program Interface
AT	Agile Team
BRM	Business Reference Model
CAFEA	Common Approach to Federal Enterprise Architecture
CAT	Core Agile Team
CPIC	Capital Planning and Investment Control
CPM	Collaborative Planning Methodology
CRUD	Create, Read, Update, Delete
DevOps	Development Operations
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
OIS	Office of Information Security
OIT	Office of Information and Technology
OMB	Office of Management and Budget
OV-1	Operational View
PEST	Political, Economic, Social and Technological
PLA	Product Line Architecture
POAM	Plan of Action and Milestones
SAFe	Scaled Agile Framework
SIPOC	Supplies, Inputs, Process, Outputs and Customers

Abbreviation	Definition
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
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.

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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 semicoupled (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.

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» 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.