SD 24

Value Engineering:
A Guidebook of Best Practices and Tools

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Office of Systems Engineering and Architecture

Office of the Under Secretary of Defense
for Research and Engineering

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Value Engineering: A Guidebook of Best Practices and Tools
Change Record

Date	Change	Rationale
February 2025	Major revision to SD-24 dated June 13, 2011	Reissuance of DoD Instruction 4245.14 and DoD Value Engineering Program lessons learned

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Foreword

The 2022 National Defense Strategy (NDS) reinforces the importance of the investment decisions DoD makes today to create the capabilities we need for tomorrow. The NDS states,

> A strong, principled, and adaptive U.S. military is a central pillar for U.S. leadership, particularly in the face of challenges arising from dramatic geopolitical, technological, economic, and environmental change. The Department of Defense (DoD) stands ready to meet these challenges and seize opportunities with the confidence, creativity, and commitment that have long characterized our military and the democracy that it serves. (NDS 2022, 1)

Value engineering (VE) is one means to realize the potential of DoD efforts to build the future we need. Office of Management and Budget Circular A-131 defines VE as "a systematic process of reviewing and analyzing the requirements, functions, and elements of systems, projects, equipment, facilities, services, and supplies for the purpose of achieving the essential functions at the lowest lifecycle cost consistent with required levels of performance, reliability, quality, or safety." VE can increase performance, reliability, safety, durability, and other desirable characteristics we want to achieve from investments.

VE is a problem-solving tool that is not limited to design activities. The VE process can be used to plan, manage, control, improve, or analyze value in the context of delivering on expectations of stakeholders. This guidance is useful for anyone concerned about finding the best value for a given investment.

Using VE is a choice but is one driven by statute, regulation, and policy. Every DoD agency has a responsibility to decide when VE is appropriate for its projects whether executed by Government or industry. VE is a sound and effective business practice that can yield significant returns on investment not only for cost but also for capability performance and schedule. The recent update to DoD Instruction 4245.14, "DoD Value Engineering Program," is intended to reinvigorate VE and, along with this guidance, facilitate an understanding of responsibilities for VE programs and how to seize the opportunities to enhance DoD processes and products.

This publication equips Components with information needed to establish and maintain viable VE programs. It describes the basics of the VE methodology, the benefits of a strong DoD VE Program, and best practices for applying VE on Government contracts.

Thomas W. Simms
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Preface

This document establishes guidance on implementing the statutory and regulatory requirements for value engineering (VE) as assigned to Department of Defense (DoD) Components by DoD Instruction (DoDI) 4245.14, "DoD Value Engineering Program." This guide also shows how VE can be an effective mechanism for improving the value of the projects, programs, processes, systems, and services within the DoD.

This guide is intended for multiple audiences. For both Government and industry management, it provides an overview of the benefits of a strong VE program and explains the impact VE can have on success. For Government contracting officers and industry, it describes best practices for applying VE on contracts. For practitioners, it gives details on the basics of applying VE and discusses how to establish a VE program. The guidance is intended for all personnel overseeing and working within or in cooperation with Component value programs, including Component Senior Accountable Officials for VE as well as their leaders, champions, and value program staff.

DoD Standardization Document (SD)-24 was last published in 2011. In the years since, a great deal has shifted in the landscape of DoD VE and DoD as a whole. At the time of this update, many DoD Components do not have VE programs. The updated guidance reflects Office of the Secretary of Defense efforts to revitalize the DoD VE Program and rebuild the Department's capacity to use VE programs in the pursuit of innovation, improved value, and reduced cost over the acquisition and operation life cycle.

The foundational concepts of VE date back to the 1940s, when Lawrence D. Miles, the creator of value analysis (as he originally called it), worked for the General Electric Company in Schenectady, New York. Tasked with providing increasingly difficult-to-find materials and parts required for the military during World War II, Miles began looking for ways to provide the function required, as opposed to the specific piece or part requested. Many of these "substitutes" performed as well as, if not better than, the originally requested items and, in some cases, for less cost. This was the birth of "function analysis," as we know it today, and remains the most important distinction of VE (SAVE International 2020, 1).

In 1954, the Navy's Bureau of Ships became the first DoD organization to establish a formal VE program. Miles and another General Electric employee, Raymond Fountain, set up the Bureau of Ships program to help reduce the cost of ship construction, which had nearly doubled since the end of World War II. The Bureau of Ships asked that the technique be called "value engineering" and staffed the office with people under the general engineer position description.

In 1959, the contractual requirement for VE was added to the Armed Services Procurement Regulation, the forerunner of today's Federal Acquisition Regulation (FAR). VE was initially used only with command approval, but, in June 1962, the DoD's procurement regulations were modified to establish VE as a mandatory program for the Department and for its contractors.

VE was largely a DoD program until the Office of Management and Budget (OMB) issued Circular A-131 in 1988 to expand the program into other organizations "where appropriate." A 1993 reissuance closed several loopholes in the circular, and now it requires that all Federal agencies use VE. In December 2013, OMB updated the 1993 version of Circular A-131 to bring it into compliance with current Public Law 111-350, dated January 4, 2011, which requires each executive agency in the U.S. Government to establish and maintain cost-effective VE procedures and processes.

A 2017 pause by OMB in reporting requirements to that agency led to a DoD-level pause in collecting data from DoD Components. This decreased the Department's ability to measure the benefits of VE despite its being an effective tool for eliminating costs that do not yield commensurate value improvements. Although VE has remained a tool, it is often misunderstood and underused, and therefore its benefits are not fully realized.

To improve the use of VE, the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)) as the Senior Accountable Official in DoD is renewing emphasis on VE by updating and publishing this guidance in conjunction with the revised VE policy.

Section 1 provides an overview of VE and the related DoD requirement. Section 2 focuses on the establishment and sustainment of value programs and offers a value program maturity model.

Section 3 looks at the applications and implications of timing VE efforts. Section 4 discusses the execution of VE activities, including both value studies and the use of VE Change Proposals (VECPs). Section 5 focuses on the implementation of the results of VE activities.

The appendices contain additional detail on focus areas such as the value methodology and contractor VECPs.

This information is intended to equip Components with the basics of VE, but this guidance is not an exhaustive resource for all potential questions or challenges. The DoD VE Program will need an active community of practice and an engaged VE Management Advisory Group (MAG).

Components are encouraged to leverage VE and their value programs to achieve excellent results and support each other in the pursuit of value for warfighters and the U.S. taxpayer.

1 Introduction

1.1 Value Engineering

OMB Circular A-131 defines VE as "a systematic process of reviewing and analyzing the requirements, functions, and elements of systems, project, equipment, facilities, services, and supplies for the purpose of achieving the essential functions at the lowest life-cycle cost consistent with required levels of performance, reliability, quality, or safety" (page 3).[1] Typically, implementing the VE process increases performance, reliability, quality, safety, durability, effectiveness, or other desirable characteristics. VE is also known by terms such as value analysis, value management, value planning, value assurance, value control, and value improvement. Some of these terms were coined to minimize confusion surrounding the word "engineering," as one does not have to be an engineer to apply VE.

1.2 Value Engineering Program

A VE program, or "value program," is the organizational structure, funding, training, and annual planning to actively employ VE concepts and processes, to include results measurement and reporting, established by the Senior Accountable Official (SAO). The value program is designed to encourage innovation, improve value, and reduce costs over the acquisition and operation lifecycle. Value programs involve the following types of efforts – referred to collectively as "value activities" – managed in a coordinated manner to obtain benefits not available from managing them individually:

- **VE Studies or Value Studies** – The application of a body of knowledge referred to as the value methodology (VM). VM is a systematic process that a multidisciplinary team, led by a qualified contractor or Government VM facilitator, used to improve the value of a project, product, process, service, or organization through the analysis of functions. The formal VM process includes eight phases referred to collectively as the VM Job Plan (SAVE International 2020, 2). VE studies result in VE Proposals (VEPs).
- **VE Proposal (VEP)** – A proposal developed by either DoD personnel or contractors under contract to improve total value using VE techniques. VEPs are formal recommendations resulting from VE studies or other value-improving initiatives that apply function analysis. VEPs are not limited to acquisitions, as VE can help improve any element of Component business. When applied to acquisitions, VEPs can come at any point in the acquisition lifecycle.

[1] Different sources use different wording to define VE. The Office of Management and Budget (OMB) definition is used here because of its clarity and completeness.

- **VE Change Proposals (VECPs)** – A proposal submitted by a contractor consistent with the VE clause(s) in the contract that, through a change in the contract, would lower the project's life-cycle cost to the Government without impairing essential functions, characteristics, or performance. Unlike VEPs, VECPs do not have to originate in the use of the VM. By their nature, VECPs are limited to the post-award stage of acquisition. The FAR and agency supplements provide direction on when and how to include VECP clauses as well as methodology for calculating savings.
- **Other Value-Improving Initiatives** – Activities other than VE studies or VECPs that result in a VEP that "improves value of required function (where value is a function of performance and resources) using function analysis to determine best value" (DoD IG Issue Resolution Agreement). These initiatives are not substitutes for VE studies, but their outcomes can be considered VEPs by inclusion of function analysis.

Because *costs* are measurable, *cost reduction* often is thought of as the sole criterion for a VE application. Cost reduction is an easily measurable benefit addressed in this document; however, increased *value* is the real objective of VE, and an increase in value does not always result in cost reduction.

In fundamental terms, VE is an organized way of thinking or looking at an item or a process through a functional approach. It involves an objective appraisal of functions requiring resources. VE is performed to eliminate or modify any element that significantly contributes to the overall cost without adding commensurate value to critical functions.

1.2.1 Value

In the context of VE, "value" is an expression of the relationship between the performance of functions relative to the resources required to realize them. This relationship can be expressed as Value = (Function Performance)/Resources (SAVE International 2020, 6).

"Resources" refer to key inputs, such as cost and schedule, while function performance relates to the essential performance and quality required to satisfy customer and user needs. Risk and uncertainty also must be considered as they relate to performance, cost, and time. Figure 1-1 illustrates a way to think about value using a Venn diagram.

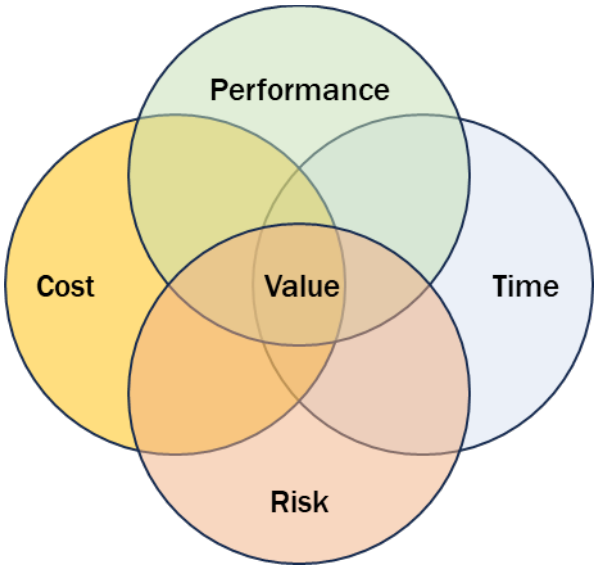


Figure 1-1. The Elements of Value

1.2.2 Function

"Function" is the element of value that focuses on achieving the customer's needs while broadening the mind of the team performing VE. In the context of VE, a function is a non-specific abstraction, consisting of an active verb and a measurable noun, that describes what an element of a project, product, process, service, or organization does or should do (SAVE International 2020, 2), for example, the function of a hammer is to "deliver force." The thorough analysis of expected and achieved functions is the most important element that makes VE unique among many problem-solving methods.

1.3 What VE Is Not

Following are clarifications of some common misconceptions of VE:

- **VE is not "cost cutting."** Cost cutting is focused on reducing scope. VE frames problems through the analysis of functions and the identification of alternative ways to perform those functions consistent with user requirements.
- **VE is not just "good engineering."** VE is not something that just happens as part of the normal design process. VE requires a planned effort following a formal process, the VM Job Plan, led by trained individuals.
- **VE is not the same as Lean Six Sigma.** The function of Lean is to "remove waste." The function of Six Sigma is to "reduce variations" and "reduce defects" to "improve quality." The function of VE is to "improve value." VE is concerned with ensuring that the solutions being optimized first satisfy the basic functions rather than potentially

optimizing the wrong solutions. Lean Six Sigma and VE can complement each other and be applied together.

- **VE is not another example of bureaucratic "red tape.**" VE became a requirement because it is a sound and effective business practice. Government agencies at all levels routinely implement VE programs that yield an impressive return on investment (ROI). For example, state departments of transportation yield ROIs ranging from 44:1 to 352:1 (NCHRP Report 850).

1.4 Why Use Value Engineering

There are many reasons to apply VE.

- **Performance** – Because VE focuses on functions, it is deeply vested in the performance of those functions. VE can help identify essential performance and find ways to optimize it.
- **Efficiency and Effectiveness** – VE is a proven tool for improving the efficiency and effectiveness of processes, services, and organizations. It is useful for identifying unnecessary functions and streamlining systems.
- **Innovation** – VE fosters innovation by leveraging functions to help participants think laterally about potential solutions. It emphasizes multidisciplinary teams to apply creative thinking to develop function-driven approaches to solving problems.
- **Time** – VE can be applied to focus on ways to deliver functions in a more time-conscious manner. Time, like cost, can be quantified, and different approaches can be considered with an eye toward improving schedule.
- **Cost** – VE is perhaps best known to be an effective approach to reduce initial costs; however, VE focuses on total life-cycle cost, which considers the time value of money over the life of the subject, whether the value relates to a facility, weapon system, vehicle, or program. Cost avoidance and cost savings are quantifiable benefits of VE and should be considered added capabilities. The return on investment of VE and related activities is often significant and should be conveyed as a sound business practice and management tool.
- **Risk** – Risk and uncertainty must be considered in improving value. VE can help teams identify risks and find effective ways to avoid or mitigate risks relative to performance, cost, and time.
- **Benefits to Stakeholders** – VE asks the question: Who determines value? This essential question must consider a wide range of stakeholders, including:

- Warfighters – The warfighter is the ultimate "user" with respect to the outcomes of VE on the facilities, systems, and equipment they use on the battlefield. The effective application of VE will ultimately benefit warfighters by improving their performance in achieving their mission and better leveraging resources.
- Executives – VE can assist those in an executive management or command role in improving their decisions related to the delivery of facilities, systems, and equipment to the personnel to whom they are accountable. It will also help them improve the efficient use of limited resources in delivering their mission (see earlier point on quantifiable benefits as added capabilities).
- Agency Personnel – Project managers, contracting staff, engineers, and other agency personnel will benefit from VE as it helps them perform their jobs more effectively and efficiently, maximizing the value they deliver in support of DoD's mission.
- Contractors – Contractors can benefit from VE primarily through the use of VECPs. Through this vehicle, contractors are encouraged to exercise their innovative thinking to create a win-win scenario.
- Taxpayers – Taxpayers are the ultimate "customers" of the DoD. Tax dollars directly support the DoD in its role as the defender of the country. It is the responsibility of DoD to make the best use of these resources in the execution of its core mission.

1.5 Overview of Statutory and Regulatory Requirements

Figure 1-2 displays an architecture for VE statutory and regulatory requirements as well as policy and guidance.

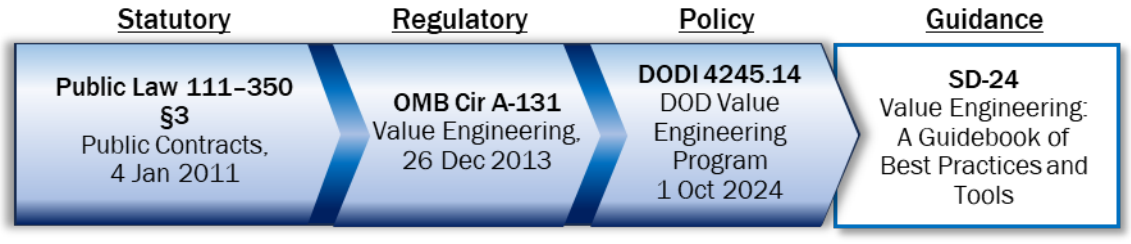


Figure 1-2. Architecture for VE Policy and Guidance

It is important to recognize why federal VE requirements exist. With the proliferation of VE in DoD, Congress recognized the benefits of agency value programs and their positive impact on the business of the Government. The revitalization of the DoD VE Program is both necessary and beneficial, and recognition of the VE requirement as an impactful management tool to aid in the delivery of value across the Department. Overviews of these requirements are as follows:

Public Law on Public Contracts, revised January 2011 (Public Law 111-350, 124 Stat. 3718.) states:

> Each executive agency shall establish and maintain cost-effective procedures and processes for analyzing the functions of a program, project, system, product, item of equipment, building, facility, service, or supply of the agency.
>
> The analysis shall be
>
> (1) Performed by qualified agency or contractor personnel; and
>
> (2) Directed at improving performance, reliability, quality, safety, and life-cycle costs.

OMB Circular A–131 implements the Public Law, stating:

> The circular provides guidance to support the sustained use of VE by Federal Departments and Agencies to reduce program and acquisition costs, improve performance, enhance quality, and foster the use of innovation. Agencies should maintain policies and procedures to ensure VE is considered and integrated, as appropriate, into the planning and development of agency programs, projects, activities, as well as contracts for supplies and services, including performance based, architect-engineering, and construction contracts (OMB Circular A-131, 1).

To accomplish this purpose, the OMB Circular establishes VE policy and promotes broad applicability. It is Federal policy that:

> Federal agencies shall consider and use VE as a management tool to ensure realistic budgets, identify and remove nonessential capital and operating costs, and improve and maintain acceptable quality in program and acquisition functions. Consistent with the guidelines in the circular, senior agency management shall ensure that agency VE policies and practices support effective, efficient, and environmentally sound arrangements for conducting the work of their agencies and provide a sound basis for identifying and reporting accomplishments (OMB Circular A-131, 4).

Key elements of the OMB Circular are listed under "Agency Responsibilities" and charge agency Senior Accountable Officials (SAOs) with responsibilities including:

- Maintaining agency guidelines and procedures for consideration, use, screening, and scaling of VE efforts.

- Ensuring training for agency personnel.
- Maintaining plans for VE use in the agency.
- Ensuring funding for the VE program.
- Maintaining documentation on the VE program.
- Reporting results of the VE program annually.

OMB provides additional direction to agencies regarding the use of value engineering/value management in Circular A-11, *Preparation, Submission, and Execution of the Budget*.

1.6 DoD VE Policy and Guidance

The Secretary of Defense has placed increased emphasis on limiting the overall expenditures of DoD to the minimum necessary to achieve the capability to fulfill its mission. VE is recognized as an effective contributor to this objective. DoD's VE program encompasses all value-oriented activities. DoDI 4245.14 requires Components to establish a VE program to encourage innovation, improve value, and reduce costs over the acquisition and operation life cycle. The instruction also defines Component roles and responsibilities and creates a governance structure.

DoDI 4245.14 establishes responsibilities for the USD(R&E):

- Establishes policy for the DoD VE Program in accordance with section 1711 of Title 41, United States Code, and OMB Circular A-131 and provides guidance on using VE to implement affordability, cost controls, and incentives for productivity and innovation.
- Maintains the VE Executive Steering Group (ESG) and the VE MAG in accordance with DoDI 5105.18.
- Designates a senior executive to chair the VE ESG.
- Reviews DoD Components annual VE results as presented to the VE ESG.
- Establishes and maintains an annual DoD VE awards program in accordance with Volume 451 of DoDI 1400.25.

DoDI 4245.14 also states that Components will apply VE principles and methodology to the acquisition, operation, and support functions of DoD services, materiel, and facilities and will incorporate VE within continuous process improvement training. The instruction further states that DoD Component heads will:

- Designate a Component senior executive for membership in the VE ESG.

- Appoint a qualified SAO for VE, charged with fulfilling the "agency responsibilities" detailed in the OMB Circular.
- Oversee their Component's implementation of the Instruction.

In addition, DoDI 4245.14 establishes a DoD reporting mechanism to position the Department to meet potential OMB requests for VE program reporting requirements. The results of value-improving activities may be included in annual VE reporting if one of the following two criteria applies:

- Results from an approved VECP.
- Results from a change that improves value of a required function (where value is a function of performance and cost) using function analysis to determine best value.

Appendix A provides more detail on function analysis along with other steps in the process of conducting VE.

2 DoD Component Value Programs

The DoD VE Program is an enterprise initiative, so each DoD Component needs to tailor the program to meet its specific needs. The DoD VE Program provides a common set of characteristics to consider when designing a Component VE program:

- Organizational Structure
- Policy
- Business Processes
- Training
- Culture

This section discusses these characteristics, their various levels of development and evolution, best practices and considerations, and supporting examples that illustrate approaches to realizing a value program. Those items are then summarized into a "starter kit" for Component value programs to use to prioritize efforts and plan for long-term success.

2.1 Value Program Maturity Model

Table 2.1 shows a proposed value program maturity model framework to map the characteristics of a value program relative to its levels of development and maturity.

Table 2-1. Value Program Maturity Model

Character.	Initial	Developing	Established	Optimized
Org Structure	No component SAO designated for VE	Incomplete component coverage by SAO(s) for VE program	Complete component coverage by SAO(s) for VE program	Highly effective component coverage by SAO(s) for VE program
	No component value program manager (VPgM) and/or assigned VE program support personnel	Designated VPgM(s) insufficient VE program support personnel and/or resources	Adequate VE program support personnel and/or resources	Optimal VE program support personnel and resources
Policy	No component VE policy	Existence of some form of VE policy in the component	Formal component VE policy	VE policy across all lower commands
	No implementation of VE policy	Inconsistent implementation of some form of VE policy in the component	Inconsistent implementation and enforcement of formal component VE policy	Universal implementation and enforcement of VE policy
Business Processes	No documented value program processes	Partial documentation and implementation of value program processes	Full documentation and implementation of value program processes	Full documentation and implementation of value program processes and integration with component business processes
Training	Little to no formal VE trained personnel (internal or industry)	Value program personnel have some formal VE training	Fully qualified and trained value program personnel	Value program personnel are actively providing VE training for other personnel within the component
Culture	Lack of awareness of VE	Lack of acceptance of VE	Value friendly environment	Universal focus on value improvement

The model considers each of the five characteristics relative to four general levels of development. The levels provide a way of thinking about the maturity of a value program by describing key observations for each. A DoD Component may have different levels of development for the five characteristics as well as the sub-characteristics where they exist.

Each Component will need to determine the most appropriate level of development for each characteristic of their value program; it may not be necessary to achieve the highest level for each characteristic.

Following is a summary of assumptions about the characteristics at each level:

- **Initial** – A characteristic is nascent and there is generally no development yet.
- **Developing** – The characteristic is reaching the first stages of development and formality.
- **Established** – The characteristic is in a fully formed state. There is room for growth and improvement, but the characteristic has reached a functional level.
- **Optimized** – A characteristic has reached a high level of effectiveness.

The value program maturity model focuses primarily on the level of implementation of the five characteristics (organizational structure, policy, business processes, training, culture). When using this model to assess value program maturity, the quality and effectiveness of the characteristic are assumed (e.g., policy that complies with federal requirements; or processes that support effective planning, execution, and reporting of value activities).

2.2 Organizational Structure

This characteristic describes the identification and location of the SAO within the DoD Component responsible for the value program. There could be one or more SAOs within a Component depending on the need. This characteristic also includes the personnel in support of the SAO in executing the value program as a mission responsibility for the Component.

2.2.1 Organizational Structure Development Levels

2.2.1.1 Initial

Early on, a Component's value program may not yet have identified a Component SAO for VE or the Component may not have staffed the value program with any support personnel to carry out the tasks to manage, execute, or otherwise fulfill necessary requirements.

2.2.1.2 Developing

At this stage, the Component's value program may have designated one or more SAOs for VE, but not all the Component's business and workload are covered. Another indicator of this level of development is that each Component SAO has some value program staff, such as a value program manager (VPgM) or other value program personnel, but resourcing is insufficient to carry out all tasks to manage, execute, or otherwise fulfill necessary requirements.

2.2.1.3 Established

Development indicative of this level could look like a Component having one or more SAOs covering all elements of the Component's business and workload and that the Component value

program has adequate support resourcing (positions, funding, time) to carry out all tasks to manage, execute, or otherwise fulfill necessary requirements.

2.2.1.4 Optimized

At this fully developed level, a Component would have highly effective coverage by the SAO(s) with the ability to fulfill all the "Agency Requirements" from OMB Circular A-131, and the value program would have optimal program support personnel and resourcing.

2.2.2 Best Practices and Considerations

As Components implement the requirements from the DoDI 4245.14, the following best practices and considerations may assist with ensuring success regarding the organizational structure of their value programs.

2.2.2.1 Consider the Purpose of the Component SAO designation.

As specified by DoD Directive (DoDD) 5137.02, "Under Secretary of Defense for Research and Engineering," the USD(R&E) serves as the DoD SAO for VE. The DoDI transfers authority to the Components in the form of an assigned mission responsibility and instructs them to designate their own SAO(s) as part of fulfilling the "Agency Responsibilities" from the OMB Circular. This transfer of requirements enables Components the greatest flexibility to implement the DoDI to best suit the differences in structure, process, acquisitions, and general execution of various organizations across the Department.

2.2.2.2 Consider Both Qualifications and Organizational Placement of the SAO

OMB Circular A-131 requires that the SAO be located "level with sufficient authority within the Department or Agency to coordinate, oversee, and ensure the appropriate consideration and use of VE" (page 4). DoDI 4245.14 requires that Component SAOs be qualified in VE, requiring consideration of relevant experience, training, credentials, and education. Agencies may establish a credentialing or certification requirement to recognize qualification in VE. This means that the qualified SAO would be proficient in the business of the area(s) under their purview as well as VE and value program requirements. Addressing these elements when designating the SAO(s) ensures that an individual charged with the responsibility for the value program can effectively carry out the responsibilities listed in the OMB Circular, ensure effective application and implementation, and advise leadership accordingly. DoD Components may establish a credentialing or certification requirement to recognize qualification in VE.

2.2.2.3 Consider Designating More than One SAO for the Component

Along with the considerations identified above, Components may determine that more than one SAO makes sense based on differences in missions and business lines. This is especially important for major differences in acquisition such as construction, major systems, or sustainment. The Army currently handles these differences by having one SAO in the U.S. Army Corps of Engineers (USACE) for engineering, construction, real property, and technical policy and another SAO in Army Materiel Command (AMC) for everything else.

2.2.2.4 Resource the Value Program as an Assigned Mission Responsibility

The DoDI, which assigns the responsibility to Components, requires that Components "provide resources necessary for the VE Program," and OMB Circular A-131 requires that agencies ensure that funding is "identified and included in annual budget requests to OMB." As Components look to reinvigorate, further develop, or optimize their value programs, this approach to resourcing is explicitly allowed by the DoDI and OMB Circular. Furthermore, OMB ties VE to federal budgets through Circular A-11, recognizing its role to support federal performance. Components are encouraged to consider VE as part of their overall performance reporting and justification for budgets.

2.2.2.5 Staff the Value Program with Personnel Assigned as Primary Duties

An effective approach allows direct access to individuals qualified in VE to assist with implementation of the DoD value program including access to expertise, enhanced reporting and documentation, and improved compliance with requirements. Across the Federal Government, the most successful value programs are those with qualified personnel dedicated to managing the value program. Historically, the best-performing value programs recognize the need for both technical qualifications in the VE process and program management capabilities to ensure consistent planning, monitoring, execution, and implementation of value program requirements and value activities. As a best practice, DoD Components may establish a credentialing or certification requirement to recognize qualification in VE.

2.2.3 Organizational Structure Examples

Figures 2-1 and 2-2 show examples of a value program organizational structure, including relationships among the SAO, Command level (Senior Executive Service/Government Official), subordinate commands, major program offices, and staffing of VPgM positions.

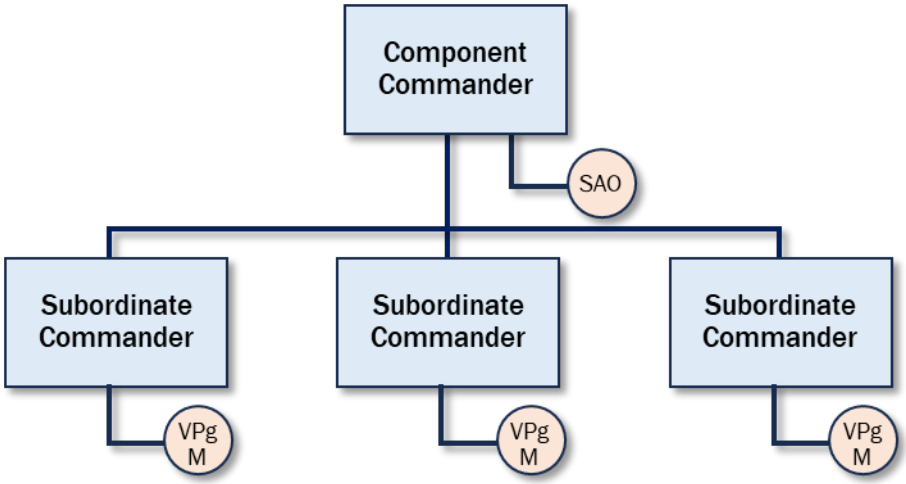


Figure 2-1. SAO Designated at Component Command Level with Value Program Staff at Subordinate Commands

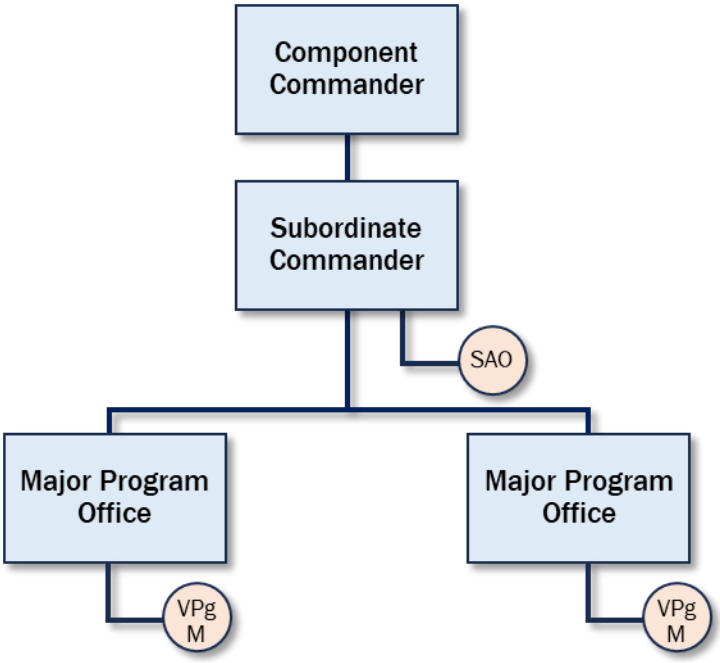


Figure 2-2. SAO Designated at Subordinate Command with Value Program Staff at Major Program Offices

2.3 Policy

Each DoD Component (and possibly its subordinate commands) typically implements DoDI 4245.14 by developing its own internal VE policy that has been attuned to meet its specific context and needs. In the DoDI's direction to implement the OMB Circular's "Agency Responsibilities" at the Component level, Component SAOs are charged with interpreting and

establishing internal VE policy that fits the business of the Component (or portion thereof, if the Component identifies more than one SAO).

An essential element of Component VE policy is the recognition that SAOs are not empowered to eliminate or combine VE with other processes to reduce the program to a mere "check the box" exercise. The authority delegated and entrusted to Component SAOs (and in cases of cross-Component work, the SAO for the contract-executing agent) is to fulfill the requirements of the OMB Circular and ensure the effective and efficient management of agency programs, projects, activities, and contracts. These and other considerations should be included in Component VE policy to ensure an effective value program.

2.3.1 Policy and Guidance Development Levels

2.3.1.1 Initial

At this stage, a Component may not have any policy or guidance for VE or, if such policy exists, little or no implementation (for discussion purposes, 20% or less) of the policy has occurred.

2.3.1.2 Developing

At this level, the Component may have implemented some level of basic VE policy or guidance. Implementation indicative of this level would look like inconsistent adoption (less than 50%) across the applicable Command(s), offices, or business areas.

2.3.1.3 Established

A value program developed to this level may have some formal VE policy or guidance specific to applicable programs, business lines, or with partial integration into other policy and guidance. Implementation and enforcement may exist for some (over 50%) areas within the Component.

2.3.1.4 Optimized

A characteristic of an optimally developed value program might be demonstrated by the presence of clear and integrated policy and guidance regarding the value program with universal (80%+) implementation and enforcement in all relevant areas.

2.3.2 Best Practices and Considerations

2.3.2.1 Consider Using Component-level Policy, Instruction, or Other Directives to Designate Component SAO(s)

Components have the flexibility to designate one or more SAOs by any means, but a recommended approach would be to incorporate this designation into existing mechanisms (policy, directive, or otherwise) that personnel across the Component can access on-demand.

2.3.2.2 Use the Combination of SAO and Policy to Adopt a More Flexible Approach to Value Program Requirements

Having an SAO and a policy allows Components to focus VE application to the areas of opportunity that make the most sense for the organization. Otherwise, the DoDI instructs Components to adopt the baseline policy of the OMB Circular, which states that "VE shall be required for new agency projects and programs when the cost estimate is at least $5 million."

2.3.2.3 Incorporate Other DoD Requirements When Establishing Component VE Policy

For example, DoD Directive (DoDD) 4270.5 defines roles and responsibilities for DoD Construction Agents. For construction and similar covered work as defined by DoDD 4270.5, where work may be accomplished through partnership between organizations covered by multiple SAOs, the Construction Agent SAO (as the contract executing agent) has the authority to make the determination on VE application.

2.3.3 Policy Examples

2.3.3.1 Department of the Army Approach

As stated in section 2.2.2, the Army has decided to designate two SAOs to address VE program requirements. The delineation of responsibility is codified in Army Regulations. This approach enables personnel at all levels to understand where the authority for VE program requirements exists and enables leadership to understand their role in implementing DoDI 4245.14. With clear lines drawn in Army policy, the SAOs are able to advise their Commands to further implement the requirements with lower-level policy, guidance, processes, metrics, oversight, and reporting to ensure a viable value program at all levels.

2.3.3.2 Department of the Interior Approach

The Department of the Interior issued their own policy on the VE program to comply with OMB Circular A-131. The policy sets specific requirements at the Executive Agency level, with the subordinate Bureaus given the choice to use only the Interior policy or issue their own with additional specificity.

2.3.4 Policy Enforcement: Audits and Internal Controls

DoDI 5010.40 details the requirements and importance for effective internal controls. As an assigned mission responsibility from the USD(R&E), effective internal controls for the VE program are important for the Components to consider and implement. Internal controls help ensure compliance with DoDI 4245.14 and OMB Circular A-131 and assist Components with validating benefits of value activities such that results are valid, trustworthy, and reportable. Amid the most recent update to Circular A-131, OMB specifically noted the need to monitor effective implementation of the Circular through agency internal controls programs in accordance with Circular A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control*.

One common internal control is the use of one or more metrics to monitor and report on elements of the value program. Example metrics could include data points such as schedule milestones, completed VE workshops, qualified personnel, cost avoidance/cost savings, or other measures of compliance with Component VE policy if one exists.

Components are encouraged to use audits (either formal or informal) to assess compliance with DoDI 4245.14 as well as any policy or processes established at the Component level or below for the value program.

2.4 Business Processes

This characteristic includes the broad range of procedures, processes, guidance, and practices that establish how the value program functions. Such processes can range from informal to formal and possess various levels of documentation.

2.4.1 Business Process Development Levels

2.4.1.1 Initial

Early in the development of a value program, a Component may not have implemented any processes in relation to value activities. At this stage, Component personnel likely have a lack of understanding on VE and the timing, steps, and integration points for VE in each acquisition or program office.

2.4.1.2 Developing

At this stage, a value program might have some processes defined and implemented, but work remains to clearly document and implement necessary processes to ensure personnel are well-equipped to coordinate and execute value activities.

2.4.1.3 Established

A value program at this stage of development might have full documentation and implementation of all relevant processes related to the value program, with opportunities to better integrate into existing business processes for other Component elements such as acquisition types, budget programming and execution, decision making, governance, or financial reporting.

2.4.1.4 Optimized

Optimal development in this regard might look like the presence of fully documented value program processes and integration with all other relevant business processes.

2.4.2 Best Practices and Considerations

Best practices should tie in with existing processes related to programming, planning, and development of projects and acquisitions. Value program requirements are easier to implement when integrated with other business processes.

Programs should account for the upfront planning and implementation efforts necessary for successful value activities. Successful value program processes consider time to plan and execute value activities as well as time for decision and implementation of value proposals.

Common business process categories within a value program typically include the following:

- Screening and determination process for application of VE.
- Planning and resourcing value program activities.
- Validation of VE outcomes to ensure accuracy and defensibility.
- Reporting benefits of VE activities.

2.4.3 Business Process Examples

Example processes useful for a value program could include, but are not limited to:

2.4.3.1 Value Management Plan Process

One Defense organization requires project managers to develop a Value Management Plan as part of their overall Project Management Plan or Program Management Plan. The process developed here highlights when and with whom the project manager consults to develop the strategy for value management on the project, ensuring that any value activities are scheduled

and resourced to fit the needs, opportunities, schedule, risk, and complexities of the project/program.

2.4.3.2 VEP Review Process

Another Defense organization developed a process for their Integrated Product Teams (IPTs) to use when submitting information for VEPs. This process clarifies the signatures, required documentation, justification, supporting evidence, and reviews that are necessary to submit, claim, and receive credit for VEPs. Such a structured approach increases the efficiency of VEP processing for all elements.

2.4.3.3 VECP Submission Process

In this example, both Contractors and Component employees have a resource that clearly conveys the requirements of the FAR with context to the Command's organization and other business processes. This developed process eliminates confusion and helps ensure timely processing of VECPs in accordance with FAR requirements.

2.4.3.4 Reporting Processes

Documenting and reporting outcomes are essential elements of value programs, and Components likely already have existing mechanisms to report upwards (e.g., quarterly meetings, annual reports, electronic reporting systems). Value programs often find it beneficial to lay out steps and timelines for reporting to ensure timely capture of outcomes through consistent channels to inform leadership.

2.5 Training

This characteristic considers the level of training of personnel within the DoD Component related to both the functioning of a value program as well as the application of VE. This emphasis on training both value program staff and other Component employees results in a well-educated organization that successfully complies with the DoDI and OMB Circular A-131.

2.5.1 Training Development Levels

2.5.1.1 Initial

Early in a value program's development, the organization may not have any personnel with training in VE, the value methodology, or value program requirements.

2.5.1.2 Developing

At this stage, the Component may have a value program with personnel that have accomplished some level of formal training in VE and value program requirements.

2.5.1.3 Established

A value program developed to this level would likely have fully qualified (as defined in DoDI 4245.14) value program personnel, knowledgeable in VE and value program requirements. As a best practice, DoD Components may establish a credentialing or certification requirement to recognize qualification in VE.

2.5.1.4 Optimized

At this fully developed stage, the Component's value program personnel are actively providing training to other personnel within the organization, in alignment with the requirement to train others in OMB Circular A-131.

2.5.2 Best Practices and Considerations

2.5.2.1 Consider How Value Activities Will Be Accomplished in the Component When Determining the Training Needs for Staff

If the Component wishes to outsource VE workshops to contractors or other Government agencies, then the training for the Component's value program staff may benefit from a focus toward program management and understanding how best to integrate with the business of the Component (or Command). On the other hand, if the desire is to keep technical VE facilitation as an in-house resource and capability, additional training, experience, and credentials will be necessary to complete those tasks in addition to the program management focus. DoD Components may establish a credentialing or certification requirement to recognize qualification in VE.

2.5.2.2 Seek Industry Credentials for Value Program Staff

Regardless of how value activities will be accomplished for the Component, a best practice is to seek industry credentials in both VE and program management to ensure value program staff are well-equipped to address the workload and ensure success.

2.5.2.3 Leverage Existing DoD Resources for Training

See Appendix C for additional resources.

2.5.3 Training Examples

2.5.3.1 USACE Training Requirements

For their education and training requirements, USACE requires their value program managers to receive training in both technical elements of VE and internal training on the integration of the value program into USACE business requirements. In addition, value program staff are charged with conducting periodic training for all organizational elements that relate to acquisition and federal VE requirements.

2.5.4 VE Community of Practice

To encourage the sharing of information and collective development across the Components, DoD supports the creation and use of the VE Community of Practice (CoP). Components are encouraged to establish VE Communities of Practice within their own organizations to support the sharing of knowledge. The DoD VE MAG represents all Components and may serve as a resource for the overall VE CoP and Component-level CoPs.

2.6 Culture

This characteristic describes the degree to which the individuals within a DoD Component have embraced value improvement as a key focus of the organization.

2.6.1 Culture Development Levels

2.6.1.1 Initial

At the infancy of a value program, staff across the Component have little to no awareness of VE and value program requirements.

2.6.1.2 Developing

A value program developed to this point may demonstrate a culture where staff are somewhat aware of the value program, but acceptance is very low. Here, typically there is a great deal of resistance to value activities and the main rationale for the use of VE comes down to compliance with federal requirements.

2.6.1.3 Established

At this stage, the culture has developed to generally accept VE and the value program as part of the Component's business. Leaders and IPTs are aware of and understand the requirements, and staff periodically request value program support even when it is not required.

2.6.1.4 Optimized

The culture of an optimally developed value program would demonstrate a broad understanding that the value program supports universal value improvement for the Component. Organizations at this level routinely see new and existing opportunities to use VE, with Component employees routinely seeking out value program staff to use value program tools, techniques, and resources for innovative solutions to challenges of all types.

2.6.2 Best Practices and Considerations

2.6.2.1 Retain Benefits of the Value Program

DoDI 4245.14 allows Components to retain the benefits of value activities (e.g., cost avoidance, cost savings) and reinvest the benefits to further incentivize the value program. Where possible, Components should reinvest the validated cost avoidance and cost savings into other areas that increase awareness, interest, and adoption of VE and the value program.

2.6.2.2 Share Successes Often

The positive impacts of VE, VEPs, and VECPs go far beyond financial impacts. Recognize excellence for improvements to quality, safety, reliability, maintainability, efficiency, and effectiveness resulting from value activities. Encouraging staff to nominate projects, programs, teams, and individuals for recognition in support of the value program can both support the Component's goals and improve the permeation of a value-focused culture.

2.6.2.3 Identify a Champion

Adoption of VE and the requirements of DoDI 4245.14 are best supported using Champions at the leadership level. The Champion leads and encourages others to embrace the program and its benefits and helps establish a long-term supportive culture while the SAO focuses on value program operations. The intent of the DoD VE Program is for the Executive Steering Group members from the Components to serve as the Component champions for their value programs.

2.6.2.4 Dedicate Staff to the Value Program

Although this best practice was mentioned above, the agencies with the strongest cultures toward value, VE, and execution of the value program are those that have dedicated resources to oversee, manage, and execute the requirements. These individuals not only help implement requirements and educate others, but they serve as a consistent focal point and resource to assist employees from all organizations in matters related to value, VE, and the value program.

2.6.2.5 Added Duties Can Be a Hindrance

Conversely, those agencies that resource the program as an added duty to existing staff and organizations often find that the value program requirements quickly become an afterthought. As a secondary or tertiary responsibility, designated individuals and their supervisors prioritize other work and both compliance and outcomes struggle as a result. When leadership chooses to fulfill value program responsibilities as an afterthought, a supportive culture is almost impossible to build.

2.6.3 Culture Examples

2.6.3.1 Using VEP Savings to Fund Awards

One Army Program Executive Office (PEO) uses validated savings to fund cash incentive awards for individuals and teams that generate validated and implemented VEPs. Staff at this organization used a Champion to work with personnel responsible for awards budgeting to leverage existing Army Regulation allowances for cash incentives. By funding the awards out of the savings, the PEO was able to (A) stretch their awards and recognition budget further, and (B) incentivize participation in the value program.

2.6.3.2 Using VE Workshops for Non-Financial Outcomes

One Component organization uses VE workshops to begin every project over a specific dollar size. This approach not only fulfills compliance with the organization's requirements for VE, but the project teams leave the workshop with a consistently better start to their projects including cross-entity coordination and shortened timelines to develop and confirm project requirements. This consistent emphasis on improved quality outcomes without focus on cost avoidance/cost savings has resulted in a broad culture of value improvement and excitement about VE that previously did not exist in that organization.

2.7 Value Program Starter Kit

The following list is a recommended set of initial priorities to establish and implement a successful value program:

1. Designate a Component SAO and a Champion. As mentioned above, it is paramount that Components designate SAOs at the appropriate level of the organization and with sufficient ability to exercise authority over the value program. See Sections 2.2 and 2.6.2 for more details.
2. Set policy to meet VE requirements. Components and – if needed – subordinate organizations need policy that ensures compliance with DoDI 4245.14 and OMB Circular

A-131. To do so, the SAO must assess the workload; identify where and how to integrate requirements; and ensure compliance.

3. Organize the value program structure and resource VPgM positions adequately. With a policy set for the Component/organization, the next step is to identify roles, responsibilities, and necessary resourcing (personnel, time, and funding) to carry out the value program. Note: the requirements of DoDI 4245.14 are an assigned mission responsibility transferred to the Components, and OMB Circular A-131 allows Components to request funding as a line item in annual budgets. Take advantage of this opportunity and appropriately resource the value program to be successful.
4. Emphasize qualifications. The DoDI, OMB Circular, and Public Law require the use of qualified personnel to perform value activities. Consider the need for both technical VE competency as well as the program management skill sets needed to oversee and execute a value program. As a best practice, DoD Components may establish a credentialing or certification requirement to recognize qualification in VE.

3 Applications and Timing

VE can be applied in many ways and is applicable to projects, products, processes, services, and organizations. Furthermore, the timing of VE can occur at one or more points. For example, VE studies for a new military facility could occur at multiple points during design development (i.e., planning, concept, and preliminary) as well as in the form of VECPs during construction.

VE should be used to overcome poor value and quality regardless of its specific application. The following is a list of considerations, or "value indicators," that can be used when considering the applicability of VE.

- Lack of shared project information (e.g., insufficient data on the function of stakeholder requirements), which includes building materials and processes.
- Lack of ideas or failure to develop alternate solutions and then making choices based on economics and performance.
- Temporary circumstances (e.g., urgent delivery, design, or schedule circumstances can force decisions that, while quick, may be incomplete without regard to value).
- Honest but wrong beliefs (e.g., decisions based on what is believed to be correct rather than on facts).
- Habits and attitudes (e.g., response to doing the same thing, the same way, under the same circumstances).
- Changes in stakeholder requirements (e.g., new requirements may cause costs to increase without awareness).
- Lack of communication and coordination (e.g., issues of communication and coordination have been determined to be reasons for unnecessary costs).
- Outdated standards and specifications. VE helps isolate and focus new technologies and standards in areas where high costs with poor value may incur based on wrong or legacy information. Active VE can provide a framework for a rigorous review of project specifications (Dell'Isola 1997).

VE is not a design/peer review or a cost-cutting exercise. The objectives of any value study must be consistent with the overall philosophy and objectives of the program, and the individual requirements of the project. If the construction cost for a project is within budget, the emphasis of the value study is often on maintaining or improving value in terms of operations, flexibility, expandability, and so forth. If improving value can be delivered at reduced cost, then cost/budget reduction becomes a secondary goal. When a project is above budget, the emphasis of the value study is often on reducing construction cost to be within budget without compromising

requirements or eroding the value of the finished project. The value study is not intended to be used as a device for producing cost reductions by "cost cutting," with an accompanying reduction in the scope or value of the project over the life cycle of the completed facility.

The remainder of this section will explore ways in which VE may be applied and when it can be applied.

3.1 Selecting Subjects for VE

Identifying the right subject is the first challenge in preparing for a value study. It may be impractical for a Component to require VE on all projects, systems, or programs. Therefore, each Component may want to establish protocols to target high-value areas within their portfolios and make the most effective use of resources in meeting the VE requirements.

The following techniques are commonly used:

- Thresholds. The adoption of a simple threshold, usually based on cost, to determine which subjects are selected for VE studies. OMB Circular A-131 requires VE for "agency projects and programs when the project cost estimate is at least $5 million, or such lower dollar threshold as determined by the SAO and identified in the agency's VE guidelines." Having a qualified SAO allows Components to set a lower threshold for assessment and flexibility in performing VE. Otherwise, the Circular specifies mandatory VE efforts on every project as a hardline requirement.
- Scorecards. A scoring system could be developed that considers a variety of criteria in determining whether a project is a suitable candidate for VE.

Each system and subsystem must be examined to identify high-cost elements that then become prime candidates for study. For each such item, the following questions provide further guidance:

- Is the item expensive?
- Is it complex?
- Is it a high-volume item? Can a simple change in one item produce large savings within the total project?
- Does it use critical materials?
- Is it a long-lead item?
- Is it difficult to construct or does it require specialized skills to create?
- Does it have high maintenance or operations costs?

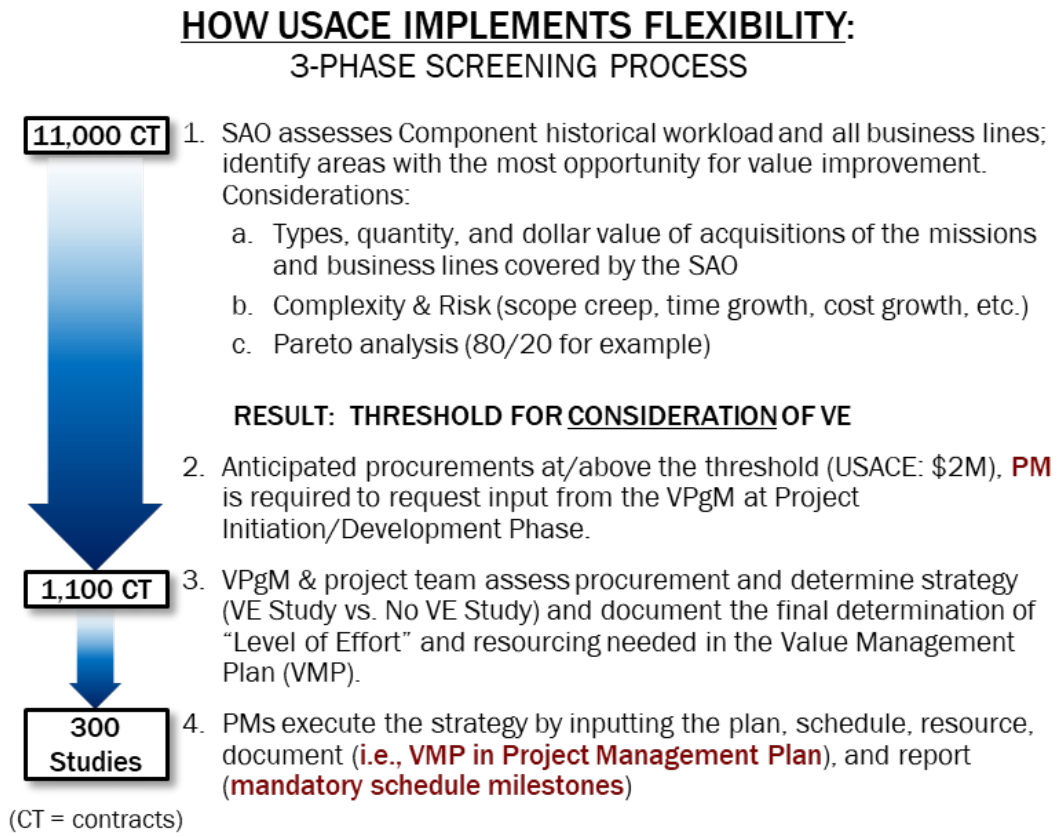
- Does it use obsolete materials and methods?
- Are costs simply “out of line”?
- Was the design rushed?
- Is there a high degree of risk or uncertainty related to performance, cost, or time?
- Would the consequences of failure be catastrophic?
- Does it suffer from performance problems?
- Is it a state-of-the-art component with a low level of proven acceptance?
- Are life-cycle costs unacceptable?
- Does it contain redundant features?
- Does it create an unwanted function of high future cost?
- Does it use traditional design?
- Is the competition producing the item at a lower cost?
- Does top management want improvement?

3.2 Budget Program Analysis

The intent of the initial screening of component business line items is to identify those areas that have the most opportunity for value improvement. Many methods exist for conducting an initial assessment of the budget program analysis. At this stage, such an analysis might look like an assessment of the types, quantity, and dollar value of the different acquisitions of the missions and business lines covered by the SAO. Components may find that a Pareto analysis will suffice for estimating where the overall value program opportunity exists. Others may determine that a more detailed analysis is necessary to identify target areas of opportunity for policy or processes in the value program.

This analysis supports the qualified Component SAO’s decision on whether to adopt the “fixed” approach for mandatory VE (studies) to be performed at the threshold set by OMB (at the time of this writing, $5 million) or the “flexible” approach to set a lower threshold for consideration and additional guidelines to determine where full or scaled VE would best benefit agency projects and programs.

Figure 3-1 describes the screening process USACE uses to analyze program budgets.



Source: USACE

Figure 3-1. USACE Budget Analysis

3.2.1 Construction Projects

The main objective of VE in construction is improving project value. This section discusses VE's application during the three main phases of a construction project: planning, design, and construction. VE can be applied at any point in a construction project, even during actual construction. Typically, however, the earlier VE is applied, the higher the return on the time and effort invested. Benefits include the following:

- Improved functionality of the project. A "second look" at the design produced by the architect and engineers ensures that all reasonable alternatives have been explored.
- Significant savings—both during construction and over the life cycle.
- More reliable cost estimates and scope statements. Both are checked thoroughly to ensure that nothing has been omitted or underestimated.
- Best value will be obtained over the life of the building (National Institute of Building Sciences 2015).

Generally, no constraints are placed on the VE program in terms of areas of study for projects. Likewise, governing criteria, except as required by building codes or laws, are considered open for challenge by VE provided that the value and cost benefits are worthwhile and no compromises are made to important project functions. Even the requirements for a project are open to challenge by the VE team, to the extent that programmatic inefficiencies can be eliminated without sacrificing the basic project objectives and intended features or functions of the completed facility.

For a specific project, any constraints placed on the value study must be identified and justified before starting the study. Such constraints are uncommon and are, generally, the result of specific studies produced by the architecture and engineering (A/E) firm or other consultants and not the result of the normal design process.

Conversely, the VE team is expected to use common sense when challenging design decisions or criteria that are deep-seated and important issues to the A/E firm or the agency user. This expectation also should preclude the team from spending valuable time on far-fetched or frivolous ideas that have little or no chance of acceptance. USACE (USACE, Regulation No. ER 11-1-321, 2011) and the Naval Facilities Engineering Command (NAVFAC) (NAVFAC 2011) maintain detailed guidance for VE program requirements for construction and other mission areas assigned to those organizations.

In cases of construction and similar categories of work (e.g., facilities engineering, renovation, maintenance), the DoD Construction Agent bears accountability as the contract-executing agent to ensure compliance with VE requirements. As such, the Construction Agent SAO has authority to determine the appropriate VE strategy.

3.2.2 VE during the Planning Phase of a Construction Project

During the planning phase, VE can make a major impact on the life-cycle cost of a construction project. The life-cycle cost includes the cost of planning, design, construction, and ownership of a project over the projected effective useful life of the project, and its determination includes consideration of functional obsolescence of major components or systems. The life-cycle cost is used to compare and evaluate the total costs of competing solutions.

In addition, adjustments to the program at this point have very little if any disruptive impact on schedule, A/E time, and redesign costs. Consequently, the project should proceed with fewer changes and with a greater understanding by all parties of what the final function and space allocations will be.

VE conducted during the planning phase is sometimes referred to as “value planning.” During the planning phase, an independent VE team should do the following:

- Review the program.
- Perform function analysis of the project.
- Obtain the owner/user's definition of value.
- Define the key criteria and objectives for the project.
- Verify/validate the proposed program.
- Review master plan utility options (e.g., central utility plant versus individual systems).
- Offer alternative solutions (square footage needs per function, materials, and so forth).
- Verify whether the budget is adequate for the developed program.

Projects may benefit from bringing in an independent VE team to provide an outside view of alternate solutions from other similar projects. Organizations can employ value planning to improve designs and resolve issues. Value planning can be an attractive means of eliciting ideas and resolving issues.

For example, a value planning effort was conducted on a military construction (MILCON) project to align the DD1391 scope and budget, which was set years before the value study, with actual cost environment and changes to the military mission. This effort was successful in ensuring that the project would meet the current objectives while working within the original project justification and authorized funding.

3.2.3 VE during the Design Phase of a Construction Project

VE is most often used when the design is in the schematic stage (i.e., the architecture drawings are developed enough to include the major components, such as elevation, electrical, mechanical, and so forth). By this time, typically 35 percent of the design has been completed. The workshop is an opportunity to bring the design team and client together to review the proposed design solutions, the cost estimate, and the proposed implementation schedule and approach, with the goal of implementing the best value for the money. The definition of good value on any project will change from client to client and project to project. Generally, VE activities include the following:

- Obtaining all necessary information from the best possible sources.
- Determining and evaluating the functions of the present design.
- Obtaining costs and determining present design constraints.
- Answering the questions "what is it," "what does it do," "what must it do," and "what does it cost"?

- Using brainstorming to develop creative alternative proposals or designs that meet the required functions.
- Answering the questions "what does each feasible alternative cost" and "will each perform the basic function(s)."
- Recommending specific design alternatives.

VE is frequently applied to construction projects sometime during the design phase because an initial design concept has been developed and cost and schedule information usually exists. This level of design information allows VE teams to estimate cost and schedule savings more accurately.

An example of a value study performed during the design phase for a construction project is one located at Defense Logistics Agency (DLA) Headquarters. The project involved the renovation of 25 elevators in three buildings at the complex. The elevators had been installed in the mid-1990s with the initial building construction. The value study generated alternative concepts that provided moderate cost savings and a significant schedule reduction for the elevator modernization. The accepted value proposals improved functionality, resulted in initial cost avoidance, and reduced the construction schedule dramatically (by as much as 16 months). DLA realized a return on investment of $19 for every $1 spent on the VE effort.

3.2.4 VE during the Construction Phase of a Construction Project

VE improvements are still possible during the construction phase using VECPs. A VECP is submitted by the construction or design-build contractor to propose a change or substitution in the requirements, materials, or methods prescribed in the contract documents. The change is intended to reduce cost (both initial and/or life cycle) but still meet or exceed all necessary functions, including performance, safety, aesthetics, operations, and quality. A contractor may provide a fresh approach to construction that can reduce the cost of facilities and, at the same time, improve the construction sequences and reduce time on the job. The objective of the VECP program is to encourage contractors to investigate improved construction methods and materials, submit VECPs, and, upon acceptance, receive fair and reasonable compensation in the way of shared savings. The general contractor is encouraged to include a VE clause in their subcontracts, depending on the value of the subcontract.

DoD's user must consider contractor-generated proposals carefully from a life cycle and a liability perspective. The A/E team must be included in the decision-making process to help ensure that the proposed change will not have a negative impact on the overall design and building function. The evaluation of a VECP is treated similarly to any change order during construction, with issues such as the impact on the schedule and productivity being considered

along with the perceived cost savings generated. A more detailed discussion of VECPs is contained in Appendix B of this document.

3.3 Business Processes

A business process is a sequence of actions or steps taken to achieve a specific purpose that indirectly supports a DoD mission. DoD business processes are wide ranging and include the establishment and definition of administrative, technical, contracting, maintenance, training, and organizational processes. Examples include the articulation of a recruiting process; a maintenance procedure for a military vehicle; a weapon system training curriculum; a disciplinary protocol; or an engineering process.

The application of VE to processes begins with developing a current understanding of what processes exist and their relative importance. While many processes are documented, it is notable that the lived experience of many engaged in executing them can differ significantly. It is not always clear what the functions are or what the activities or steps in a process are. The examination of the functions of a process can reveal significant insights into how they can be streamlined, enhanced, and made more effective. All processes involve effort, resources, and time. VE can improve the value of processes resulting in improved outcomes, reduced waste, and lower costs.

Another related area is concerned with criteria and standards related to DoD business processes. VE can be used to evaluate the functions of criteria and standards with an eye toward challenging historical assumptions and suggest changes that are in line with current industry practices and technologies.

3.3.1 Screening and Selection

Determining which processes to select for value study can be daunting given the multitude of processes that exist within the DoD. A good place to start is to examine the annual budget of a DoD Component and begin identifying the processes involved in supporting major budget items. Depending on the context, this could involve identifying the major processes supporting a high-cost military program. Once the key processes have been identified, the team should analyze the resources involved in executing these key processes or the value of the outcomes of the processes. Another approach is to look at processes that are experiencing challenges in delivering process outcomes or are experiencing quality issues.

For example, assume a DoD Component expended a large part of its annual budget on a particular military program that involves critical procurement, testing, and training processes. Once the core processes have been identified, the team should estimate the time and resources

required to execute the processes. The Component could then prioritize these processes by total value and then perform a value study on each.

Another approach is to study a group of interrelated processes that are part of a larger program. For example, USACE requires "programmatic" VE studies every 5 years on major programs. This might include studying the processes supporting the Formerly Used Defense Sites (FUDS) Program, which is tasked with remediating contamination and unexploded ordnance on military installations. Such a value study would examine the many processes and procedures necessary to support the FUDS mission.

3.3.2 Examples

A value study focusing on improving the value of a USACE waterways dredging program focused on ways to improve the various business processes supporting the operations and maintenance of Government dredges. VE proposals were identified that could improve the efficiency of dredging operations, minimize maintenance-related downtime, improve the contracting of maintenance services, and reduce operational risk.

A value study was conducted for the MCX-POL Fuels Program that identified numerous VE proposals to revise design criteria to reduce cost and improve the performance of fueling facilities supporting DoD aircraft. Many VE proposals were also identified that could improve the efficiency of supporting business processes.

3.4 Defense Acquisition Applications and Timing

As outlined in DoDI 5000.02, "Operation of the Adaptive Acquisition Framework [AAF]," the DoD AAF is applicable to all systems and services acquired via the Defense Acquisition System (DAS). With respect to systems, acquisition encompasses the entire life cycle beginning with the development of a military need through design and development, production, operations, and support (including modifications) to disposal. With respect to services, acquisition encompasses not only services performed throughout a system's life cycle but also services performed on maintaining military facilities (e.g., building maintenance and repair) as well as supporting personnel (e.g., food preparation, human resources functions).

The six acquisition pathways within the DAS are as follows:

- Major Capability Acquisition (MCA)
- Middle Tier of Acquisition (MTA)
- Urgent Capability Acquisition (UCA)

- Software Acquisition (SWA)
- Defense Business Systems (DBS)
- Acquisition of Services (AS)

From a simple spending perspective, approximately 50 percent[2] of the defense budget is associated with the six acquisition pathways. That represents an enormous opportunity for attaining benefits derived from VE.

Section 3.4.1 discusses VE uses associated with the first three bullets in more detail. Systems covered by these bullets range from high cost, complex acquisitions that are fielded for long periods of time to acquisitions to fill urgent needs within 2 years. VE opportunities associated with the rapid and iterative delivery of software, defense business capabilities, and supporting business systems including those with "as-a-service" solutions are considered in section 3.4.2. Finally, ways to use VE in the acquisition of services are examined in Section 3.4.3.

3.4.1 Potential VE Applications for Development and Support of Military Systems and Equipment

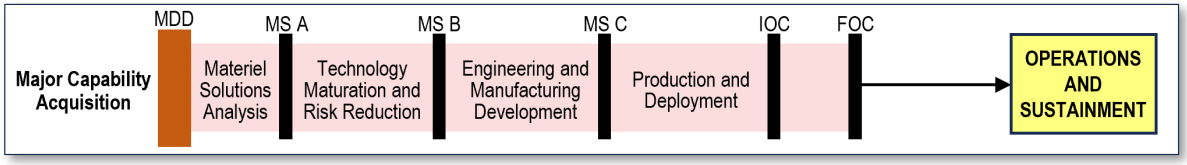
Figure 3-2 is a generic representation of the life cycle for a DoD system or item of equipment.

Figure 3-2. System or Item Life Cycle

Three of the acquisition pathways in decreasing order of cost and complexity—MCA, MTA, and UCA—align closely with the Figure 3-2 life cycle in that they depict the development of hardware systems. Figure 3-3 shows the MCA pathway.

As its name implies, the MCA pathway establishes flexible processes for the development of high-cost, complex defense systems (DoDI 5000.85). It aligns most closely with generic life cycle representation shown in Figure 3-2.

[2] Rough order of magnitude estimate based on (1) three years of congressional budget submissions showing investment funding less science and technology funding and operations and maintenance funding on services; and (2) a separate report showing operations and maintenance spending on the Defense Working Capital Fund from FY 2020 through FY 2023.



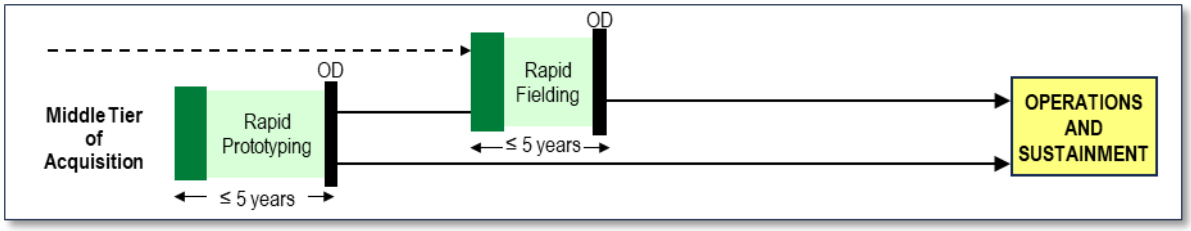
Source: DoDI 5000.02

MDD: Materiel Development Decision. MS A: Milestone A. MS B: Milestone B. MS C: Milestone C. IOC: Initial Operational Capability. FOC: Full Operating Capability

Figure 3-3. Major Capability Acquisition Pathway

- The Materiel Solution Analysis phase defines the system concept.
- Conceptual design starts at MS A.
- Preliminary design begins late in the Technology Maturation and Risk Reduction phase and is completed before MS B.
- The contract to perform detailed design is typically signed right after MS B.
- MS C marks the decision to begin initial production, usually at a low rate.
- Operation and sustainment start at IOC when an initial operational capability is fielded.

Figure 3-4 illustrates the MTA pathway. It is designed to field systems "that have a level of maturity to allow them to be rapidly prototyped within an acquisition program or fielded, within 5 years of MTA program start" (DoDI 5000.80).



Source: DoDI 5000.02.

OD: Outcome Determination

Figure 3-4. Middle Tier of Acquisition Pathway

Rapid prototyping usually encompasses a concept decision, conceptual design, and preliminary design. Next steps depend on the maturity of the technology and the nature of the system. When the technology is not mature, it is common for an MTA system to transition to the MCA pathway at MS B. For more mature technology, the system may transition to the rapid fielding phase of the MTA pathway. For the most mature technology, the next phase would be at MS C of the MCA pathway. If there is no production involved, the rapid fielding phase could include detailed design activities (if necessary) and then move to operations and support.

Rapid fielding involves detailed design. It applies to systems that have mostly completed preliminary design. If no procurement is involved, rapid fielding may transition to operations and support. Otherwise, the transition is to MS C of the MCA pathway.

The UCA pathway, as depicted in Figure 3-5, is used "to provide warfighters involved in conflict or preparing for imminent contingency operations with the capabilities needed to overcome unforeseen threats, achieve mission success, and reduce risk of casualties …. The estimated cost for acquisition programs that provide capabilities to fulfill urgent operational needs and other quick reaction capabilities that can be fielded in less than 2 years must not exceed $525 million in research, development, and test and evaluation, or $3.065 billion for procurements in Fiscal Year 2020 constant dollars" (DoDI 5000.81).

Source: DoDI 5000.02
DD: Disposition Decision

Figure 3-5. Urgent Capability Acquisition Pathway

The phases of the UCA pathway generally align with the generic life cycle model from Figure 3-2. The principal difference is that the UCA timelines are short.

- Predevelopment time is measured in days. It encompasses a concept decision and conceptual design.
- The development phase is measured in months; it includes preliminary and detailed design.
- The Production and Deployment phase corresponds to production/procurement in the generic model.
- A disposition analysis will begin no later than one year after the start of operations and sustainment. That analysis will result in a recommendation to terminate the program, sustain the program until the end of the current contingency, or transition to a program of record.

3.4.1.1 Considerations for Selecting Projects

Each system or equipment program office must determine an approach to focus opportunities to the situations where the benefits are greatest. Like any profitable endeavor, a successful project is based on an adequate ROI. While almost any activity is a possible VE opportunity, selecting projects should be based on the potential yield from the time, talent, and cost that will be invested.

The most opportune time to apply VE is early in the life cycle, *before* production begins, *before* field or technical manuals are drafted, and *before* logistics support plans are finalized. Some of the more important potential benefits are as follows:

- Savings can be applied to all production units.
- Reductions to the cost of development, the subsequent cost of production, and the consequent costs related to operation and support may be realized.
- Fewer (or no) modifications to production lines, tooling, processes, and procedures will be required.
- Fewer (or no) drawing changes will be necessary.
- Fewer post-production changes to logistic and support elements such as manuals, maintenance facilities, and spare parts requirements will be needed.

Typically, opportunities for VE projects will be derived from a known problem, a cost driver study, or anything indicating that a product or a process should be improved. In the early stages of a VE application within an organization, sophisticated project-selection criteria are not usually needed. VE can frequently offer substantial benefits, particularly when one or more of the following applies:

- High (acquisition or operations and support) cost.
- Deficiencies in performance, reliability, or producibility.
- Items with a history of quality problems.
- Requirements too restrictive/excessive.
- Difficult in repair and replacement.
- There are (more efficient) alternatives (products, requirements, procedures, or methods).
- Multiple product applications.
- Executive management interest.

Once the organization's use of VE is more fully established, additional criteria can be applied to selected subsequent tasks. Worthwhile candidates usually involve one or more of the following:

- An excessively complex product.
- An accelerated development program.
- An item that field use indicates is deficient in some way (e.g., high failure rate, low reliability, or low availability).
- An item that uses older technologies for which modernization appears promising.
- A process with long cycle time.
- Items where there are not bids.
- Items with a significant and sudden price jump.
- Items where there has been consistent price rises over time that are beyond exception.
- Items where overcharging has been found.
- The future use of the item depends on significant reduction in production costs.
- A sole source procurement.

Usually, a second level of screening is needed to further refine potential application areas. Such screening criteria are typically situation dependent. The list of possible items for study may still be too long after this second screening. Depending on the resources available to perform studies and the potential benefits that can be achieved, decision makers should select projects for further consideration as study candidates. The list of candidates normally will exceed an organization's ability to perform studies.

Candidates with the potential for high impact and leadership interest in finding a solution should be ranked highest. The following are some of the areas in which VE has been applied to systems and equipment in DoD:

- Design or equipment modifications.
- Equipment and logistics support.
- Materiel handling and transportation.
- Packaging/packing and preservation.
- Parts obsolescence.
- Publications, manuals, procedures, and reports.

- Quality assurance and reliability.
- Salvage, rejected, or excess material.
- Specifications/drawings.
- Technical and logistics data.
- Testing, test equipment, and procedures.
- Tooling.
- Training.

3.4.1.2 Examples of VE during Concept Decision and Conceptual Design

A concept decision determines an overarching approach to meet a capability need. The approach can include any combination of doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy. Further analysis should be conducted for each of those approaches to assess the potential materiel solutions to satisfy the capability need. By considering function and cost, a VE approach can provide important insights, and function analysis determines what must be done. Brainstorming in the Creativity phase considers all options to accomplish those functions. VE also links the customer requirements to the design so that cost can be managed. Companies integrate VE concepts into their design processes to establish target costs and ensure that unnecessary functions and requirements are eliminated.

The purposes of concept decision and conceptual design are (1) to refine the initial options so that a decision on the preferred solution can be made and (2) to conduct planning to support a decision on an acquisition strategy. Conceptual design presents the first substantial opportunity to influence system design by balancing technology opportunities, schedule constraints, funding availability, performance parameters, and operational requirements.

During conceptual design, systems engineering ideally provides top-level, iterative, and recursive analytical processes for each alternative under consideration. Such application of the systems engineering processes can result in a technical evaluation of the operational effectiveness and estimated life-cycle costs of the alternatives that may provide a solution to a needed mission capability. Trade-offs among system operational requirements, operational utility, technology maturity, and life-cycle costs lead to a best system solution within allowed constraints. Effectively employing systems engineering will also support a preliminary assessment of the technical and technical management risk that will be considered in choosing the preferred materiel solution and formulating the acquisition strategy.

These activities lead to a Systems Engineering Plan (SEP) at MS A. VE can have a significant role in support of the SEP during conceptual design. Cost-effectiveness studies can use VE to

evaluate functions analytically and provide a mechanism to analyze the essential requirements and develop possible alternatives that offer improved value (Wells 1968). In this context, the project team evaluates the technical requirements of each alternative and determines their effects on total performance. Concurrently, for each alternative being considered, the effect on life-cycle cost is estimated and related to the technical requirements. Areas of high cost and high-cost risk are identified, and the associated requirement is examined in relation to its contribution to system effectiveness. The requirements identified by these high-cost areas are examined for cost-effectiveness. Based on these efforts, the VE function can be used to do the following:

- Constructively challenge the stated needs and recommend alternatives.
- Constructively challenge the desired mission performance envelopes to ensure that they are necessary and cost-effective.
- Ensure that user requirements are well founded.

3.4.1.3 Examples of VE during Preliminary Design

Preliminary design reduces technology risk and determines the appropriate set of critical subsystem technologies that will be integrated into a full system. It is a continuous technology discovery and development process that reflects close collaboration among the science and technology community, the user, and the developer. Technology development is an iterative process of assessing technologies and refining user performance parameters. At the end of the preliminary design, all critical technologies should have been demonstrated in a relevant environment at the system, subsystem, or prototype level. The level of this effort is quite high for the MCA pathway and much lower in the UCA pathway.

During preliminary design, systems engineering provides comprehensive, iterative processes to mature the suite of technologies for the preferred system solution by

- Converting critical capabilities into subsystem performance specifications.
- Translating user-defined performance parameters into configured subsystems.
- Integrating the technical inputs of the entire design team.
- Managing interfaces.
- Characterizing and managing technical risk.
- Transitioning technology from the technology base into program-specific efforts.
- Defining the functional baseline.
- Developing preliminary designs.

- Verifying that preliminary designs meet operational needs.

VE can be used to support transitioning technologies to program-specific applications. Potential value study subject areas are as follows:

- Identifying where new technologies can be used by considering the functions performed in different potential application areas.
- Identifying how new technologies can be incorporated into prototypes associated with those application areas.
- Modifying prototypes for transition to a program of record.

VE can also be used to support technology trades by

- Comparing the function, cost, and worth of technologies.
- Considering life-cycle cost implications of new technologies.
- Evaluating initial prototypes, design layouts, and other details to provide additional opportunities to improve value.

In addition, VE can be used to analyze the value of each requirement and the specifications derived from it by comparing function, cost, and worth. By critically examining the cost consequences of requirements and specifications, VE can generate answers to the following questions:

- Is the resultant cost effect of each requirement comparable to the worth gained?
- Is the resultant cost effect of the tolerance specified on each requirement comparable to the worth gained?
- Is its resultant cost effect upon the product comparable to the worth gained by the specification?
- Can the specification be tailored to minimize effort and cost?

Such an analysis can help determine whether user requirements and specifications are well founded and can also lead to their relaxation or elimination in an effort to transition technology from the technology base into program-specific use. Once technology is mature enough to transition, the functional baseline can be refined. In this context, VE should be used to:

- Identify the necessary top-level functions for each of the missions considered.
- Identify technical approaches (i.e., design concept) to the missions.

- Identify necessary lower-level functions for each technical approach (the value engineer should place emphasis on eliminating unnecessary design-restrictive requirements).
- Evaluate the system design concept(s) in terms of cost and value operations, maintenance, test, customization, and supply support and supplier availability functions to make significant improvements in total cost.
- Design for the "ilities" (e.g., reliability, supportability, maintainability, usability) from a function analysis perspective.
- Evaluate each function in terms of technical feasibility.
- Estimate the cost of various functions.

An effective application of VM will include further analysis of the high-cost functions and the identification of alternative, less costly ways of achieving the same result. When programs view life-cycle cost as an independent variable, it should be treated as equally important to performance and schedule in program decisions. Cost goals and trade-off studies tie closely to VE.

Cost, schedule, and performance can be traded off within the trade space between thresholds and objectives documented in the Capability Development Document (CDD). Over time, as the system design matures, the trade studies become more refined and specialized.

The following is an actual example of VE during preliminary design.

Enhanced Polar System (EPS) Program. The EPS program used VM to work with the user community to shed CDD requirements, which eliminated redundancy within the warfighter portfolios and enabled almost $1 billion worth of savings through a rigorous should-cost exercise by enforcing strict affordability constraints. In addition, EPS promoted effective competition and realized $352 million in savings.

3.4.1.4 Examples of VE during Detailed Design

In detailed design, the program, system architectures, and system elements down to the configuration item level are defined based on the technology matured. Preliminary designs and the support concept are refined, and integration and manufacturing risk are reduced.

During detailed design, systems engineering reduces technical risk, identifies potential technical management issues, and guides detailed design choices by allocating requirements at greater levels of detail. Through the use of systems engineering, the detailed design effort demonstrates the system performance in its intended environment. Test units are built to verify that specified

requirements have been fulfilled at each step. Validation at the end of the process confirms that user needs are met.

As part of detailed design, VE should support the systems engineering process by helping to develop alternative ways of providing the required function through lower production and sustainment costs. The value engineer usually engages in such activities in high-leverage areas. Therefore, the VE process should first identify individual high-cost subsystems or items to stimulate early detection of unnecessary costs in time to take corrective action. Once these high-leverage areas have been determined, the next step is to shape and evaluate alternative designs in relation to the technical requirements, performance limits, subsystem interrelationships, logistics support requirements, and system cost and value. VE contributes to sustainability planning since it is used to establish maintenance plans and to ensure that the design process incorporates logistic requirements and cost considerations, including reliability, maintainability, spares, and obsolescence.

Common VE activities include the following:

- Evaluating design concepts and technical approaches from a life-cycle cost standpoint.
- Eliminating unnecessary design-restrictive requirements established by the user or design community.
- Achieving cost goals.
- Meeting system requirements at the lowest life-cycle cost.
- Searching for new manufacturing processes, technologies, or new materials to be used in the design.
- Avoiding obsolescence and shelf-life issues.
- Designing for the “ilities” (e.g., reliability, supportability, maintainability, usability) from a function analysis perspective.
- Searching for problems encountered by others who attempted to design similar systems or components.
- Defining interfaces between or among functional areas.
- Conducting design trades.

Although design for manufacture and assembly may begin during technology maturation and risk reduction, value studies can be used during engineering and manufacturing development to

- Select another approach to achieve the desired functions if something appears too difficult to build.
- Reduce manufacturing cost by
    - Identifying manufacturing cost drivers.
    - Establishing a benchmark for what the product should cost.
    - Improving processes and materials to achieve "should-cost."
    - Simplifying the design to improve manufacture and assembly.
- Reduce manufacturing cycle time in conjunction with Lean Six Sigma.

During detailed design, VE challenges the need for expenditures on such cost drivers as data, number of prototypes, and customized support equipment. Initial prototypes are evaluated to identify additional opportunities to improve value. VE efforts at this stage analyze how suppliers can help reduce costs by asking the following questions:

- Has the project team invited suggestions from prospective suppliers regarding possible value improvement from loosening specification requirements?
- Have all non-standard parts been identified and approved?
- Can a redesign replace a non-standard part with a standard part?
- Are the standard circuits, standard components, and standard hardware the lowest cost items that will supply the minimum required characteristics?

Once models and prototypes have been built, they must be verified to meet the requirements. VE also supports this testing process by

- Identifying functions to be tested.
- Challenging the need for certain tests based on the functions the tests are designed to serve.
- Identifying special tooling to be built for conducting tests more rapidly.
- Challenging the tolerances of the tests specified, based on the functions the tests are designed to serve.
- Determining cost-effective ways to test the models and prototypes.

Finally, as a result of the testing experience, the VE process should look for opportunities to simplify the design for operational use—make the system easier to operate and maintain. Once production begins and the system has been fielded, it becomes much more expensive to make these kinds of changes.

Following are actual examples.

Patriot Tactical Trainer. The Missile Segment Enhancement (MSE) Missile Round Trainer (MRT) is a complex design planned for use as an MRT and an Empty Round Trainer (ERT). The MRT/ERT allows the soldier to train for unique MSE tactical usage, to include two-pack kitting/unkitting, MSE two-pack launcher loading/offloading, ERT six-pack offloading, and missile present indication at launcher. The MRT has been designed with extensive use of tactical hardware. Since the design will be costly to produce, a VE analysis was performed to assess the most cost-effective method of providing these vital items to the soldier. As a result, a new design for the Trainer was implemented. Total 3-year savings are $23.6 million.

Phalanx. The Phalanx Close-In-Weapon-System is a fast-reaction, rapid-fire 20-millimeter gun system that provides Navy ships a terminal defense against anti-ship missiles and fixed-wing aircraft that have penetrated other fleet defenses. It can also be used against small gunboats, standard and guided artillery, and helicopters. Phalanx uses advanced radar and computer technology to locate, identify, and direct a stream of armor-piercing projectiles to the target. A contract was awarded to retrofit Phalanx with a manual controller to direct fire against targets of opportunity. Using function analysis, the contractor identified an opportunity to replace a military standard fixed-hand controller (like a joystick) with a derivative of a commercial unit that was not built to military standards. The contractor, on its own initiative, worked with the commercial source to produce a modified unit and tested the unit against the requirements for the military-standard version. Based on the test results, the contractor had confidence that the commercial derivative would meet all the technical requirements at a lower cost. Therefore, the contractor submitted a VECP to replace the standard military controller with ruggedized commercial derivatives. The military-standard controller would cost $7,600, while the commercial derivative would cost only $2,100. Since each gun required three controllers, the net savings would be $16,500 per system. Approximately $2 million in savings were shared by the Navy and the contractor. Eventually, the Navy may save more than $9 million if the idea is applied to all ships. In addition, the VECP provided for earlier implementation of the improved system.

Integrated Fires Mission Command (IFMC). The IFMC integrates current and future sensors, weapons, and their respective command and control (C2) systems into one networked Air and Missile Defense (AMD). The program office conducted a VE study to determine the best way to reconfigure the Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS) to

eliminate deficiencies caused by the Engagement Center Trailer (ECT). The status quo was no longer viable for future missions. The study focused on the transport assets function to improve transportability and mobility of the IBCS. By removing the ECT from design and using a large cargo truck, the program realized $8.7 million, eliminated the Container Roll On/Roll Off Platform (CROP), and provided approximately 72 square feet of additional surface area for growth.

3.4.1.5 Examples of VE during Production and Procurement

Procurement is a cross-cutting function among the pathways. The MCA, MTA, and UCA pathways may result in the procurement of a defense-unique system or item of equipment that is designed (at least in part), developed, and produced (manufactured) as part of different phases of the system's life cycle within those pathways. In some instances, however, the fielding of those systems involves the procurement of commercial-off-the-shelf (COTS) equipment (e.g., power suppliers or generators). DoD missions also require the purchase of personnel support equipment (e.g., protective clothing or medical supplies). Some of the items may be COTS. Some may be purchased by DoD's supply system, and some may be obtained via program offices.

VE has been used extensively for procurement applications. Potential benefits[3] include:

- Improved competitive position
- Better quality
- Elimination of unnecessary materials
- Standardization or simplification of operation
- Lighter weight
- Reuse of materials
- Technology insertion

During this phase, the system achieves operational capability to satisfy mission needs. As the integrated components develop into a system, the test and evaluation processes frequently reveal issues that require system improvements or redesign. When the testing environment more closely resembles actual field conditions, the required improvements may be complex and subtle. The initial manufacturing process may also reveal unanticipated problems that can be resolved by changing the product somewhat. Low-Rate Initial Production (LRIP) should result in the

[3] The list of benefits is adapted from the Defense Logistics Agency (DLA) Land and Maritime Value Management and Engineering Program. See https://www.dla.mil/Land-and-Maritime/Offers/Technical-Support/Value-Management/#source-approval-request.

completion of manufacturing development. Full-Rate Production delivers the fully funded quantity of systems and supporting materiel and services for the program or increment.

Systems engineering during production and procurement is primarily concerned with analyzing known deficiencies and determining corrective actions. A plan to build, modify, verify, and test the proposed solution is also formulated and approved. The proposed solution to the deficiency is translated to the appropriate hardware, software, or specification changes. Modifications are created, incorporated, and verified in accordance with the approved plan. This product change may include retrofitting since the production process has begun. The impact on system cost, schedules, and performance should also be considered when addressing production.

VE contributes to these systems engineering activities by devising alternatives to achieve the required functions and developing alternative designs to meet functional needs. VE has been extensively applied to evaluate and improve manufacturing processes, methods, and materials, which include support equipment, technical data, facilities, and the supply, transportation, and handling, maintenance, and training functions. High-leverage opportunities for VE projects often occur when

- Recent developments indicate a potential opportunity for cost reduction.
- The future use of the item depends on significant reduction in production costs.
- New manufacturing technology and new materials become available.

In addition, as production becomes more mature, VE may support the decision to eliminate quality assurance testing, which often cannot be proposed until the production team has acquired considerable experience and gathered data to prove that eliminating the testing is feasible. VE may also reveal that the management reports required to understand a complex situation early in production may turn out to be unnecessary after the production team has gained more experience.

High-leverage opportunities for VE projects during manufacturing and procurement often occur when, for example,

- Recent developments indicate a potential opportunity for cost reduction.
- Another product can perform the same function more effectively or at less cost with equal effectiveness.
- The product can be packaged, stored, handled, or transported in a more advantageous, less costly manner.
- There are unnecessary test procedures, operations, or steps.

- The product is sole source.
- New manufacturing technology, new product technology, new materials, new processes, or new designs become available.

Manufacturing cost may be reduced by shortening manufacturing cycle time using VE in conjunction with Lean Six Sigma or by

- Identifying manufacturing cost drivers.
- Establishing a benchmark for what the product should cost.
- Improving processes and materials to achieve should cost.
- Simplifying the design to improve manufacture and assembly.

VE can also address variation in production. For example, when Alan Mulally became CEO of Ford Motor Company in 2006, he targeted unnecessary and costly product variations that contributed no value to the customer. The following anecdote was not actually a VE application, but it illustrates the kind of solution that might be derived from VE. According to Langley (2006), Mulally "laid out 12 different metal rods that Ford uses to hold up a vehicle's hood. He wanted to demonstrate to managers that this kind of variation is costly but doesn't matter to consumers."

DLA operates much of DoD's supply system and has its own value management program associated with procuring various items "to embrace numerous cost saving initiatives that have proven beneficial to the Federal Government, industry, the military services, and taxpayers. The VE program embraces initiatives directed at analyzing the functional requirements of systems, equipment, facilities, procedures, and supplies for achieving essential functions at the lowest total cost, consistent with the needed performance, safety, reliability, quality, and maintainability" (DLA website "Land and Maritime Value Management & Engineering (VE)").

The following two DLA VE examples are for the development of an alternate source of supply to create competition to lower cost. Alternates can be developed by reverse engineering or the use of technical data in the Government's possession when the Government has sufficient data rights.

Data Entry Joystick. A data entry joystick had two approved sources. When one source quoted $902.98 each for 200 items, a price-challenge analyst determined that several major drawing and data issues needed to be corrected before an award should be made. The analyst found that competition existed with three manufacturing sources. The analyst advised forwarding the item to the product specialist of record to get all technical data and drawings updated. The original solicitation was cancelled, and the product specialist was successful in making the item

competitive. Based on competitive procurement, the price of the item was $651.18 each, a 28 percent reduction in stock fund expenditure. A total of $4.2 million has been saved because of this competitive procurement.

A-10 Ballistic Foam. Initially, the A-10's 800+ ballistic foam National Stock Numbers (NSNs) had production lead times of 6 to 12 months, which did not support scheduled A-10 refurbishment. The A-10 Program Office, DLA Aviation engineers, and Air Force engineers joined together to expand competition. This joint venture was completed in time to support the A-10 Refurbishment Program while achieving savings to date of $1.9 million and procurement lead times reduced to 21 to 90 days.

Additional procurement examples outside of the DLA context are as follows.

Virginia Class Submarine. Using VE and other process improvements with advanced planning tools, efficient production engineering practices, shop floor tools, and upgraded material procurement practices, the costs of the Virginia class submarine have been reduced. These improvements have significantly contributed to the Virginia class submarine goal of producing two submarines every year, for $2 billion each, starting in FY 2012. The following bullets summarize three VEPs for this effort:

- **Outfitting Process Improvements.** The VE team was able to identify a number of inefficient shipboard installation steps and move those steps back into the subassembly and shop installation process. These steps previously consumed 30 percent (1.5 million man-hours) of the total boat's manufacturing span time. By doing these operations earlier, each activity could be done much more quickly because of the improved workspace environment (access to space, proper tools, and working conditions). Thousands of man-hours per ship were saved, which resulted in a cost savings per hull of $5 million.
- **Virginia Class Submarine Material Management.** After developing a current state value mapping of the material flow through both Electric Boat shipbuilding facilities, the team identified "best in class" material flow processes. Improvements were identified from material procurement, vendor and Government interactions with the process, material demand change management, material transportation, tracking and storage, and timing of material delivery. Beta testing of improvements was highly successful, and savings of $5.4 million per hull were achieved on Hull 782 and beyond.
- **Design for Production Process Improvements.** This task involved shipyard planning and production personnel and was focused on how to take digital information that existed in the product model and provide this information in the form most appropriate for shop floor operation without the need to reproduce the data in multiple forms for each activity

that required the information. Research activities captured the best Lean manufacturing capabilities, transformed these capabilities into design standards, applied these capabilities during design activities, and produced seamless "on-demand" deliverables derived from the original three-dimensional (3D) models. The impact of this effort resulted in a $3.6 million savings per hull, starting with Hull 784.

Wideband Global Satellite (WGS) Communication Program. The WGS program was able to employ VE to reduce oversight personnel by 70 percent (from 24 to 7 Government employees), complete production of satellites 8 months ahead of schedule, and realize $292 million in total savings by saving $73 million per satellite on satellites 7–10. In addition, a $10.5 billion, six-partner Memorandum of Understanding (MOU) (the highest valued U.S. international space agreement to date) allowed for the procurement of WGS-9 while avoiding a more than $600 million cost to the U.S. Government. Implementing this cost-sharing agreement simultaneously added six gigabits per second of capacity to the WGS constellation, strengthened alliances, and ensured interoperability across U.S. and coalition warfighters.

Terminal High-Altitude Area Defense (THAAD) System Future Lot Production Effort. The THAAD project office must ensure continuous delivery of the THAAD system to the warfighter at an economical price while maintaining a continuous production schedule and consistent delivery by the contractor to deliver a cost-effective THAAD system without sacrificing operational effectiveness. An evaluation team determined that the program could use an existing lot production contract and consolidate the delivery schedule of upcoming Interceptors to ensure a continuous production schedule. The original plan was to negotiate and obligate a separate production contract only after award of the upcoming contract. That process would have required the contractor to submit a formal proposal funded by the project office and a separate technical evaluation of the proposal using Government resources. The evaluation team instead included the future contract as an option to the upcoming contract, which eliminated redundant effort and potential delays. This effort reduced the price for future units by basing the price on the negotiated upcoming contract and resulted in savings of $35.37 million.

Tactical Aviation and Ground Munitions (TAGM). During FY 2023, the TAGM Project Office completed a Container Stencils VE project. This effort was undertaken to determine a more cost-efficient way to apply identification markings to missile containers. After evaluating three alternatives, a printed label process was selected and implemented. This new approach will reduce costs and reduce time and space requirements for labeling work on the production line.

One final example is provided below because of its uniqueness. VE has the potential to create incentives for the contractor to perform the material management function and solves short-term budget problems associated with a quantity purchase, as shown in the following real example for radomes for the Standard Missile.

Standard Missile Radomes. The Standard Missile is a surface-to-air defense weapon. Its primary mission is fleet area air defense and ship self-defense. It also has a secondary anti-surface ship mission. The radome is a dome that covers the radar on the outside of the missile. There are few radome suppliers because of the complexity involved in finishing them. Radomes must be capable of withstanding high heat and acceleration while allowing signals to penetrate without distortion. Due to reduced program funding, the Navy halved its Standard Missile procurement rate. Radomes are a high-cost item with large lot charges under this particular missile program acquisition. If the radomes were to be purchased on the revised procurement schedule, the unit price would increase by 50 percent due to production slowdown. Because radomes do not change, the Navy wanted to make a quantity purchase to reduce the overall cost. In that way, the radome supplier would be able to level load production to the quantities required for succeeding fiscal years. It would also optimize manufacturing setup time, allowing savings to be passed to the contractor; however, the Navy did not have the resources to pay for the quantity purchase in the current fiscal year. The contractor had the latitude to use its own funds to make the quantity radome purchase without using the VE clause; however, there would be no likelihood for an ROI, since, based on FAR pricing principles, the contractor would be required to sell them back to the Navy at the price paid. Meanwhile, the contractor would have incurred inventory holding costs and lost opportunity costs. Use of the VE clause enabled the contractor to make the quantity purchase and sell future radome lots back to the Navy at the lower bulk-buy price, thus leading to significant savings.[4] This case led to a total savings of $1.5 million shared equally by the contractor and the Navy.

3.4.1.6 Examples of VE during Operations and Support

During the Operations and Support phase, system support is provided to satisfy operational requirements and sustainment needs in the most cost-effective manner over the life cycle. Usage data are collected and analyzed to determine the root cause of any problems encountered. After a risk assessment is conducted, corrective actions are formulated.

In this phase, systems engineering processes support in-service reviews, trade studies, and decisions made about modifications, upgrades, and future increments of the system. Interoperability or technology improvements, parts or manufacturing obsolescence, aging issues, premature failures, changes in fuel or lubricants, Joint or Service commonality, and safety issues

[4] A mistaken belief is that a VECP requires a change in a specification. It does not. It requires only a change in the contract. The change could be a contract modification for a business arrangement that authorizes the VECP and agrees on sharing future savings without any technical change to the configuration baseline. That was the case in this radome example, where the contract contained the former military standard on configuration management. As such, it required the VECP to be submitted on DD Form 1692, "Engineering Change Proposal." On Block 30 of the form, Configuration Items Affected, it listed, "None." On Block 31, Effects on Performance Allocations and Interfaces in System Specification, it listed, "This change will have no effect on the end item's system performance. This Value Engineering Proposal simply allows us to take advantage of the substantial cost savings obtained by the multi-year contract that [*the contractor*] has negotiated."

may indicate the need for a system upgrade. System disposal is not a systems engineering activity, but systems engineering processes that inject disposal requirements and considerations into the earlier design processes ultimately affect disposal.

After fielding, opportunities for VE may exist for a long time. Product life cycles are being extended. For consumables, no sure way exists to determine the total quantity that will be purchased. Also, in the past, many items that entered the defense inventory were never subjected to a VE analysis. The potential for VE savings on these items is real. Advances in technology or changes in user requirements provide a basis for potential savings.

In the Operations and Support phase of the product life cycle, VE provides opportunities to attack existing cost drivers. Within the DMSMS situation, VE concepts can identify many resolution options, evaluate their potential for solving the problem, develop recommendations, and provide incentives for the investments needed for successful implementation (Mandelbaum 2008). Using VM provides greater opportunity for developing and implementing innovative solutions to DMSMS problems.

After a system or item has been fielded, changes are often expensive to implement. The potential for large savings to the operation, maintenance, and other logistics functions, however, might justify the investment. Using VE principles supports the development, evaluation, and implementation of such changes within the overall systems engineering processes. Within DoD, the following activities have proven to be a successful context for VE:

- Establish cost consciousness in the program.
- Establish a cost baseline and identify cost drivers.
- Develop a cost-reduction strategy.
- Manage cost within the program.
- Establish cost goals, objectives, and thresholds.
    - Establish meaningful cost-reduction metrics.
    - Identify and quantify cost-reduction initiatives.
    - Track implementation of cost-reduction projects.
    - Measure results against the plan.

VE contributes to every aspect of those activities. It is especially suited to the identification and evaluation of cost-reduction initiatives. The evaluation function is important because these initiatives typically include an up-front investment that will be recouped over time.

VE has been used to formulate initiatives to

- Extend item life by applying state-of-the-art designs, materials, or unit processes.
- Reduce repair costs by achieving the repair function in a more economical manner.
- Reduce packaging costs by improving or reducing packaging procedures or materials.
- Remanufacture and replace legacy systems.
- Improve reliability and maintainability.
- Use commercial unit processes, technologies, and commercial off-the-shelf items to reduce cost and improve reliability.
- Replace aging engines and engine parts.
- Improve supply-chain response time and reduce logistics footprint.
- Initiate reliability-centered maintenance and condition-based maintenance to reduce preventive maintenance costs without affecting corrective maintenance needs.
- Resolve obsolescence issues.
- Reduce the number of people required to operate and maintain by improving usability and maintainability.
- Eliminate sole source procurement.

The following are examples of actual operations and support VE in DoD.

Utility Helicopters Project Office (UHPO). The VE efforts initiated by the UHPO have improved reliability and maintainability, obsolescence, readiness, and the lives of the soldiers using the Utility family of helicopters. UHPO is proactive in identifying VE opportunities and maintaining an active VE program and has established a process whereby areas of need are identified, and the value methodology performed. One such study examined the large size of the turret on the Star SAFIRE II Forward Looking Infrared Radar (FLIR) that, combined with its location on the underside of the aircraft at the top of the nose, made it vulnerable to damage.

As more aircraft are fielded, the expense will increase as more FLIR turrets are damaged because of hard landings. Cost, obsolescence, and weight are additional concerns. The VEP effort qualified the Talon FLIR, which resulted in a net savings of $31 million and a 60-pound weight savings. The following organizations shared in the savings from the Talon qualification: HH-60, Medical Research and Material Command, Operation Enduring Freedom, and the National Guard Bureau.

Another study examined the localized damage to the UH/HH-60M Wide Chord Blade Cuff that has been observed during incoming inspection of main rotor blades for the Hontek Erosion Coating Removal process. Damage is a result of cotter pin installation and removal. As a critical safety item, scratches and dents are not allowed. Since the cuff cannot be removed from the blade and replaced, damage makes the entire blade unserviceable. The UHPO initiated a VE effort, which resulted in the Aviation Engineering Directorate's development of a cuff repair procedure at the Prototype Integration Facility. The maintainers were educated on the procedure to remove the blade without damage to the cuff. This effort resulted in saving $27.9 million, which was shared between UHPO, the Air Logistics Center, and the Performance Improvement Plan.

SSN 688 Class Operating Interval Extension. By applying VE principles, this team conducted a comprehensive review of 115 Los Angeles class maintenance requirements tied to the submarine's 48-month operating interval. The VE team led detailed analysis and discussions of each maintenance requirement with the appropriate technical authority warrant holders, in-service engineering agents, and life-cycle managers. By examining the inspection results, maintenance actions, repairs, casualty reports, and material condition assessment reports accumulated over the past 10 years of SSN 688 class operation, the operating cycle was safely extended from 48 months to 72 months but subjected the submarine force to only a minimal level of additional operational risk. The VE team effectively and efficiently led this multifaceted/multidisciplinary effort to completion in 6 months. This effort resulted in the elimination of 37 SSN 688 class Docking Selected Restricted Availabilities (DSRAs) and one Pre-Inactivation Restricted Availability (PIRA) and the replacement of 13 SSN 688 class DSRAs with significantly smaller Continuous Maintenance Availabilities. Elimination of these Depot-Level Maintenance Availabilities is equivalent to approximately 900,000 workdays of submarine maintenance. The estimated 4-year savings is $529 million.

Some examples combine O&S and procurement:

Enhanced Position Location Reporting System (EPLRS). The EPLRS supports the Army's Brigade Combat Team. It provides a mobile wireless data communications backbone for the Army's Tactical Internet and embedded situational awareness/position navigation. By the mid-1990s, the EPLRS PM faced many obsolescence issues to produce 2,000 radios. The PM and the contractor created a partnership to address the situation with a VECP approach. The PM encouraged the contractor to submit a VECP to update the technology within the system to overcome the obsolescence issues. The PM and the contractor worked together in an IPT environment to create the VECP. Because of the collaborative approach used, the VECP was successfully processed in parallel by acquisition, engineering, depot, quality, logistics, the program office, and the VE office. Benefits of using VECPs for the EPLRS were as follows:

- Circuit card assemblies: reduced from 18 to 8.
- Bandwidth: increased by 230 percent.
- Processing speed: factor of 10 increase.
- Cost per unit: reduced by $2,490.
- Mean time between failures: increased by 70 percent.
- Contractor received approximately $20 million for non-recurring engineering.
- Savings to the Government: $58.8 million.
- Contractor profit: $8.5 million.
- Other contractor benefits: Government used savings to purchase additional units and other equipment from the contractor.

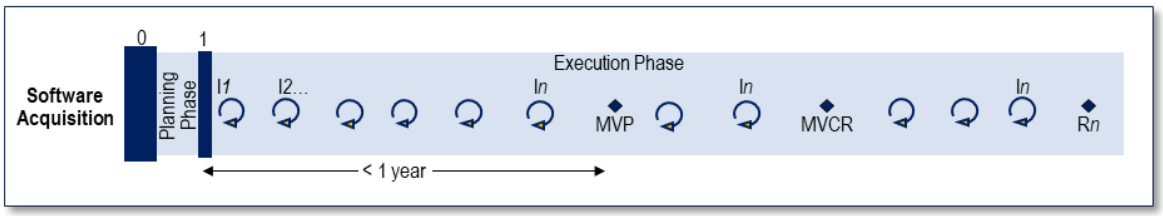
Army/Navy/Transportable Radar Surveillance-2 (AN/TPY) Radar. The X-Band radar signal/data processor equipment used within the AN/TYP-2 (Army/Navy/Transportable Radar Surveillance-2) radars became obsolete, which negatively affected the continual requests for additional radar deployment around the world. Alternatives to purchasing "as new" assets were reviewed and, as a result of a VEP, decommissioned Government-furnished property (GFP) was identified. The Federal Bureau of Investigation possessed nine Superdomes that could be transferred to the MDA. The VEP, therefore, enabled the accelerated production and fielding of a new radar that was required to meet warfighter requirements. The proposal also ensured that quantities of cost-effective radar components and assemblies were available for effective support worldwide. This effort was a joint venture that included expertise between the X-Band Radars Project Office and the Army Combat Capabilities Development Command. Total VE savings were $116.8 million.

Discarded Parts. A team of people from the Aviation Logistics Center, Aviation and Missile Center, and the Corpus Christi Army Depot (CCAD) formed a partnership and executed multiple VE initiatives to repair previously discarded parts so they could be used in lieu of new buys, saving more than $60 million. In addition, the availability of the 2,000+ parts enhanced maintenance, overhauls, and readiness.

3.4.2 Potential VE Applications for Software and Business Systems

The SWA "pathway is for the timely acquisition of custom software capabilities developed for the DoD…. Programs using the software acquisition pathway will demonstrate the viability and effectiveness of capabilities for operational use not later than one year after the date on which

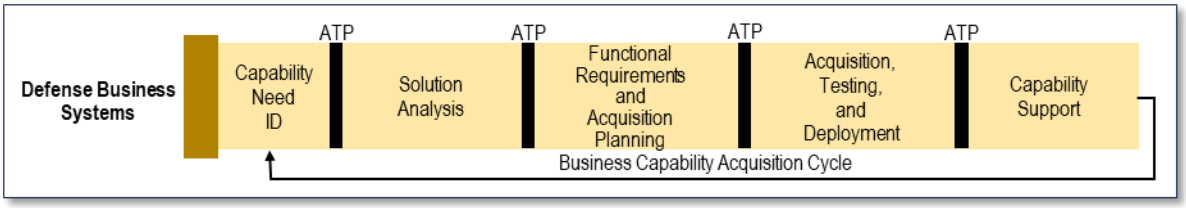
funds are first obligated to develop the new software capability" (DoDI 5000.87). Figure 3-6 diagrams the SWA pathway.



Source: DoDI 5000.02
In: Iteration n. Rn: Release n. MVP: Minimum viable product. MVCR: Minimum viability capability release.

Figure 3-6. Software Acquisition Pathway

The DBS pathway, as portrayed in Figure 3-7, "may be used for other non-developmental, software intensive programs (including national security systems, productivity solutions, and IT infrastructure), when approved in program acquisition strategies" (DoDI 5000.02). The authorities to proceed in the figure represent business decisions associated with the delivery of business capabilities.



Source: DoDI 5000.02
ATP: Authority to Proceed.

Figure 3-7. Defense Business Systems Pathway

This document combines these two pathways in a single section because the activities are similar enough in nature for the purposes of this discussion. User needs are established in the SWA pathway's planning phase; the output is a Capability Needs Statement. For the DBS pathway, business capability needs are defined during the capability need identification phase.

The Execution phase of the SWA pathway iteratively delivers software capabilities until a Minimum Viable Product (MVP) is attained based on a product roadmap. An MVP is defined as "an early version of the software to deliver or field basic capabilities to users to evaluate and provide feedback on" (DoDI 5000.87). Further iterations along the product roadmap lead to a Minimum Viable Capability Release (MVCR), which "delivers initial warfighting capabilities to enhance mission outcomes" (DoDI 5000.87). Subsequent capability releases correct errors and add new features. This progression is equivalent to the DBS pathway phases. Solution Analysis and Functional Requirements and Acquisition phases create the logical equivalent to a product roadmap. The Acquisition, Testing, and Deployment phase parallels the interim deployment of

capability leading to the MVP and MVCR. Subsequent releases occur in the Capability Support phase.

3.4.2.1 Considerations for Selecting Projects

For both pathways, there should be an analysis to identify applications where there is a potential for value improvement. While there are many possible ways to perform such an analysis, the following criteria may be indicative of greater opportunities.

- High cost
- Complexity
- Number of users
- Criticality
- Degree of automation
- Number of interfaces
- Extent of hardware integration
- Use of critical program information
- Need for protection in the program protection plan
- Extent of custom development

Different weights may be assigned to each of the above criteria. Projects may be selected for further consideration based on overall score. Further screenings may be needed to shorten the list. One criterion to always consider is the receptivity of the application-owner to using VE and implementing proposed recommendations.

3.4.2.2 Examples

SWA pathway policy requires that the sponsor and user community perform a value assessment at least annually on the software (including architecture and computer programs) delivered. The value assessments will be used "to assess progress on the program, update strategies, designs, and inform resourcing decisions" (DoDI 5000.87).

Questions to address in studies include:

- Can some other architecture perform the same function more effectively or at less cost with equal effectiveness?
- Is there a more effective hardware/software mix?

- Are user requirements too restrictive/excessive?
- Can a commercial product or a custom product or modifications to existing products provide better value?
- Are any test procedures, operations, or steps unnecessary?
- Are there alternatives (products, requirements, procedures, or methods)?
- Is there a more efficient way to accomplish a function or process?
- What's the most efficient pace for developing and fielding new capability?
- Are there opportunities to add value associated with hardware development of procurement?

Hardware may also be delivered when using the SWA or DBS pathway as shown in the following example.

Defense Information Security Agency (DISA) Terminals. The current operational capacity of legacy Follow-on Terminals (FOTs) is above warfighter requirements. Installation of Advanced Extremely High Frequency (AEHF) Navy multi-band terminals without removing a percentage of the FOTs would require significant funding for procurement items and Service Life Extension (SLE) tasks. Using a VE approach, approximately $4 million in cost avoidance was realized due to the reduction in procurement items and the elimination of SLE tasks associated with the worldwide installation of new AEHF satellite communications terminals and associated equipment. Reductions in hardware procurement, site provisioning, and construction were accomplished by reusing antenna pads, towers, and equipment shelters. Reductions in terminal SLE tasks for 10 legacy extremely high frequency (EHF) FOTs decrease the frequency of replacing of mission-critical wear parts and extensive onsite testing and validation.

Cross-Domain Server. The Army's Integrated Air and Missile Defense (IAMD) Battle Command System implements the C2 of multiple sensors and weapons. The IBCS includes Engagement Operations Centers (EOCs) that provide the Information Technology Infrastructure that hosts the C2 software. Currently, multiple Cross-Domain Servers (CDSs) deployed across the EOCs enable access and data transfer of configuration and status information between the unclassified network radios and the network management systems on the secret network. A CDS is a means of information assurance that provides the ability to manually, or automatically, access or relay information between two or more differing security domains.

CDS certification requirements were reduced in 2020 because of the implementation of a VEP that reduced licensing fees; however, this solution was a temporary agreement until a more permanent solution could be put in place. Because maintenance and licensing costs of the

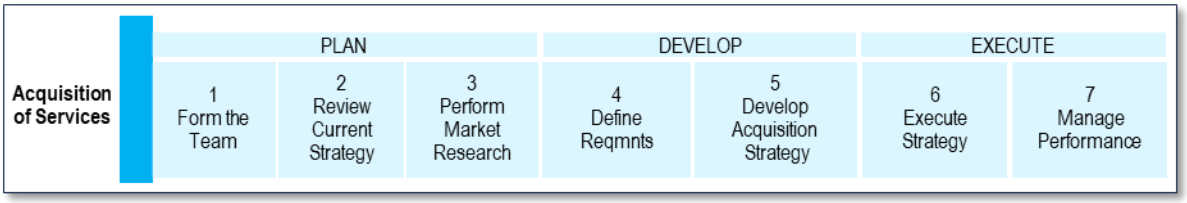
multiple CDSs are expected to increase dramatically, a Value Engineering Study (VES) analyzed alternative solutions for accessing and relaying information within the IBCS.

The study team chose to deploy a modified COTS product already in use by the Army to eliminate the need for CDSs. The solution cost was $463,000 to implement along with $1.2 million per year to maintain. Over the next 5 years of operation, the solution saved more than $12 million.

3.4.3 Potential VE Applications for Services

Figure 3-8 illustrates the steps in the AS pathway. DoD purchases services in a wide variety of areas (DoDI 5000.74), such as:

- Professional support (e.g., simulation, engineering/technical).
    - Administrative support (e.g., logistics support, contract/procurement/acquisition support).
- Real property maintenance.
- Architect-engineering (e.g., electrical systems, mechanical systems).
- Information Technology (IT) and telecom (e.g., Software as a Service, Infrastructure as a Service).
- Quality control.
- Equipment/materials testing.



Source: DoDI 5000.02

Figure 3-8. Acquisition of Services Pathway

Not all services are governed by this pathway. Exceptions include

- Construction services.
- Research and development.
- Services related to active military operations.
- Services managed by other pathways (unless explicitly opted in).

The steps shown in Figure 3-8 are straightforward. Organizations have been established to "review, validate, and approve services requirements" (DoDI 5000.74). Senior leadership approves the acquisition strategy. Performance is tracked through metrics, and those metrics are used for independent reviews.

3.4.3.1 Considerations for Selecting Services Projects

As was the case elsewhere, criteria must be used for reducing the number of services efforts that can be considered for a VE application. Factors that inhibit VE benefits may include:

- Benefits may be more difficult to realize when efficiency opportunities cut across organizational boundaries and hence require cooperation (versus organizational stovepipes). This situation is further complicated when an investment in one aspect of a service may generate savings that accrue to a different part of the DoD.
- There is usually limited opportunity for savings associated with staff augmentation.
- In areas where service work is routine or commoditized, and there are low barriers to entry and competition is fierce, driving down labor rates. Base support and classroom training are two examples. There is generally some but perhaps not a lot of room for improvement on the basis of applying advanced technology and productivity tools. An exception is in IT contracts, where continuous change is expected. Incorporation of new technologies is assumed for lowering the cost of IT services in the option years. Other services, for the most part, are not as driven by rapidly changing technology.

On the other hand, some situations may provide better opportunities for VE improvements. For example, product development/support services contracts are normally less competitive than those for commoditized services, as the barriers to entry are higher. Software development services and high-end training services involving sophisticated equipment (such as simulators) are other examples. In general, to maximize VE opportunities, acquisition of services should be sought where there is an opportunity to examine the entire value stream. Furthermore, other screening criteria potentially identifying VE opportunities include:

- Requirements are complex.
- Projects are large.
- There is an ability to apply technology.
- There are recent technological changes.
- Overhead is high.
- There are management inefficiencies.

- Competition is low.
- Significant automation is feasible.

To a large extent, the application of VE to the acquisition of services takes different forms as a function of pathway phase. During the development phase, where requirements are defined and the acquisition strategy is developed, VE studies, informed by research conducted in the planning phase, would typically be performed to identify

- Overly excessive or restrictive requirements.
- Alternative approaches to meet requirements.
- Opportunities to apply new technology.

Once execution begins, VE opportunities would primarily come from contractor-submitted VECPs.

3.4.3.2 Examples

Services related to the support of DoD systems represent an important, and not unusual, VE opportunity.

Strategic and Operational Rockets and Missiles (STORM). The STORM project office has an ongoing requirement to transport certain Guided Multiple Launch Rocket System and Reduced Range Practice Rocket missile parts to facilities around the country. Specially made Performance Oriented Packaging wood boxes are used to transport and store these missile parts, or to transport parts to a demilitarization facility to be destroyed. Nearly all the boxes were used only once and then discarded. As a result of a value study, the program initiated an effort to evaluate alternative solutions that allowed the boxes to be reused, saving $7.5 million.

Although DoD does not have a great deal of experience using VE on non-weapon system related services, there should be opportunities, especially in light of the magnitude of spending on services. OMB Circular A-131 states "… ensure VE is considered and integrated, as appropriate, into the planning and development of agency programs, projects, activities, as well as contracts for supplies and services, including performance based, architect-engineering, and construction contracts." FAR 48.201(a) requires that a VE clause (found in FAR 52.248-1) be included in all contracts for supplies and services exceeding a specified threshold. The following illustrative examples concentrate on theoretical VECPs.

Services Contract Example 1

The following simple example of a janitorial service contract (Table 3-1) demonstrates that the unit price can be calculated relatively easily for each of the Contract Line Item Numbers (CLINs) established. In this scenario, a building had extensive amounts of tiled floors that needed to be swept (daily at a rate of $60), mopped (weekly at a rate of $120), and waxed (monthly at a rate of $240) under a 5-year contract (1 year plus 4 option years). A contractor could propose to replace the tile with carpet and show a net savings in upkeep over a period of time. The carpet would have to be vacuumed weekly at a rate of $120 and shampooed twice per year at a rate of $300. While there would be an initial investment for installation of the carpeting, the savings in cost of upkeep could result in significant savings over the length of the instant contract and the 4 option years. Table 3-2 shows the assumed results of the VECP changes.

Table 3-1. Janitorial Service Contract Example before VECP Changes

CLIN	Requirement	Quantity	Unit	Rate	Total
0001	Sweep 15,000 sq. ft. of office space daily, Mon–Fri, for the 5-year period October 1, 20XX–September 30, 20XX	1,200	Days	$60.00	$72,000
0002	Mop 15,000 sq. ft. of office space weekly for the 5-year period October 1, 20XX–September 30, 20XX	250	Weeks	$120.00	$30,000
0003	Wax and polish 15,000 sq. ft. of office space monthly for the 5-year period October 1, 20XX–September 30, 20XX	60	Months	$240.00	$14,400
	Total				$116,400

Table 3-2. Janitorial Service Contract Example after VECP Changes

CLIN	Requirement	Quantity	Unit	Rate	Total
0001	Purchase and install 15,000 sq. ft. (1,667 sq. yds.) of industrial-strength carpeting	1,667	Sq. yd.	$20.00	$33,340
0002	Vacuum 15,000 sq. ft. of office space weekly for the 5-year period October 1, 20XX–September 30, 20XX	250	Weeks	$120.00	$30,000
0003	Shampoo carpet twice yearly for a 5-year period October 1, 20XX–September 30, 20XX	10	EA	$300.00	$3,000
	Total				$66,340
	Net Savings ($116,400 – $66,340)				$50,060
	Contractor Share of Savings Using a 50/50 Share ($50,060 × .5)				$25,030
	Revised Total				$91,370

Services Contract Example 2

The following hypothetical example assumes a 3-year contract (1 base year plus 2 option years) for the professional services of a physician to give full physicals to 3,600 military personnel each year for $100 each for a total of 10,800 physicals or $1.08 million over 3 years. Table 3-3 shows the associated contract requirements.[5]

Table 3-3. Medical Service Contract Example before VECP Changes

CLIN	Description	Quantity	Unit	Unit Price	Total Price
0001	Provide a complete annual physical to military personnel	10,800	EA	$100	$1,080,000

Since most of the military personnel are in excellent physical condition and the majority of personnel are young, the contractor could propose a VECP for a modified physical plan. Under the plan, anyone under 25 years of age would get a complete physical every 3 years, anyone 26 to 36 would get a complete physical every 2 years, and anyone over 36 would get a complete physical every year.[6] Military personnel not given a full physical would have a modified physical that could be done at a lesser cost of $50. The VECP results in Table 3-4 assume the military population is divided equally among the three age bands.

Table 3-4. Medical Service Contract Example after VECP Changes

CLIN	Description	Quantity	Unit	Unit Price	Total Price
0001	Provide a complete annual physical to military personnel	6,000	EA	$100	$600,000
0002	Provide a modified physical to military personnel	4,800	EA	$50	$240,000
	Subtotal	10,800			$840,000
	VECP Savings ($1,080,000 – $840,000)				$240,000
	Contractor's Share of Savings Using a 50/50 share ($540,000 × .5)				$120,000
0003	New CLIN for VECP savings	10,800	EA	$25.00	$120,000
	New Contract Total				$980,000

The benefit for the Government is that costs are reduced by more than 10 percent.[7] Without VE, however, the contractor does not have any incentive to propose such a requirements trade. To make it worthwhile in a service environment, a better mechanism of compensation may need to

[5] This example depicts only one element of a larger contract. Certainly, some people would need more extensive medical care as a function of their physical condition. Such care would be provided in a separate CLIN. Also, depending on a person's occupation, additional assessments may be required. This example focuses only on that element of the population required to have a physical as their annual health assessment.

[6] This example is not intended to imply that the military would ask for more service than it needs. Instead, it illustrates how risk/requirements trades can be made.

[7] A secondary issue is that indirect rates may have to be increased if a significant reduction occurs in the number of billed hours.

be found because a contractor needs some incentive to perform less work. With less work, revenue is down, so there must be a balance or trade-off to increase profit to make such a VECP a worthwhile proposition for the contractor.[8] In this example, if we assume a 10 percent profit, the $120,000 share of the savings appears to more than compensate for lost revenue.

One key to using VECPs on services contracts is finding a way to allow *the unit price to be changed to reflect the VECP*. Then a services contract would operate much the same as a hardware contract and produce similar benefits to both the Government and the contractor. There are other considerations such as:

- Identifying the mechanisms for sharing savings.
- Calculating savings with certainty.
- Determining collateral savings.

See Section 4.4 and Appendix B for tips on creating successful VECPs.

[8] There also are collateral savings associated with the VECP depicted in Table 3-4. Since the modified physicals take less time, people would not be away from work as long and therefore would be able to perform additional duties. Since this benefit is relatively small and difficult to quantify, such collateral savings are normally not claimed.

4 Execution of Value Engineering Program Efforts

4.1 Determining Level of Effort

OMB Circular A-131 requires agencies "to include a process for determining the level of effort (scale) for VE studies of agency projects and programs."

The level of effort, or the amount of work to be performed, will scale with the size and complexity of the project or program that is being analyzed and varies to some degree concerning VE studies, VECPs, and other value-improving initiatives. Dedicated value program personnel are responsible for making level-of-effort determinations based on policy, guidance, situational assessment, experience, and understanding of VM tools and techniques. Figure 4-1 illustrates this concept. Review of the project plan and analysis of the project budget, schedule, and system architecture or scope of effort is a starting point for assessing opportunity for VE application. Additional considerations include external factors such as technical criteria and requests from leadership. Together these will enable value program personnel to determine the level of effort for potential value activities.

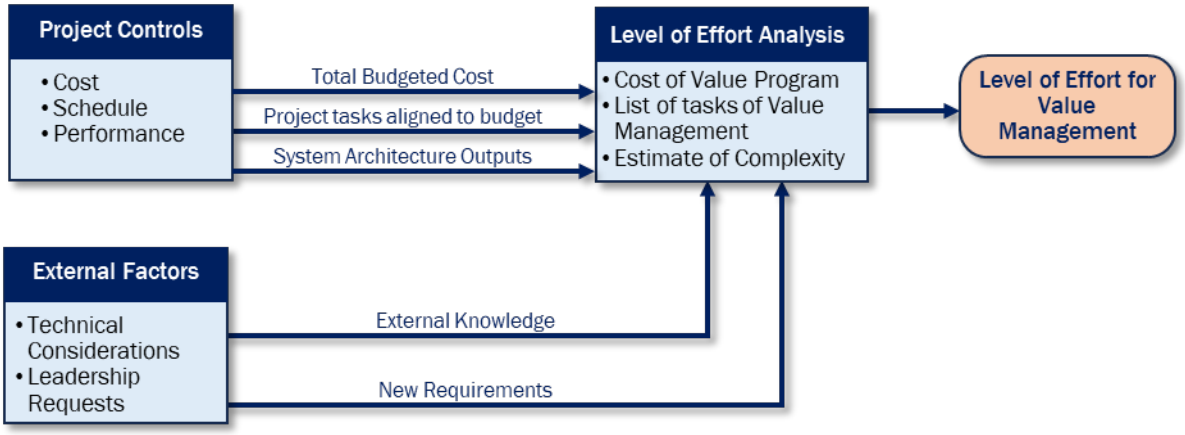


Figure 4-1. Level-of-Effort Determinations

In many situations, the following considerations are useful indicators that there would be sufficient benefit to hold a VE workshop or similar value-improving activity. Although these factors are often intertwined and jointly present, this is not a checklist to determine if the project or program would benefit from VE or similar tools. Just one of these factors may be enough on its own to warrant further consideration and application of VE or other value-improving activities:

- The program has determined that multiple issues exist.
- Multiple issues that exist within a program are interconnected.

- Multiple stakeholders are involved who represent competing priorities.
- Previous solutions were applied, but they did not adequately resolve the issue.
- The team members share a common mind-set about the issue and therefore may not effectively identify different aspects of the origin of the issue and the solution(s) required.
- High-cost drivers result due to several resources being required to resolve the issue.
- The original solution considered could potentially result in adverse effects on other aspects of the program.

For a VECP, these considerations can assist a program or contractor in determining if a VECP submittal would be beneficial. These considerations are also not inclusive. For more information regarding VECPs, refer to Appendix B.

- Products that have accelerated development programs.
- Items that have long procurement periods.
- Items requiring complex tools and fixtures.
- Items that are difficult to manufacture.
- Product designs that push new technologies.
- High-cost, high-volume items.
- Items with long service life.

4.2 Executing Value Studies

Execution of a value study will involve a team dedicated to applying VM to the project or effort specified by leadership. VM is applied through the VM Job Plan, which is a sequential set of phases that build upon each other. Refer to Appendix A for detailed information on the VM Job Plan. Execution can occur as a workshop between 3 to 5 days in duration, or longer in some instances, in which the team members are dedicated solely to applying the Job Plan to address the project or effort, or execution can take place as a prolonged event that occurs over several weeks or months. In the case of a prolonged event, the team members continue their regular mission support and meet periodically to apply phases of the Job Plan to the project or effort.

After completing the value study, the VE team presents resultant VEPs to the decision authority (or study sponsor) to obtain commitment to follow a course of action and initiate a path forward. Solutions presented by the team usually contain a prioritized list of alternatives, along with each alternative's advantages and disadvantages. A life-cycle cost analysis should be included to assist in ranking this prioritized list according to an estimate of each alternative's life-cycle cost-

reduction potential relative to the status quo. Cost estimates must be as complete, accurate, and consistent as possible to minimize the possibility of error in assessing the relative economic potential of the alternatives. Other non-quantified benefits also should be considered.

The decision authority determines which VEP(s) to implement based on the recommendations of the value team, IPT members, and other stakeholders. Decision factors usually include multiple considerations, including but not limited to:

- What are the life-cycle savings?
- Do the benefits outweigh the costs?
- What are the major risks?
- How can the risks be mitigated?
- Are any technical issues outstanding?

To assist the decision authority in choosing alternatives for implementation, the VE teams or IPTs (dependent on Component policy) can develop an implementation plan for each alternative, which should include a schedule of the required implementation steps; personnel responsible for executing the plan; and specifics of the resources required, the approval process, the necessary documents, the timing requirements, and the coordination required. Teams should also anticipate problems relating to implementation and propose specific solutions to each.

To begin implementation, the value study team will coordinate with the functional areas to begin the tasks outlined in the implementation plan that was previously presented to the decision authority. The program must always consider that possible funding could be required for any solution moving forward.

Additional tasks that foster and promote the success of implementation are:

- Obtain copies of all completed implementation actions.
- Compare actual results with original expectations.
- Submit cost savings or other benefit reports to management.
- Submit technical cross-feed reports to management.
- Conduct a “lessons-learned” analysis of the study to identify problems encountered and recommend corrective action for the next value study.
- Publicize accomplishments.

- Initiate recommendations for potential future VE studies on ideas evolving from the study just completed.
- Screen all contributors to the effort for possible receipt of an award and initiate recommendation for appropriate recognition.
- Make sure to document all proceedings from the value study to justify the rationale used to generate the final solutions.

A VEP, developed internally by DoD personnel, formally documents the execution of the solutions generated by the value study or other value improvement effort. Since VEPs are developed and implemented by Government personnel, all resulting savings accrue to the Government. A VEP can also be the result of a technical support contractor effort if it is funded by the Government specifically to conduct a value study on a contract to which it is not a party. While each Component has different formatting requirements, generally a VEP must illustrate application of VM (outlined in Appendix A) and the resulting benefits. Some non-monetary benefits include inserting new technology, reducing weight, increasing space, mitigating obsolescence, improving reliability, limiting cycle times, lowering lead times, inhibiting corrosion, enabling contracts, automating tasks, and improving schedule. The documentation generally establishes the study baseline and compares this baseline to the implemented improvement.

4.3 Executing VE Change Proposals

A contractor can submit a VECP under the VE provisions of FAR 52.248. The contractor is incentivized to generate and submit these proposals because the proposal solutions will likely create benefits for both the Government and the contractor. The Government can refer to FAR 48 for guidelines to establish and maintain VECP efforts. Appendix B provides detailed information regarding VECPs and covers topics such as:

- Information that contractors need to consider when establishing an internal VECP program.
- VECP terminology and the various conditions under which VECPs can apply.
- Detailed steps that contractors can follow to submit a successful VECP to the Government.
- What the Government needs to consider for sharing resultant VECP savings with the contractor.
- Best practices for both Government and contractors to consider for successful VECPs.

4.4 Other Value-Improving Initiatives

The basis of Public Law 111-350, OMB Circular A-131, and DoDI 4245.14 is the use of VE, and Components are required to incorporate VE as outlined in the DoDI; however, in addition to VE, Components are encouraged to incorporate the tools and elements of VE (both whole and in part) in other ways to maximize value to the warfighter and the public. Components can incorporate VE elements through novel stand-alone applications or through more common approaches such as tying VE with other similar processes and techniques.

To conduct a novel or non-typical value activity that does not meet the definition of VE, Components are reminded that "other value-improving activities" include the use of function analysis and must result in one or more VEPs. See Appendix A for more details on function analysis as well as other elements of the VM Job Plan.

Regarding integrating VE with other management improvement processes, OMB Circular A-131 states:

> VE can be used as a stand-alone tool or with other management techniques and methodologies to improve performance and reduce costs. . . . The complementary relationship between VE and other management techniques increases the likelihood that overall management objectives are achieved. (OMB A-131, page 6)

VE is a management tool that can be used alone or with other management techniques and methodologies to improve operations and reduce costs. For example, the total quality management process can include VE and other cost-cutting techniques, such as life-cycle costing, concurrent engineering, and design-to-cost approaches, by using these techniques as analytical tools in process and product improvement. Components should consider how a value program should interface with other value-enhancing methods and related programs. The VM shares characteristics of other value-enhancing methods and can work well with such programs.

One such example is to incorporate VE techniques into Agile processes. Programs are increasingly adopting the Agile methodology to manage projects, and the methodology relies heavily on collaborative teamwork while addressing customer needs. VE can improve collaboration and can assist the program in maintaining focus on customer requirements.

In general, a sound method for integrating the VM with other improvement practices is to use function analysis to support problem definition, opportunity identification, and prioritization of effort before proceeding with the remainder of the desired technique, process, or tool.

5 Documenting Value Program Activities

It is imperative for Components to track value program efforts and maintain files to ensure the program is successful and compliant with statute, the OMB Circular, and DoD policy. Documenting supports many required value program activities, such as:

- Establishing and maintaining annual VE plans and goals.
- Measuring performance, including the use of metrics.
- Reporting annual results to various leadership echelons.
- Recognizing both individuals and programs in award programs.

The following paragraphs provide additional insight on tracking and documentation. See also OMB Circular A-131 and DoDI 4245.14 for information.

5.1 VE Plans and Goals

OMB Circular A-131 directs that, at a minimum, agencies should prepare plans "before the beginning of the fiscal year and identify both in-house and contractor projects, programs, systems, products, etc., to which partial or full VE studies will be conducted during the next fiscal year, and the estimated costs of these projects. These projects should be listed by category. VEPs and VECPs should be included under the appropriate category. Annual plans shall be made available for OMB review upon request" (page 6). DoDI 4245.14 adds that Component VE plans will include annual training and staffing requirements; however, the Component VE plan is more than a federal requirement; it is a tool for organizing potential levels of effort into actual VE activities within a FY and for future years. The plan can also assist a Component in determining the resources required to maintain a viable VE program.

The DoDI also requires that Components establish VE goals for subordinate organizations' Government-only and contractual activities. The act of preparing these plans supports the Component's efforts to set effective VE goals by forcing consideration of scheduled, anticipated, or necessary efforts and associated resourcing to accomplish requirements. Estimated activities and their results serve as goals for Component VE programs.

At the Component level, the SAO can use methods or criteria specific to the program to calculate the annual monetary goal, and methods of calculation will differ among the Components and programs. One example for calculating an annual monetary goal is AMC's method of using 1.5 percent of its annual obligated funding, with only Procurement, Operations and Maintenance, and Army Working Capital Funds being considered. VE goals will also focus on other metrics, including the number of efforts planned, potential VECP pursuits with contractors, scheduled

workshops, the number of individuals or programs to be trained, and expected funding requirements for these activities. Component VE goals will flow down to major systems, PEOs, and program or project offices. Once the plan and goals are established, the Component can refer to these metrics and track progress throughout the FY.

5.2 Establishing and Maintaining Metrics

Components should report their VE program progress and lessons learned annually to the VE ESG. This information will help the ESG assess the Department's overall VE status and program effectiveness and also will be used in formulating VE ESG guidance and policy recommendations. To ensure alignment between the Component VE program and Component business objectives, SAOs and leadership often find it beneficial to establish metrics relevant to the program and its activities, including but not limited to:

- Completion of scheduled VE milestones.
- Completion of planned VE studies or workshops and what benefits, both financial and intangible, were achieved.
- The number of trained or qualified personnel.
- The amount of program funding that was expended in support of VE efforts.

Organizations should consider their functions, challenges, and critical success factors. Program metrics can be used to track customized emphasis areas to ensure consistent focus toward improvement. These measures are used by Component SAOs to monitor viability of the VE Program and to ensure connection with the Component's overall direction. SAOs have flexibility to work with local leadership to establish relevant measures and frequency for internal reporting.

At the end of each fiscal year, SAOs should use metric data to support both the annual reporting exercise as well as internal control evaluations.

5.3 Maintaining Value Program Files

In assessing the value program's accomplishment of annual goals and metrics, accurate documentation is helpful. The OMB Circular states that each Component should be "[m]aintaining files on projects and programs that meet thresholds or criteria for the required use of VE. Documentation should include reasons for granting waivers of VE studies on new projects and programs which met the threshold identified in this Circular, or such lower threshold as the agency established, and on any existing projects and programs where VE is required by agency policy. Reasons for not implementing recommendations from VE studies should also be documented."

A digital file for each VE effort is an optimum format for documentation. Such files should document completed VE efforts as well as efforts that were not completed because proposed solutions or efforts were rejected or were granted a waiver. An appropriate VM practitioner should review each file to ensure it is complete. Digital files should be maintained in a database both within the program that is implementing the value proposal and at the Component-level value program office. The program and value program also should maintain a digital file for each VECP, including the contract modification and final dates of settlement.

Suggested content for each file includes the following minimum elements:

- Unique project number or identifier.
- Identification of development and implementation costs to the Government above normal administrative costs consistent with the FAR. Government costs are those agency costs that result directly from developing and implementing the value-improving project, such as any net increases in the cost of testing, operations, maintenance, and logistics support. The term does not include the normal administrative costs of processing the value-improving project.
- Description of gross and net savings to the Government. Savings may be reported up to 6 years consistent with budget projections in the Future Years Defense Program (FYDP) that is current at the time the value improving project is implemented. Savings may be reported in the years they occur during the FYDP period or as an estimate projected against the FYDP budget profile. Life cycle savings may be reported up to 10 years.
- Description of technical changes.
- Validation of savings (either through actual documented savings or documented estimate of future savings or cost avoidance using established financial analysis procedures with approval and date).
- Approval of technical change and date; identification of who conducted the study or analysis or submitted the idea.
- Program approval and date.
- Identification of items to which the VE proposal applies.
- Date project initiated or proposal submitted for approval.
- Cost and savings figures for each of the years identified.
- Date of construction, etc. Include customized instructions on completing form (applies to construction projects only). Indication of the above VE criteria met (if not VECP, must document minimum elements of function analysis).

- VECPs. For acquisition savings, report of the Government's share during the VECP sharing period; thereafter until the end of the FYDP period, 100 percent of the net savings may be reported. For collateral savings (life cycle savings other than acquisition), Government share of average annual collateral savings for the FYDP period may be reported.

5.4 Reporting

Once annual VE efforts and activities are completed and measured against any program metrics, each Component should prepare a report of the results for leadership. The OMB Circular states that each Component shall report the fiscal year results of using VE annually to OMB's Administrator for Federal Procurement Policy (OFPP). Reports are due to OMB by December 31 of each calendar year and should include the previous fiscal year results as well as the current name and contact information for the agency's SAO. However, OMB paused this reporting requirement to OFPP in OMB Memorandum M-17-26, June 17, 2017. Regardless of OMB reporting requirements, DoD policy is that Components, at a minimum, should present their annual VE savings and other Component-defined VE metrics and lessons learned to the VE ESG.

In addition, Components can benefit from reporting results throughout their affiliated programs and major systems. These programs and systems can use their respective reporting format to present information to their leadership while also leveraging the Component-level reports. Components should display in the reporting the value program's capacity to generate potential savings that can be applied toward previously unfunded or underfunded internal program efforts. Leadership at all levels that remains informed about VE activities and successes on an annual basis will be more prone to promote continuous VE efforts.

5.5 Awards

A value program activity often overlooked is recognizing individuals, teams, and programs that have successfully completed VE efforts and achieved value improvements to their programs. The DoDI states that Components will "[d]evelop criteria and procedures for providing recognition awards to individuals and organizations for exceptional VE accomplishments" as well as providing Component "nominations for annual DoD VE awards" (DoDI 4245.14, para. 4.1.j.). Based on the achievement of goals outlined in the plan and tracked throughout the year, recognizing entities that contributed to the value program efforts is an effective method to foster continued participation in VE efforts. Components are not limited to pre-existing awards programs; in fact, Components are encouraged to develop internal recognition policy. An internal award program can create further incentive for personnel to consider VE and provides leadership with the opportunity to honor commitment to VE excellence.

Appendix A: Overview of the Value Methodology Job Plan

The value methodology (VM) follows a sequence of phases referred to as the VM Job Plan:

1. Preparation
2. Information
3. Function Analysis
4. Creativity
5. Evaluation
6. Development
7. Presentation
8. Implementation

Programs should follow the VM Job Plan from start to finish to fully realize the benefits of value improvement. Figure A-1 provides an overview of the sequence and basic functions of eight phases, described in more detail on the following pages.[9]

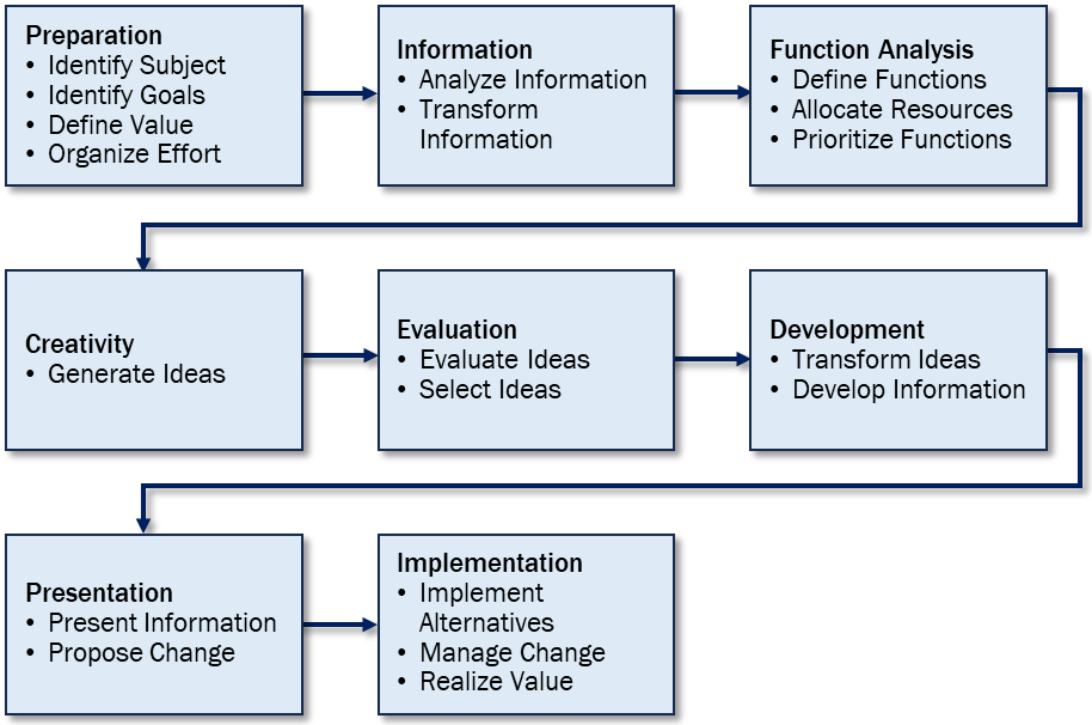


Figure A-1. Phases and Functions of the VM Job Plan

[9] The content of this appendix was largely derived from VM Guide: A Guide to the Value Methodology Body of Knowledge, SAVE International®, 2020, Chapter 3. Used by permission.

A.1 Preparation Phase

Thorough preparation is critical to the success of any VM study. The first part of this preparation is identifying what is to be studied (the VM study subject) and when it is to be studied. A variety of techniques may be employed to select the best subjects for study and to identify the proper timing for the VM study.

Key activities involved in the Preparation phase include:

- Defining and confirming the VM study goals and objectives.
- Identifying the key participants, customers or users, and stakeholders.
- Determining how value is defined.
- Identifying the study duration.
- Identifying the logistics required to support the VM study effort.

The VM study team can gain a basic level of understanding by gathering and reviewing the appropriate information gathered before starting a VM study. Depending upon the type of VM study, the information required will vary slightly; however, in all studies, information pertaining to the subject scope, performance or quality, time or schedule, cost, and risk should be identified, gathered, and organized for use in the Information phase.

The study leader may conduct a pre-study meeting to plan and organize. This meeting typically includes the value practitioner and key stakeholders and, in some cases, the rest of the VM study team. This meeting helps ensure a well-defined VM study by aligning all participants and focusing their effort on value improvement relevant to the VM study sponsor's goals.

A.2 Information Phase

The primary objective of the Information phase is to obtain a thorough understanding of the subject under study. The team discusses the information gathered before and during the VM study. Typically, the stakeholders responsible for the study subject will present the current state of the information to the VM study team and answer their questions. Key considerations in this phase include:

- Human relations are important to the success of any VM study. "People problems" are oftentimes more difficult to resolve than technical problems. The effectiveness of a value practitioner's efforts depends upon the amount of cooperation among stakeholders involved with, or responsible for, the subject under study.

- All pertinent facts concerning the subject must be uncovered and drawn together, including but not limited to customers, stakeholders, the sponsor's objectives, the history of the subject and its development, cost, time and schedule, quality and performance requirements, implementation successes and failures, and potential risks.
- All aspects of the subject should be questioned, analyzed, and examined. It is often helpful if the subject can be observed in actual operation (if applicable). The main considerations are getting all the facts and getting them from the best available sources.
- The subject information must be thoroughly analyzed, and meaningful conclusions drawn from it. One of the key activities of the Information phase is to transform the "raw" information into a form that the VM study team can use to focus them on value improvement. This effort ultimately assists the team in identifying areas of opportunity and allocating the most pertinent information to functions in the subsequent phase.

A.3 Function Analysis Phase

Function analysis is the heart of VM. The ultimate objective of the Function Analysis phase is to identify functions that do not provide good value and those that are altogether unnecessary. There are three steps in the Function Analysis phase:

1. Define the subject's functions. This includes the activities of identifying, classifying, and organizing functions.
2. Allocate resources to functions. Project information related to cost, performance, schedule, risk, and other information (such as size, weight, etc.) is associated with specific functions to identify an understanding of these relationships and enhance the team's understanding of value improvement opportunities.
3. Prioritize functions for value improvement. Ultimately, the objective of function analysis is to prioritize specific functions for value improvement. These will serve as the focus for the Creativity phase and aid the team in thinking laterally about potential alternatives.

In a typical VM study, several functions usually stand out as requiring improvement, either from the cost/time/risk relationships that were developed or through the identification of a function(s) as a root cause of a performance or quality problem.

A.4 Creativity Phase

In the Creativity phase of the VM Job Plan, a creativity session is conducted for each function targeted for improvement during the Function Analysis phase. During these creativity sessions, any idea that can be associated with that function is recorded for later evaluation. Creativity techniques are typically employed to identify numerous ideas on each function requiring

improvement. Generating a large quantity of ideas is the goal, rather than the quality of the ideas. A large quantity of ideas leads to a greater number of quality ideas. A key element of creativity is to avoid evaluating ideas generated during the creative process.

A variety of creative techniques can be employed to stimulate the VM study team's imagination. Team brainstorming is typically used to initiate the creative process. All members of the VM study team must be encouraged to participate, because a high level of participation motivates and energizes the creative process. The focus should first be on the development of ways to perform the function, and secondly on ways to improve the value of the function.

A.5 Evaluation Phase

The objective of the Evaluation phase is to reduce the large quantity of ideas generated in the Creativity phase to the best value-improving ideas. The VM study team will discuss and evaluate each idea relative to performance, quality, time, cost, and risk. With this evaluation process, they identify the major benefits and challenges of each idea and how it would impact value. The team then agrees on a rating for the idea. Rating serves as a filter, with the better or higher rated ideas generally advancing to the next step and being developed further.

Frequently, several ideas or a combination of competing ideas remain. When this occurs, an evaluation matrix may be used that better quantifies the impact of competing ideas to identify which will best meet the VM study subject's need, purpose, performance, and cost objectives. Key considerations include:

- Spending money as you would your own. This is an important rule when considering the cost of implementing an idea.
- Evaluating the ideas relative to performance and quality.
- Understanding how the ideas will impact time and risk. Will the idea take more time than the current approach? Will it reduce uncertainty by maximizing opportunities or minimizing threats?
- Identifying implementation factors, such as the time required and resources available to integrate the change. The challenges related to acceptance of the ideas and resistance to change also should be considered.
- Comparing the benefits and challenges of each idea relative to the current state of the subject.
- Refining ideas that otherwise might be rejected. Often additional creativity techniques can be used to develop a solution for a problem that arises during evaluation. It is useful to think of the Creativity and Evaluation phases as an iterative process. The surviving

ideas are then refined, and more cost information is obtained. Detailed estimates are prepared only for the more promising alternatives.

- Selecting ideas for further development. Ideas with the greatest value improvement potential are normally chosen to be developed with further study, testing, refinement, and information gathering. If there is more than one outstanding idea addressing a specific function or the differences between two or more ideas are not clear enough to eliminate any of them, then all should be retained and carried over into the next phase.

A.6 Development Phase

The objective of the Development phase is to develop the best ideas identified during the Evaluation phase into specific VM proposals, recommendations, or alternatives that have been technically validated. The impact of each VM proposal should also be quantified as much as possible. Key questions and considerations include:

- Does the proposal clearly explain the nature and rationale of the proposed change?
- Does the proposal consider all the impacts to resources (e.g., initial cost, life-cycle cost, schedule, etc.)?
- Does the proposal consider how the change will be implemented?

The team should ensure that each VM proposal has been fully documented and is presented in a format that will enable decision makers to clearly understand all relevant information.

A.7 Presentation Phase

The VM study concludes with the Presentation phase, in which the study team prepares a final report containing the alternatives and presents the information to the VM study sponsors or stakeholders. This initial presentation is to provide the team's findings and should not be advertised as a decision meeting. The decision-making process should occur in the final phase, Implementation. The VM study team typically provides the written report after the presentation. Key considerations in presenting results include:

- VM study presentations, both written and oral, are intended to gain the cooperation of the decision makers and their advisers, so the proposals should be developed and conveyed in as clear and concise a manner as possible.
- During a presentation, the VM study team can elaborate on points that are not clear to the listeners and answer questions regarding the VM proposals.
- The team should distinguish VM study presentations from decision-making meetings.

A.8 Implementation Phase

The Implementation phase is critical to the ultimate success of the VM Job Plan. During this phase, the sponsors or stakeholders involved in the decision-making process will review and assimilate the data given to them in the Presentation phase.

An implementation meeting should be conducted once sufficient time has passed to allow the sponsors and stakeholders to review the VM study team's findings. The purpose of the implementation meeting is to decide the acceptability of each VM proposal. Ideally, the VM study team will be present to provide clarifications and assistance to the decision makers.

Accepted proposals require the development of an implementation plan and schedule for integration into the VM study subject. Tracking the implementation of VM proposals and auditing the results helps the team measure the efficacy of the VM effort. Components should have a mechanism in place to allow the study leader to change to the subject's scope, performance, quality, schedule, cost, and risks to be managed.

Appendix B: Value Engineering Change Proposal Contractor Details

The purpose of Appendix B is to provide detailed information and suggestions that can facilitate the successful development, preparation, submission, and implementation of VECPs to realize the benefits of VE for the Government and its contractors. While a vigorous VE program at a contractor location is certainly beneficial in many ways, this appendix section focuses only on use of the FAR clause 52.248-1, Alternates I, II, and III, which, if included (VE Clause) provide the basis for contractors to submit VECPs in supplies or services contracts along with the compatible information in FAR Part 48. It is not intended to make the contractor an expert on VE principles or techniques.

Use of VECPs is a tremendous opportunity for both contractors and the Government to add value. The VECP Section B.1 identifies contractor considerations for the effective use of VE in Government contracts. Provisions of the VE terms and conditions in contracts are briefly discussed in Section B.2. Sections B.3 and B.4 provide guidelines for preparing VECPs and for sharing VECP-generated savings, respectively. Section B.5 identifies Government and industry best practices for using VECPs.

As in all other contractual actions, it is extremely important to read the contract before developing VECPs. This review will acquaint the reader with specific contract requirements and provisions and could also reveal non-value-added requirements or provisions that add cost to the performance of the contract. These non-value-added requirements or provisions may be appropriate targets for a VECP submittal if other VECP requirements are met (i.e., a change to the contract is required and the cost of performance could be reduced).

Contractors can obtain additional guidance from (1) the VE clause in their applicable contract; (2) FAR 52.248-1, Alternates I, II, and III, which, if included, provide the basis for contractors to submit VECPs in supplies or services contracts; or (3) their Government contracting office. Assistance also can be obtained from the Government program or Component VE advocate. The overall DoD VE point of contact (POC) can be reached by sending an email to osd-sea@mail.mil with the subject line “Attn: Value Engineering”.

B.1 Establishing and Maintaining an Effective Contractor VE Program

A VECP is a proposal submitted to the Government by the contractor in accordance with the VE clause in the contract. It proposes a change that, if accepted and implemented, provides an overall cost savings to the Government. A VECP may update an existing design to the current state-of-the-art technology, simplify complex material by modifying or eliminating components, update specifications/drawings to provide improved data for future procurements, or reduce Contract Data Requirements List (CDRL) items, to name a few examples. Despite the term

"value engineering," no engineering effort may be required—only a proposal that reduces the cost of performance under the contract and requires a contract change for implementation. The VE terms and conditions in a contract prescribe that the contractor receive a substantial share in the savings accrued because of implementation of the change.

There is a mistaken belief that a VECP requires a change in a specification. It does not. It requires only a change in the contract. To qualify as a VECP and to ensure that savings can be shared, the proposed change must be submitted under a current contract and must meet two primary requirements:

- It must require a change to the contract under which it is submitted.
- It must provide an overall cost savings to the customer after being accepted and implemented. (A VECP could result in increased unit cost but reduced O&S cost. Thus, there would be an overall savings to the DoD.)

There is an exception called out in the clause

> "…provided, that it does not involve a change
>
> (i) In deliverable end item quantities only;
>
> (ii) In research and development (R&D) end items or R&D test quantities that is due solely to results of previous testing under this contract; or
>
> (iii) To the contract type only."

As in the Government, management support is necessary for successful contractor use of VE on Government contracts. The following is a suggested listing of questions to help contractors determine whether they have the attitudes and disciplines needed to have a viable, effective VE program:

- Does the company establish VECP goals?
- Do VECP goals flow down the corporate structure?
- Are contractor management personnel involved in VECP decisions, and do they approve VE operating goals and budgets?
- Do contractor management personnel consult with key Government personnel on the use of VECPs as a cost reduction tool and gain Government agreement on the need to apply VM to the system being acquired?

- How do contractor personnel benefit from contributions to approved VECPs? Are there special awards and/or recognition?
- Do contract negotiators understand the FAR VE provisions?
- Does the contractor have supply chain policies that encourage VECP submittal?
- Does the company's accounting department identify VECP income separately so that
  - Management personnel can recognize the monetary benefit of VE?
  - Management can be kept informed of expenditures and receipts resulting from the VE effort?
- Are resources assigned specifically for the development of VECPs?
- Does the company work to minimize the time to
  - Develop a VECP?
  - Obtain internal approval before submitting a VECP to the Government?
- Does the company conduct formal VE workshops to expand in-house capabilities?
- Is there a VE training and indoctrination program?
- Does management ask why an ECP or other change cannot be a VECP?
- Do engineering and program management personnel look at VECPs to incorporate new technologies?
- Is there coordination between Government contract administration and the company's marketing efforts with respect to VECPs?

B.2 VE Terms and Conditions in Contracts

The basic VE provision is the Value Engineering Incentive (VEI) clause in the FAR (Alt I as referenced in FAR 52.248-1). The VEI clause is included in most supply/service contracts when the contract price exceeds the simplified acquisition threshold. It may also be included at lower thresholds (e.g., a common practice among many DoD organizations is using the clause for spares/repair kit contracts over $25,000 if the contract is not for standard commercial parts).

The VEI clause may be included in contracts under the threshold if the contracting officer sees a potential for significant savings. If the VEI clause is in the contract, contractor participation is voluntary. However, when contractors do participate in the VE program by originating, preparing, and submitting VECPs, they will be rewarded for their (and any of their subcontractors') ideas if the ideas are adopted by the procuring activity. The sharing rate (percentage of the savings) received by the contractor is specified in the FAR.

In addition to the basic VEI clause, the FAR contains alternative provisions that can be incorporated into a contract that requires a mandatory VE effort by the contractor (referenced as Alt II in FAR 52.248-1). Known as the VE Program Requirements Clause (PRC), it may be included in initial production solicitations and contracts for major programs if the contracting officer determines that significant savings and/or other value benefits may result from a sustained, specified VE effort. Typically, solicitations and contracts employing a VEPRC include a SOW, a CDRL to report progress, and a separate contract line item. The VEPRC can be used as a risk-sharing mechanism whereby the parties to the contract may agree to share development costs. A VEPRC does not necessarily result in a VECP but can resolve issues and add value by increasing the effectiveness of the contract or products and services. Unfortunately, the use of the VEPRC has declined in DoD because of the perceived extensive amount of Government preparation and oversight required to manage it.

B.2.1 When No VE Provisions Are Included in the Contract

It is possible that a contractor could have an idea for a VECP but has a contract that does not contain any VE provisions. In this case, the contractor should notify the Procuring Contracting Officer (PCO) that it would like to submit a VECP. The contractor should request that a contract modification be issued as soon as possible to incorporate applicable FAR provisions. Normally, VEI provisions will suffice; however, if the contractor's idea will require significant initial funding and the marketing/pre-sell efforts have indicated that the Government is interested, the contractor may request the VEPRC provision.

B.2.2 Subcontractor VE

The FAR requires prime contractors to extend VE provisions to their subcontractors on contracts of $150,000 or greater. It is recommended that VE provisions also be extended to subcontractors on contracts of lesser value unless the nature of the work precludes VE benefits. A subcontractor must submit its VECP to the prime contractor who, in turn, submits it to the Government.

B.2.3 VECPs on Different Contract Types

According to OMB Circular A-131, "VECPs are applicable to all contract types, including contracts with performance-based specifications." The contracts may be cost plus or fixed priced and may or may not include incentives.

B.2.3.1 VE Clauses and Performance Specifications

Some believe that performance-based contracting is eliminating the contractor's incentive to submit VECPs because under a performance-based contract, contractors can make changes without Government approval and keep all the savings on the current contract. Performance-

based contracts do not preclude VE; however, it is more difficult to find the required "change to the contract." There are several reasons why a contractor would submit a VECP and share the savings with the Government including increasing profit, inserting new technology, involving the customer (Government) in decisions, improving competitive position, defraying development and implementation costs, and preventing long-term issues. Performance specifications have, in most instances, eliminated the need for contractor-proposed VECPs to make minor changes in the Government-prepared specifications of Technical Data Packages (TDPs). Instead, the contractor has the latitude and flexibility to make changes if contract-specified performance parameters are met. Nevertheless, contractors have submitted and continue to submit VECPs on performance specification contracts.

In situations that involve high development and implementation costs, new or risky technologies, changes that require Government test facilities, or improvements that affect the acceptance of products, it is mutually beneficial for contractors to submit (and the Government to accept) VECPs. Many changes such as these do not pay for themselves (or pay back enough) under the current contract. VECPs are needed because they lock in savings on future contracts (i.e., a share of the savings over a longer period may be preferable to all of the savings in a shorter period of time). Even a negotiated sole source contract with option years does not lock in the savings for the contractor. The Government may require certified cost and pricing data before exercising an option. If the contractor made significant investments in the non-recurring costs of the VE change, the opportunity to recover these costs would be lost because the contractor would only be able to sell at the new reduced price and would lose the opportunity to share in future savings and recover unamortized investments without a VECP in place. Without VECPs, the contractor would most likely refrain from any investment because of the risks involved.

In addition, even in a performance-based contract, some areas for which VECPs can be submitted remain under Government control. VE clauses do not apply only to changes in the specifications or the TDP. For example, VECPs can be used to eliminate redundancies in testing, parts control, and other logistics issues. Also, in some instances, it is beneficial for the contractor and the Government to share in investment risk. The VECP can be used to share the investment risk, and both parties will share the subsequent savings. Finally, in a contract where cost and pricing data may be collected, often it is beneficial for a contractor to submit a VECP to secure a share of future savings that otherwise would be negotiated away as general efficiencies. VECPs should be used to implement any change to the contract that significantly benefits the Government.

B.2.3.2 VE Clauses and Incentive Contracts

Contract share lines provide a negotiated way to share underruns and overruns on incentive contracts. The goal of such sharing arrangements is to obtain specific acquisition objectives by

(1) establishing reasonable and attainable targets that are clearly communicated to the contractor and (2) including appropriate incentive arrangements designed to (a) motivate contractor efforts that might not otherwise be emphasized and (b) discourage contractor inefficiency and waste. While any VECP savings generated for the current contract will be captured under the share line, VECPs must be used to share the savings on concurrent and future contracts as well as sharing in any collateral savings.

B.3 Preparing VECPs

VECP preparation encompasses marketing the idea, gaining informal Government approval, developing the required information, and submitting the formal VECP. These ideas are discussed in Subsections C.1 and C.2. Subsection C.3 addresses additional VECP guidelines.

B.3.1 VECP Marketing

VE clauses in DoD contracts are not enough. The clauses merely invite or require contractors to question the value of the requirements in their contracts (Government specifications, SOWs, etc.) that contribute little or nothing (except cost) to the tasks or items being acquired. Both parties—the Government and the contractor—must work together to capture the actual benefits of VE efforts.

As with any change to an active contract, communication between the contractor and the approving authority is critical because a VECP is a change to the contract and thus a change to the program. Generally, a program manager's primary concerns are schedule, performance, cost, and risk. Any change (or lack of a change) that could have an impact on any of these areas requires early discussion and general agreement from all parties involved, including the PCO and the Administrative Contracting Officer (ACO) for the particular contract.

A potential VE idea should be presented as early as possible to the appropriate POCs. The cost of preparing a formal VECP is often substantial. Marketing enables the contractor to get from the Government an indication of whether a potential idea should be pursued. The contractor should get to know the Government POC/Government VE advocate who has the responsibility for evaluating and accepting or approving the VECP. Since, in many cases, a VE advocate may not have been assigned, the contractor should find the appropriate person in the program office who can champion the idea. A good champion might be the person or group within the PMO who would be "most affected" by the change or improvement.

This informal submission may take the form of a slide (or other) presentation that explains the technical aspects of the idea, lists its advantages and disadvantages, estimates the cost to implement and the potential cost savings, and meets as many of the eight minimum requirements

of paragraph (c) of FAR 52.248-1 as possible. A contractor is not required to make an informal submission, but doing so is likely to improve the contractor's chances of success, especially if the development of the idea presents the possibility of significant risk to the contractor or the program. This presentation can help the Government determine whether the idea deserves additional consideration or should be abandoned. If the Government is receptive to the idea, the contractor can request the Government's views on qualification and testing requirements as well as other Government cost impacts. The contractor should be aware that the Government's interest in the preliminary proposal has potential to be accepted as a VECP but does not guarantee that the VECP will be accepted or approved, nor does it guarantee ownership of the idea. Also, the Government's favorable response does not obligate the contractor to submit a VECP.

While a preliminary, informal submission does not eliminate all risk to the contractor, it reduces one major element of contractor risk by preventing a contractor's expenditure of significant funds and time on ideas that have little or no chance of being accepted or approved. In rare cases of concurrent competitive contract efforts, an independent formal submission of a VECP from a competitor may preempt the favorable consideration of a preliminary proposal. The Government is prohibited from unilaterally "using" a contractor's VECP idea or sharing it with a competitor, but competitors are not prohibited from independently pursuing similar efforts and making independent formal submissions.

The contractor also should be aware that an informal submission does not establish ownership of a VE idea or the right to share in any resultant savings. This ownership is established only when a fully documented, formal VECP is submitted.

In summary, preliminary submission of ideas for a VECP is advantageous to the contractor because it reduces the risk of expending time, effort, and funds on an idea that the Government does not want to pursue.

B.3.2 Basic Requirements of the Formal VECP

When the contractor decides to submit a VECP, those responsible for preparing it should realize that the chance of the VECP being approved is proportional to the completeness and credibility of its preparation. Sufficient information must be provided so that the Government can conduct a thorough evaluation within a reasonable amount of time. Failure to provide adequate data will usually result in a request for additional data (which significantly delays the process) or could possibly result in the rejection of the VECP. The contractor should prepare a VECP using an approach like responding to a formal procurement solicitation. The following eight steps are the minimum amount of information required for a VECP submission according to FAR 52.248-1:

- A description of the difference between the existing contract requirement and the proposed requirement, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, the effect of the change on the end item's performance, and any pertinent objective test data.
- A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revisions.
- Identification of the unit to which the VECP applies.
- A separate, detailed cost estimate for (a) the affected portions of the existing contract requirement and (b) the VECP. The cost reduction associated with the VECP shall take into account the contractor's allowable development and implementation costs, including any amount attributable to subcontracts under the Subcontracts paragraph of this clause.
- A description and estimate of costs the Government may incur in implementing the VECP, such as test and evaluation and operating and support costs.
- A prediction of any effects the proposed change would have on collateral costs to the agency.
- A statement of the time by which a contract modification accepting the VECP must be issued to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.
- Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved, and previous Government actions, if known.

B.3.3 Format of the Formal VECP

The FAR clause relative to VE does not specify a particular format to be followed in preparing a VECP. If the contract requires the contractor to use DD Form 1692, Engineering Change Proposal (ECP), as the basic document for submitting an ECP, it should also be used for a VECP. If the use of DD Form 1692 is not called out in the contract, the contractor should use the same form used for an ECP for the submission of a VECP. Configuration management should be performed in accordance with the terms of the contract. Any questions should be directed to the Government contracting officer.

The DD Form 1692 (https://www.esd.whs.mil/Directives/forms/dd1500_1999/DD1692/) consists of a basic information page (page 1), a continuation sheet, and six supplemental pages. On page 1, blocks 1–11 should be completed by the contractor. In block 5, Class of ECP, generally check the "Major" box since most VECPs will result in a significant change to the contract, and, in the associated block 6, the "Urgent" box should be checked so the VECP is processed as quickly as possible. For block 7, ECP Type, the "Formal" box should be used. Check the "Value

Engineering" box in block 8, Justification Code, when submitting a VECP. For block 9, Description of Change, and block 10, Need for Change, provide a brief description of the VECP (block 9) and potential savings achieved by implementing the VECP (block 10). Blocks 14–21 are filled in as required or needed to document the proposed VECP. Blocks 22–24 are filled in with the requisite information and signed by the contractor. The contractor should use pages 2–7 as needed to explain and justify the proposed VECP. Use page 4 as a checklist to detail the non-reoccurring engineering costs and potential savings achieved by implementing the VECP. Note that page 6 is used for proposed hardware, services, and so forth, and page 7 is used for proposed software VECPs. For additional assistance with filling out the DD Form 1692, the contractor should contact the local Defense Contract Management Agency (DCMA) representative or the contracting officer.

B.3.4 Where to Send VECPs

The FAR governs the distribution of VECPs. The clauses for supply/service contracts require that VECPs be submitted to the PCO and to the ACO when the contract is administered by other than the Defense customer (e.g., DCMA). Copies should also be sent to the appropriate program office and to the associated Government VE office and/or VE advocate, as appropriate.

DoD's VE advocate, if there is one, and the program office champion should be made aware of the VECP to assist in expediting the evaluation and to support the accept/reject decision process by the PCO. The Government VE advocate monitors all VECPs received and, through close coordination with the PCO and program office, facilitates timely processing. The Government VE advocate can also serve as a POC from whom the contractor can obtain the status of the VECP.

B.3.5 Transmittal Letter

Preparation of a transmittal letter forwarding the VECP is also an important step toward success. The transmittal letter should state that the VECP is being submitted pursuant to the VE provisions of the contract. The transmittal letter also should serve as a summary of the contents of the VECP, should briefly state the nature of the proposed change and the estimated price changes, and should reference where complete details can be found in the proposal. The transmittal letter serves as a table of contents of the proposal and as a marketing document that highlights the proposal's technical advantages and overall cost reductions to the Government.

B.3.6 Restricting Data

Normally, the Government has unlimited rights to use the data in a VECP. If a VECP contains information that the contractor wants to restrict from use before Government approval, the

contractor should include an appropriate legend on each page of the VECP to include the DD Form 1692. The FAR clause 52.248-1 language for supply/service contracts for this legend is as follows:

> These data, furnished under the VE clause of Contract No. _____, shall not be disclosed outside the Government or duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate a VECP submitted under the clause. This restriction does not limit the Government's right to use information contained in these data if it has been obtained or is otherwise available from the contractor or from another source without limitations.

If the VECP is accepted, the Government normally has the right to use any data contained in the VECP and its supporting documents.

If the VECP contains proprietary data that the contractor wants to restrict even after acceptance of the VECP, a statement to that effect must also be included in the VECP. If DD Form 1692 is used, pages 2 and 3 should identify proprietary data. The proposal should be marked with the appropriate limited rights legend from the "Rights in Technical Data and Computer Software" clause of DoD's FAR Supplement (the Defense Federal Acquisition Regulation Supplement (DFARS)), and the contractor must explain in the proposal the basis for asserting limited rights. The contract modification implementing the VECP should specify the limited rights that the Government has accepted. The contractor should realize, however, that a VECP that results in a "sole source" condition for future acquisitions might not be as readily accepted as one for which this restriction is not imposed.

B.3.7 Additional VECP Guidelines

The following additional guidelines apply when preparing VECPs:

- When a contractor submits a VECP for approval, the contractor should not initiate action to implement the change until the contractor receives a formal contract modification from the Government.
- When a contractor submits a VECP, the contractor should identify other similar or related contracts to which the VECP may apply (if known). The contractor should identify the potential to have other program customers participate in the VECP non-recurring cost (e.g., FMS customers).
- When a contractor undertakes a VECP effort, the contractor must keep records of development costs and require that subcontractors do the same.

- Contractors should be as accurate as possible in calculating implementation costs and insist that the Government provide accurate and complete data when calculating Government implementation costs.
- When a VECP is incorporated into the contract(s), the contractor should maintain internal records (for at least 3 years) identifying the first item delivered containing the VECP.
- The contractor can withdraw the VECP in whole or in part before acceptance or rejection; however, any withdrawn VECP or portion thereof can be subsequently incorporated into the contract without payment of a share of the cost savings to the contractor. This mechanism helps preclude a possible situation in which the contractor, not satisfied with the contracting officer's determination of the worth of a VECP and the associated share in cost savings, withdraws the idea to place the contracting officer in an unfair negotiating position.

B.4 Sharing VECP Savings

DoD has been encouraging submission of VECPs since the VE policy was first established in the Armed Services Procurement Regulation in 1959. Over the years, many changes that have occurred have clarified the FAR language and increased the contractor's share of savings.

Acquisition and collateral savings are two basic types of savings that can be shared when a VECP is approved and implemented under a supply/service contract. Subsections D.1 and D.2 describe the sharing arrangements for firm-fixed-price contracts with VEI provisions, and Subsection D.3 discusses sharing arrangements with subcontractors. Sharing arrangements vary with other types of contracts. FAR Part 48 and FAR 52.248-1 define the terms used in VE, the criteria for VECP acceptance, and guidance on sharing arrangements. In addition, incentive contracts may contain special provisions to ensure that no adjustments are made to targets or ceilings when an approved VECP results in instant contract savings rewarded under the overall contract cost incentive. Whatever the type of contract, the Government's intent is to offer a full range of motivational VE options to contractors while precluding duplication of incentives.

B.4.1 Acquisition Savings

FAR Part 48 and 52.248-1 define acquisition savings as "… savings resulting from the application of a VECP to contracts awarded by the same contracting office or its successor for essentially the same unit." Acquisition savings may include savings obtained on the instant contract, concurrent contracts, and future contracts.

The instant contract is the contract under which the VECP is submitted and accepted. As the VECP is implemented on items delivered under this contract, the contractor will receive a

percentage share of the net savings that accrue as a result of the VECP. In calculating these savings, the contractor's (and, if applicable, subcontractor's) reasonable, allowable, and allocable costs for development and implementation of the VECP and the Government's costs for implementation are all taken into consideration. A contractor's development costs are those costs incurred in developing, testing, preparing, and submitting the VECP. Development costs materialize after it has been determined that a VECP will be prepared and before acceptance of the VECP by the Government.

Implementation costs are those costs that result from contractual changes required as a result of Government acceptance of the VECP. Implementation costs are incurred after the VECP has been approved. For audit purposes, the contractor must identify and record those costs incurred (including subcontractor costs). In calculating any adjustment in this contract's price for instant contract savings (or negative instant contract savings), the contractor's allowable development and implementation costs include any subcontractor's allowable development and implementation costs and any VE incentive payments to a subcontractor that clearly result from a VECP accepted by the Government under this contract.

The contractor can choose any arrangement for subcontractor VE incentive payments provided that the payments do not reduce the Government's share of concurrent or future contract savings or collateral savings. The arrangements negotiated for the instant contract are continued in future contracts, including any negative instant contract savings for the contractor submitting the VECP to the Government.

Concurrent contracts are those contracts that the VECP originator (referred to as Contractor A) and other contractors (Contractors B, C, and so forth) have ongoing at the time that the VECP is approved for essentially the same item. If the Government directs that Contractor A's VECP to be incorporated into Contractor B or C's contract, then Contractor A will receive a share of the net savings obtained from contracts B or C (any contract affected by Contractor A's VECP). Contractor A's instant contract total price will then be increased by that amount.

Acquisition savings can be shared in one of three ways: "lump-sum," "future per-unit savings," or "no-cost settlement." If the Government can predict with some degree of certainty the number of affected items that will be procured within the share period (and this number is not classified), the "lump-sum" method of settlement can be used only if the contracting officer has established that this is the best way to proceed and the contractor agrees. The contract modification incorporating the VECP will specify the anticipated future procurement quantity. The cost savings per unit are then multiplied by the anticipated share period quantity, and the instant contract price is increased by the contractor's share of that amount.

The second but primary way of sharing future savings is for the contractor to receive a portion of the per-unit savings that occur as contracts incorporating the VECP are awarded. This sharing applies to items scheduled for delivery within the determined share period (as described in the FAR), which begins upon acceptance of the first item affected by the VECP. In the case of multi-year contracts, sharing applies only to quantities that (1) are fully funded at the time of VECP acceptance and (2) fall within the determined share period. It is the contractor's responsibility to maintain records from the time the first VECP-affected unit is accepted until the determined VECP share period ends for 3 years after final payment on the contract under which the VECP was accepted.

Whenever the Government issues a new contract during this share period for essentially the same item and the contractor's VECP has been incorporated into the contract documents, the contractor is entitled to a portion of any per-unit savings during the share period. Payment will be made via the instant contract when savings are realized. Normally, the savings per unit calculated for the original contract will be multiplied by the number of units scheduled for delivery before expiration of the share period.

Also, in design or LRIP contracts, the Government can modify the usual VE clause to improve contractor incentives. If the clause is modified, the sharing formula is expressed in terms of a specific quantity and not in time. This quantity is the number of units affected by the VECP that are scheduled to be delivered over a period between 36 and 60 consecutive months (set at the discretion of the contracting officer for each VECP as described in the FAR) that spans the highest planned production, based on planning and programming or production documentation that exists at the time the VECP is accepted.

The third way of sharing savings with the contractor is the "no-cost settlement" method. Under this method, the contractor keeps all savings from the instant contract and its own concurrent contracts. The Government keeps all savings from future contracts and concurrent contracts with other sources as well as all collateral savings. This method, if agreed upon by the Government and the contractor, can minimize the administrative costs of determining and negotiating savings.

If the "lump-sum" method or the "no-cost settlement" method cannot be mutually agreed upon, then the "future per-unit savings" method will be used.

B.4.2 Collateral Savings

Collateral savings are those measurable net reductions in the cost of operation, maintenance, logistics support, shipping, or GFE that result from an accepted VECP. In some situations, a VECP might increase the acquisition cost of an item but result in substantial collateral savings. For collateral savings, the contractor is entitled to 20 to 100 percent (determined by the

contracting officer as described in the FAR) of the savings that the Government estimates will be realized during a typical 1-year period; however, the contractor's share cannot exceed $100,000 or the value of the instant contract, whichever is greater. The Government determines the amount of collateral savings. Some contractors have had several VECPs approved and implemented with substantial collateral savings; however, determining and verifying measurable net reductions can be difficult and, in some instances, the Government may exclude the collateral savings program.

B.4.3 Sharing Savings with Subcontractors

As discussed previously, the prime contractor's allowable development and implementation costs include any subcontractor's allowable development and implementation costs and any VECP incentive payments to a subcontractor that clearly result from a VECP accepted by the Government under this contract. The contractor can choose any arrangement for subcontractor VE incentive payments provided that the payments do not reduce the Government's share of concurrent or future contract savings or collateral savings.

The prime contractor can make prime-to-subcontractor VECP arrangements that extend to the subcontractor any or all of the instant contract savings or a percentage of whatever amount the prime contractor receives as its share of concurrent contract share, collateral share, and future acquisition share. For example, a simple paragraph could be included in a subcontract to provide a 50 percent share of whatever dollar amount the prime contractor receives in the future, concurrent, and collateral areas of sharing on a successful VECP.

The sharing arrangement between prime contractor and subcontractor can be a matter of negotiation between them and should provide motivation for the subcontractor to submit VECPs to the prime contractor. It should also provide a fair share to the prime contractor, who is responsible for putting a subcontractor's VECP into proper format and proposing it to the Government. Any development and implementation costs incurred by the subcontractor and the share of instant contract savings extended to the subcontractor are considered to be a part of the prime contractor's development and implementation costs.

B.5 Government and Industry VECP Best Practices

The four major elements of the VECP process are idea generation, suggesting the VECP, VECP approval, and VECP settlement.

Figure B-1 shows an example of a VECP process (terminology may change relative to the Component):

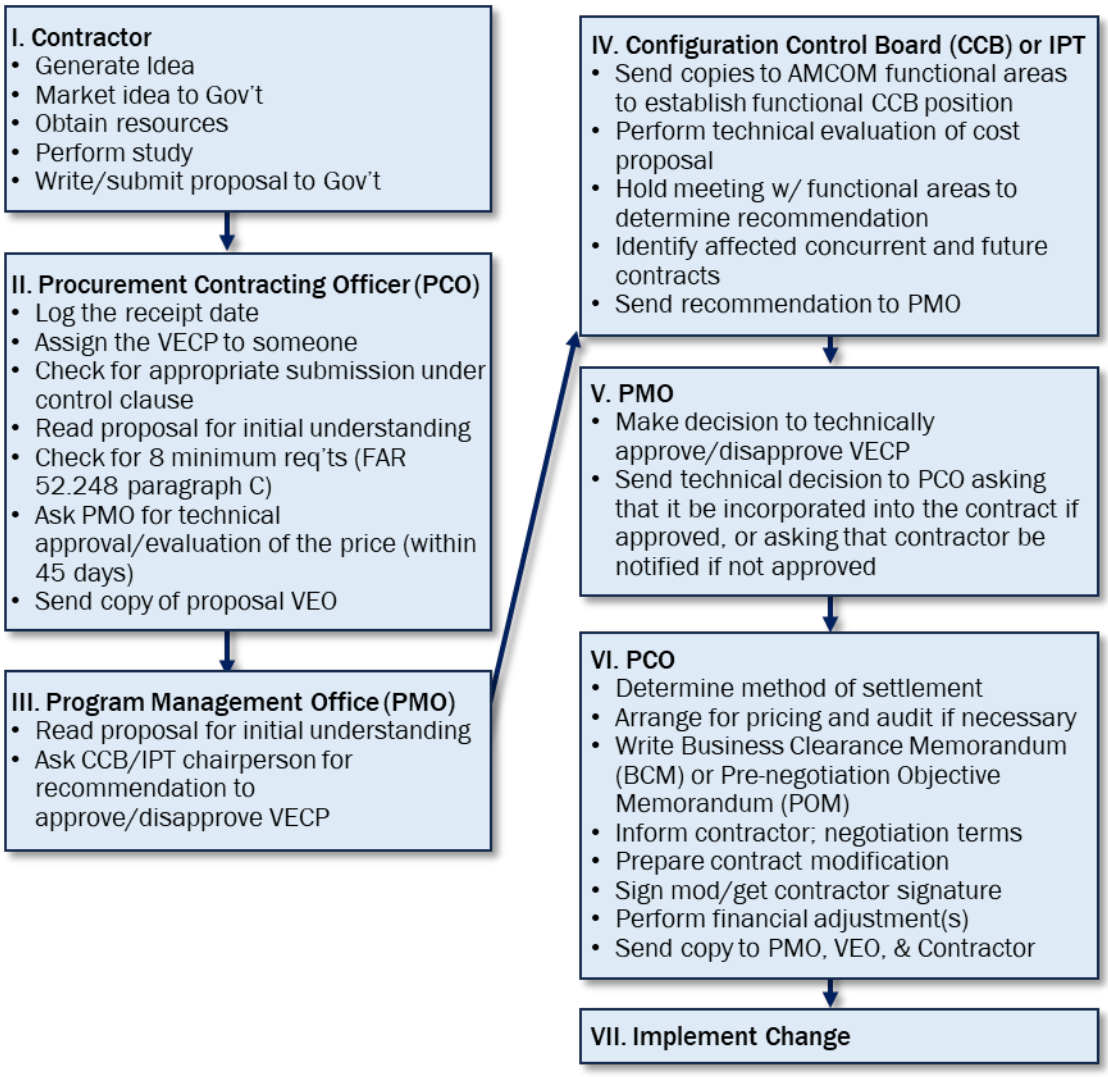


Figure B-1. Steps for Evaluating a VECP

The following sections, B.5.1 through B.5.4 and Figures B-2 through B-6, provide additional information on the four elements of the VECP process. Yellow blocks signify contractor activities for which further information is provided, and blue blocks signify Government activity for which further information is provided. The widespread dissemination and use of this information, along with sharing other knowledge and experience, will help advance VE strategic objectives and provide increased profit and other benefits to the contractor. The DoD will benefit from cost savings and improved system performance.

B.5.1 Idea Generation

Figure B-2 portrays the idea-generation process.

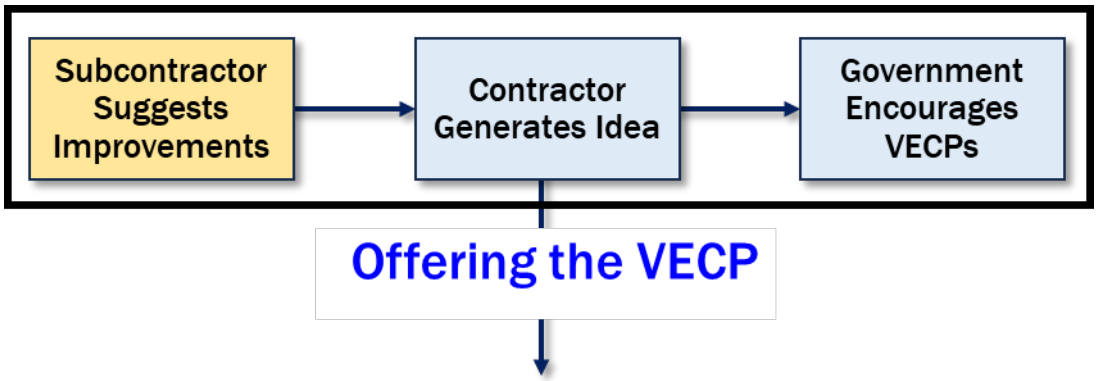


Figure B-2. VECP Idea Generation

B.5.1.1 Contractor Generates Idea

The following are several best practices for a viable contractor VE program:

- The company should establish VECP goals.
- At each management meeting, a chart should be included that shows the progress against the VECP goals or at least a listing of the VECPs being pursued.
- VECP goals should flow down through the corporate structure.
- Any time a change is contemplated, management should ask why it cannot be done as a VECP.
- Contractor management personnel should be involved in VECP decisions and approve VE operating goals and budgets.
- Contractor management personnel should consult with key Government personnel on the use of VECPs as a cost-reduction tool and gain Government agreement on the need to apply VM to the system being acquired.
- Contractor personnel should benefit from contributions to approved VECPs in the form of special awards and/or recognition.
- Contract negotiators should understand the FAR VE provisions.
- There should be an active VE component within supply chain management to encourage and reward suppliers for VE efforts.
- The company's accounting department should identify VECP income separately so that
  - Management personnel can recognize the monetary benefit of VE.
  - Management can be kept informed of expenditures and receipts resulting from the VE effort.

- Resources should be assigned specifically for developing VECPs.
- The company should work to minimize the time to
  - Develop a VECP.
  - Obtain internal approval before submitting a VECP to the Government.
- The company should conduct formal VE workshops to expand in-house capabilities.
- There should be a strong VE training and indoctrination program.
- Engineering and program management should treat VECPs as a mechanism for incorporating new technologies into their programs.
- Logistics should use VECPs to address obsolescence issues.
- There should be close coordination between Government contract administration and the company's marketing efforts with respect to VECPs.

B.5.1.2 Subcontractor Suggests Improvements

Although only the prime contractor can submit a VECP, many potential ideas can be developed by a subcontractor.

- Prime contractors and their subcontractors have a unique contractual relationship. The Government customer is not involved.
- The Government customer deals only with the prime contractor.
- The entire supply chain can benefit from reducing system cost, increasing performance, and accelerating fielding.
  - It makes the prime contractor more competitive.
  - It strengthens the business relationship between the prime contractor and its subcontractors.
  - Savings can be shared.
- The prime contractor should encourage its subcontractors and their suppliers to participate in VECPs.
  - Prime contractors should have a business plan for encouraging subcontractor involvement in the VE process. This plan can be developed jointly with the Government customer.
  - Incentives can be offered.
  - It could be a way in which suppliers are evaluated.

  - Prime contractors often develop "roadshow briefs" on VECPs for subcontractors or convene periodic meetings to address or resolve prime contractor-subcontractor issues. These meetings are opportunities to address VECP opportunities and rewards with subcontractors. A joint Government/prime contractor/subcontractor VE workshop is an excellent way to substantiate the benefits to all parties.

- The subcontractor should propose a business plan to the prime contractor to maximize VECP benefits for all parties—prime contractor, subcontractor, and Government customer. The proposed change could affect other contracts that the prime contractor has with the subcontractor or other business the subcontractor may have with other companies. If a large investment is required, a way may be found to minimize the non-recurring expenses to the instant contract by spreading these costs over multiple programs. The prime contractor may be willing to pay large non-recurring expenses that cannot be offset on the current contract for some consideration or may offer greater returns if the subcontractor provides the funding. Other business that they conduct with each other could affect their willingness to initiate the VE effort and might be considered.
- The way savings are split is entirely dependent on the negotiations between the prime contractor and the subcontractor. The FAR VE clause (FAR 52.248-1(l)) requires the prime to insert "an appropriate VE clause" in all subcontracts of $150,000 or more and may include one in those of lesser value. "Appropriate" should be interpreted as being a clause that sufficiently motivates a subcontractor to prepare and submit VECPs to the prime for further submission to the Federal Government.
  - The Federal Government recognizes the importance of VECPs developed by subcontractors (where much of the actual work takes place) by allowing (per FAR 52.248-1(l)) the subcontractor to "take the first bite out of the apple" on instant contract savings—even if that means no instant contract savings are left for the prime contractor and the Government to share. However, there must be overall savings for the Government, and the Government must be the primary beneficiary of all concurrent, future, and collateral savings.
- The prime contractor should share savings with its subcontractors. This also applies to situations in which the VECP changes the prime contractor's requirements to the subcontractor but does not involve a VECP to the Government.

B.5.1.3 Government Encourages VECPs

At a general level, VE advocates should brief program offices about the importance and benefits of VE.

- At every opportunity, industry should be told of the Government's interest and receptiveness to VE.
- The program manager should use meetings with contractors to express interest in VECPs throughout the acquisition process.
- VE advocates should explain the need for VE to DCMA representatives, who, in turn, could present a VE briefing to contractors and try to promote VECP champions in industry.
- The program office should encourage the contractor to think about additional ideas and recommend other areas where the Government would be receptive to VECPs.

B.5.2 Marketing the VECP

Figure B-3 depicts the process of offering the VECP.

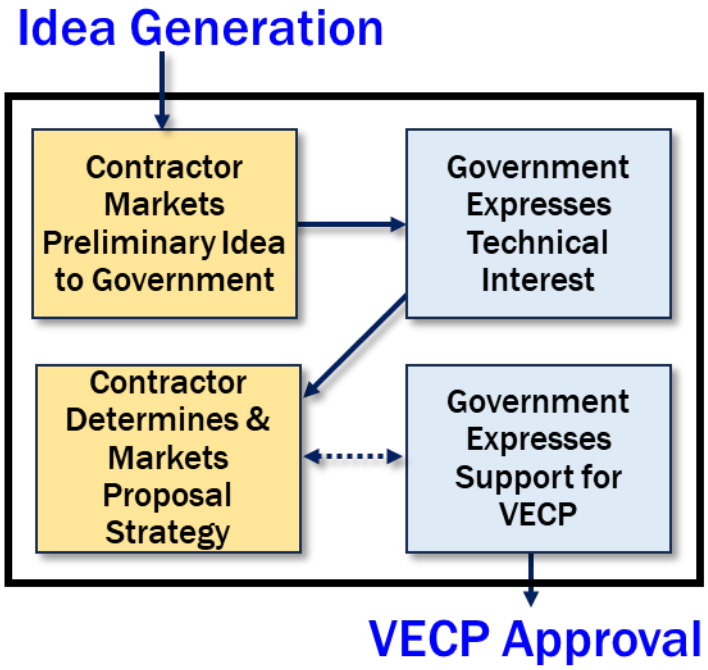


Figure B-3. Marketing the VECP

B.5.2.1 Contractor Markets Preliminary Idea to Government

This activity is a low-key activity designed to gauge whether there is any Government interest. It does not generate a commitment by the Government.

- The contractor should brief the idea to the Government technical team or equivalent thereof.

  - There should be limited contractor investment in the briefing.
  - It is a good idea to include approximate ricing and potential savings. Excluding this pricing and savings makes the brief far less effective.
  - The contractor should also indicate potential risks in cost, schedule, and performance.
  - It is important to address when the VECP effort would be completed (i.e., when the new configuration would be tested and qualified). The Government can make a VECP uneconomical by expending all the savings on expensive testing. This situation is more likely to occur with missiles and aircraft because of safety, but it is always a concern. That is why "qualification" is included even in some preliminary briefings. The contractor wants the Government to agree that its approach seems correct. For example, the contractor might suggest that if a flight test is required, it be a "ride along" as part of another flight test so there is virtually no cost.
- It is generally advantageous from a customer acceptance perspective to also include a short synopsis or information paper.
- Contractors should also seek feedback on Government needs.
  - Should the idea be modified?
  - Would the Government be receptive to VECPs in other areas?
- Desired outcome: a statement of Government interest and technical feasibility.
  - The Government should tell the contractor exactly what additional technical information should be provided when making a more formal presentation.
  - The Government should identify someone in the program office to champion the VECP.

B.5.2.2 Government Expresses Technical Interest

View the contractor's suggestion as an opportunity for the Government to save money and improve performance.

- Ensure the right people are present.
- Be constructive. Make suggestions for how the ideas can be improved.
- Provide the contractor an honest and complete assessment of what is presented and any additional technical information that is needed.

B.5.2.3 Contractor Determines and Markets Proposal Strategy

Some of the key questions the contractor considers before formally presenting the idea to the Government are as follows:

- How should the VECP be proposed?
  - As a "voluntary" effort on the contractor's part (maximum risk but maximum savings) or as a "mandatory" clause incorporated in the contract (risk reduced due to Government sharing the risk and Government funding all or part of the development and implementation costs. Because of the reduced risk, there is reduced sharing benefit to the contractor).
- Who (contractor or Government) should invest what and when for maximum savings and return?
- How big or small should the VECP (assuming it is not a simple one-item change) be?
  - When dealing with long, stable production runs, it may be desirable to break the proposed change into two or more VECPs to ease processing or approval, or it may be helpful to lump several smaller changes into one big change. Combining ideas may be acceptable for marketing purposes. Often, the Government wants to change something but cannot afford to do so. The contractor might incorporate the Government's desired change into the VECP (even though the Government-desired change saves little or nothing). By letting the Government-desired change become a part of the VECP, the contractor can make the VECP more marketable. The same would hold true for some things the contractor wants to change that would not be economically viable unless part of a larger VECP.
- Which contract could/should be the instant contract?
  - Among the many factors to consider are which contract will have the most impact, rebid considerations, and so forth.
- What should the implementation schedule, savings period (3 to 5 years), and savings allocation be?
- When should the activity be started?
  - The contractor should explain how it might be accomplished as soon as possible.
- The contractor should prepare a formal presentation to the Government justifying the VECP.
- For simple VECPs, a formal presentation may not be required. Instead, a courtesy phone call to the recipient with the offer to provide further information may suffice.

  - Otherwise, the formal presentation is the most important facet of the VECP process.
- The briefing is normally made to the program manager and all relevant stakeholders (finance, technical, logistics, and contracts). The activity VE POC, expert, or advocate (if any) also should be included.
  - Coordinate with the program manager to ensure the proper attendance (Government and contractor).
  - Clarify agenda and discussion topics. Talk with the Government counterparts about exactly what people will want to see.
- Desired outcome: Government provides all the feedback necessary for the contractor to submit a VECP, and there is buy-in from the program manager.
  - This feedback should be worded carefully so that an "approval contingent on the additional information being provided" is not implied. The Government cannot imply approval at this point. It can only indicate level of interest and potential areas of concern or suggest information to be provided. Also, the contractor is not obligated at this point to provide anything.
  - Through discussion with the Government, the contractor gains insight into what information would be helpful for the Government to make a technical and contractual decision on the VECP.
  - There is usually a lot of interaction at the meeting. It is important for the contractor to deal with questions on negative impacts (if any) by showing how far the benefits outweigh them.
- Maintain interaction with the Government as needed while the VECP is being prepared (important for both parties).
  - Usually, the contractor responds to questions or concerns, which could be logistics impacts or questions about testing or the Government may want to include something else in the VECP. These questions or concerns do not always result in another briefing, but, if required, the contract administrator or program manager would arrange for it.

B.5.2.4 Government Expresses Support for the VECP

The Government must evaluate the idea from a technical and financial perspective. All technical, cost, and logistics concerns should be communicated to the contractor at that time.

- The program manager or his representative should tell the contractor how to modify the idea to make the VECP more acceptable.

- The program manager should be unambiguous about the desire for a formal VECP.

B.5.3 VECP Approval

Figure B-4 illustrates the process for VECP approval.

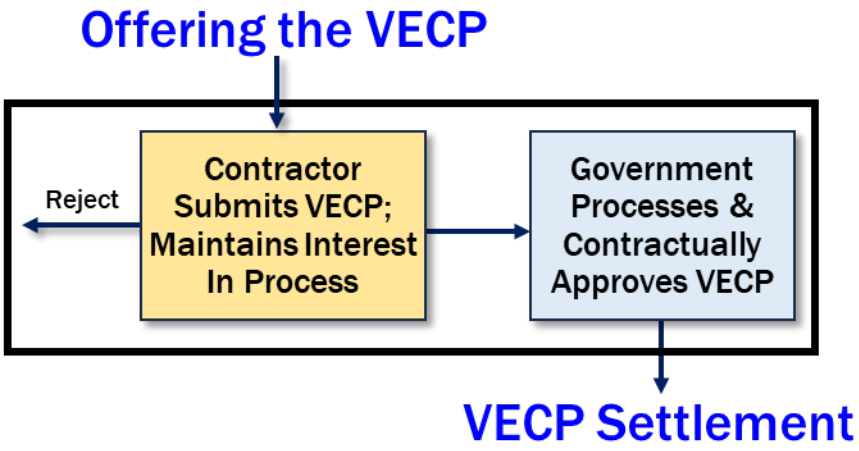


Figure B-4. VECP Approval

B.5.3.1 Contractor Submits VECP

Once there is concurrence on the scope of the VECP, the contractor should expedite the in-house preparation of the formal VECP and provide it to the customer as soon as possible after briefing the program manager.

- The contractor should work as the contract requires until the contracting officer approves the VECP.
- The VECP is submitted at least to the PCO with information copies to the ACO, VE POC, and program manager, in addition to any other contractually required distribution.
- If the contractor perceives reluctance on the part of the contracting officer to accept a VECP, it may be a good idea to also send a copy to the overall VE lead for the Command or Component (if any). If processing problems are encountered, it may be possible for higher headquarters to help resolve the issue.
- In the formal submission (often in the cover letter), the contractor should identify terms and conditions and associated rationale for VECP acceptance, share period, savings share, and any required Government investment. Rationale (e.g., added risk, investment, or a prolonged period before the contractor would receive any incentive) should be provided if requesting a share ratio greater than 50/50 or a sharing period greater than 3 years.

- The Preliminary VECP no longer exists, although some program offices still use the term. Under MIL-STD-973, which was cancelled in 2009, contractors could use Preliminary ECPs to propose a change. These ECPs were submitted before all the engineering was complete but usually after enough data were available to show that the change was, or could be, viable. Preliminary ECPs also included a price. From this approach evolved the idea of a Preliminary VECP, which was defined as "a full up proposal that included a firm price (or Not to Exceed price), a technical description of the change (including testing or qualification requirements)," and eight other required elements as described in the VE clause, FAR 52.2481(c). The only item it did not contain was the actual drawing or configuration changes of the final record ECP or the testing results. Such a submittal would now be a formal VECP.

B.5.3.2 Contractor Maintains Interest in the Process

The contractor should try to find a champion in the Government program office (someone who supports the change) to expedite action on the VECP. The VE POC may be the champion.

- The contractor should continue to communicate with the Government through the champion to check on status and provide answers to questions.
- Sometimes the contractor's local DCMA can help remind the Government program office that it needs to act on the VECP to obtain the maximum savings.

B.5.3.3 Government Processes and Contractually Approves VECP

Using an IPT to concurrently address all the VECP issues can expedite the Government process. The program manager can assist if obstacles occur.

- The VECP must be technically approved as being able to meet the functional requirements.
- The sharing rate will not have to be negotiated if a rate has previously been agreed upon provided that the conditions (e.g., risk or investment) are still similar. If there has not been a previously agreed-upon sharing rate, the PCO may consider information (from the IPT) such as amount of risk undertaken by the contractor that will help the PCO negotiate a fair sharing rate.
- The contract modification approving the VECP enables the contractor to begin work. The PCO can approve or settle the VECP in several ways:
    - The PCO can negotiate the rate, settle the VECP, and issue a contract modification.
    - The PCO can issue an unpriced order with a not-to-exceed amount cited on the modification and a guaranteed unit savings to be paid by the contractor. This

approach may be necessary to meet customer schedule needs and capture high-production quantities. The FAR VE clause recognizes this approach and, by implication, encourages the Government to accept the VECP technically and then complete any pricing negotiations in a subsequent modification to the contract.

- If the Government issues an unpriced order, it may also establish a not-to-exceed limit on contractor VECP development and implementation costs and a not-less-than savings and a not-to-exceed on Government investment. This approach is usually taken when there is a need to expedite VECP implementation and contract modification to ensure that the changes are made on imminent production units. If not-less-than savings or not-to-exceed development costs are included, the contractor should insist that these costs be based on some agreed conditions, such as timely approval when needed, assumptions about inflation and quantities, and so forth. If these conditions change, the not-less-than savings or not-to-exceed costs should also change.
- When the development and implementation costs exceed the savings on the instant contract, the VECP is implemented through a negative instant contract modification, which means the Government increases the contract by the amount of the negative savings as specified in the FAR Part 48. While the contract price should be increased to cover the negative instant contract saving, it often does not happen because the Government does not have the money. There are ways around this issue, such as the contractor accepting the risk associated with the negative instant contract savings with the understanding that it will be recognized in the next production lot (if there is one) or delaying the settlement of the VECP until the next award so there are enough savings on the two contracts to avoid any negative instant contract saving.
- In general, if there is a need to expedite implementation of the VECP, instead of an unpriced change order, the contracting officer may grant approval to implement the VECP through an Un-definitized Contract Action or via a Contracting Officer's initial modification per FAR 52.248-1(h). Formal VECP implementation and Government final acceptance of the change are subject to the change passing technical qualifications.

B.5.4 VECP Settlement

Figure B-5 shows the settlement process.

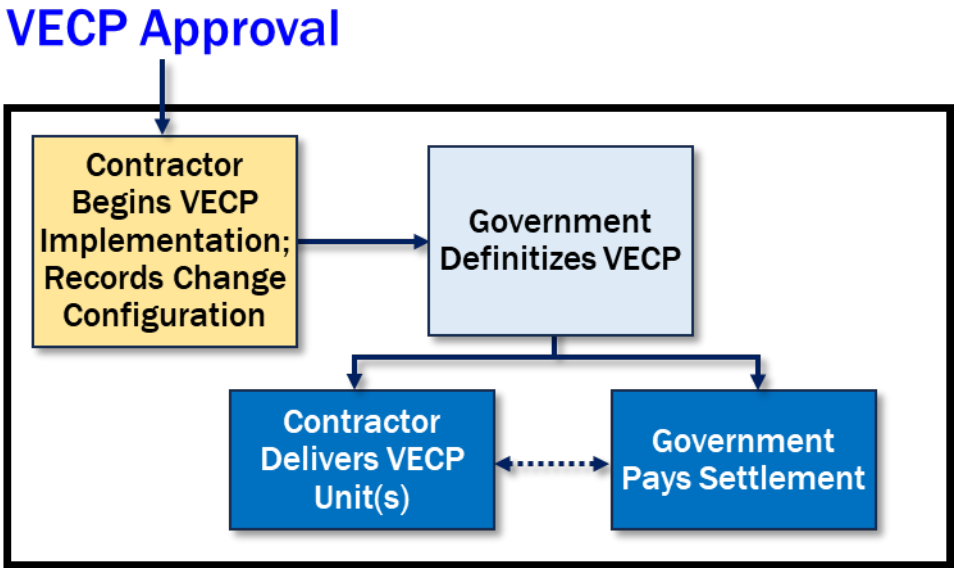


Figure B-5. VECP Settlement

B.5.4.1 Contractor Begins VECP Implementation and Records Change Configuration

As a part of the VECP implementation process, the contractor must record the ECP that changes the drawing to incorporate (or allow) the VECP configuration on contracts where the Government retains configuration control. It is usually the last step because it is done after the change has been completed and the new drawings are finalized.

B.5.4.2 Government Definitizes the VECP

Definitizing implies reaching an agreement on future per-unit savings and the schedule for repayment of non-recurring expenses and other upfront contractor/Government investment.

- The definitizing contract modification generally occurs on the first contract in which a VECP unit is delivered.
- Expeditious processing encourages additional VECPs from the contractor.
- This action is a PCO action with assistance from the program manager and IPT as appropriate.
- The contractor's value proposition should be accommodated as much as possible.
- Administrative requirements should be minimized.

B.6 Contractor and Government Organizational VECP Process Steps

Figure B-6 shows an example of contractor and Government VECP organization process.

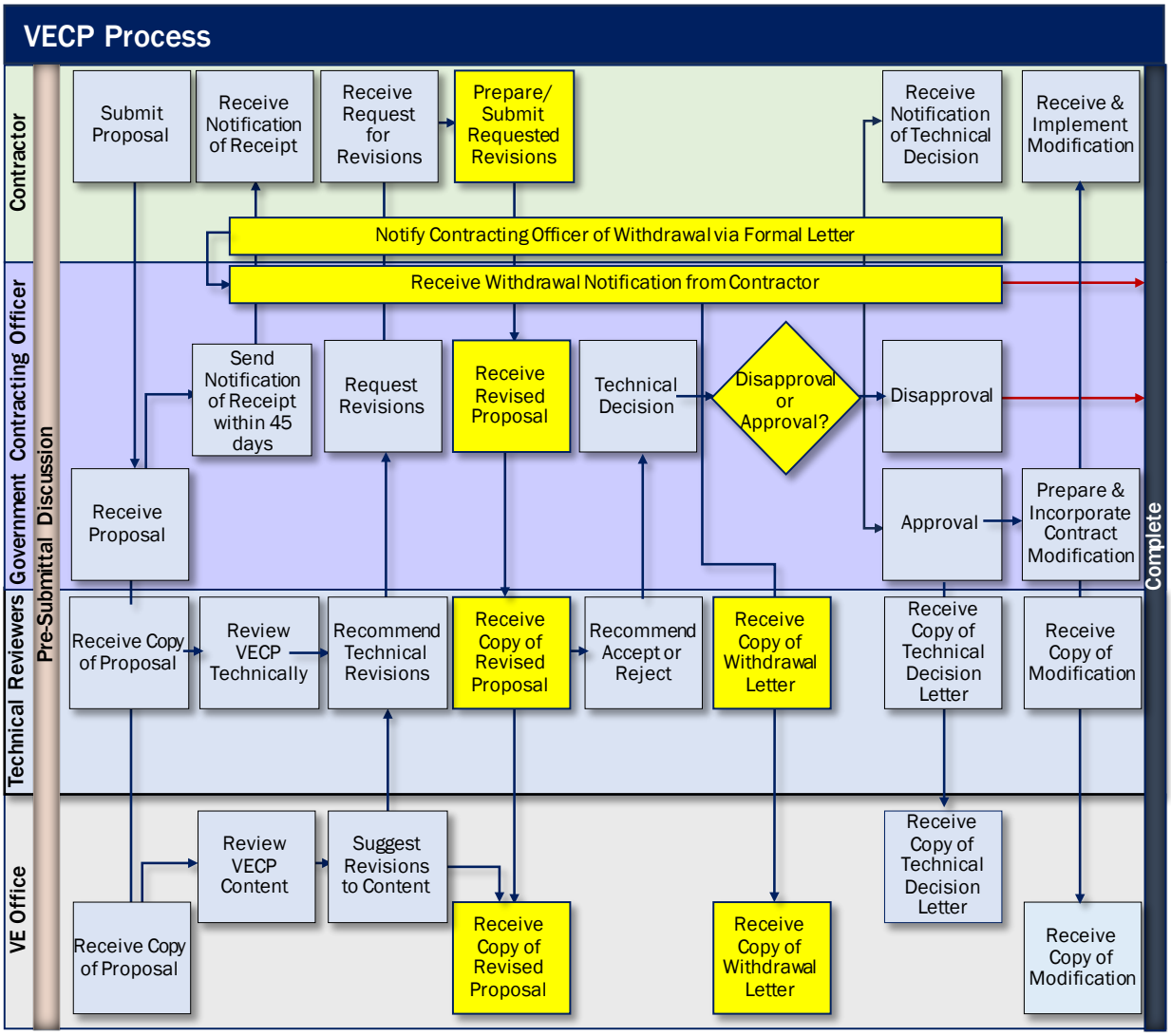


Figure B-6. Sample VECP Organization Process

B. 7 Concluding Comments

Because VE is the only incentive program with a predefined means for contractor sharing in savings, it represents a valuable means of increasing a contractor's margins while also providing savings to the DoD. The success achieved is proportional to the resources invested in the effort. Having a formal VE program to establish policies for promoting VE with subcontractors, market VE, and provide guidance regarding the basic requirements of submitting a VECP will increase a contractor's success.

Increasing VECP usage is in the best interest of the Government and industry because it improves industry's bottom line and reduces Government cost while delivering greater capability to the warfighter. Many contracting officers, program managers, and their contractor counterparts see only a few VECPs in their career. Therefore, it is important for the Government and industry to build upon this expertise, learn from others, and share best practices to formulate and implement VECPs. Once people begin exploiting the opportunities provided by VECPs, the use of these VECPs will become self-perpetuating.

Acronyms

A/E	Architecture and Engineering
ACO	Administrative Contracting Officer
AEHF	Advanced Extremely High Frequency
AMD	Air and Missile Defense
AS	Acquisition of Services
C2	Command and Control
CDD	Capability Development Document
CDRL	Contract Data Requirements List
CDS	Cross-Domain Server
CLIN	Contract Line Item Number
COTS	Commercial Off-the-Shelf
CROP	Container Roll On/Roll Off Platform
DAS	Defense Acquisition System
DBS	Defense Business System
DFARS	Defense Federal Acquisition Regulation Supplement
DLA	Defense Logistics Agency
DoD	Department of Defense
DoD IG	DoD Inspector General
DoDD	DoD Directive
DoDI	DoD Instruction
ECP	Engineering Change Proposal
ECT	Engagement Center Trailer
EOC	Engagement Operations Center
EPS	Enhanced Polar System (EPS)

ERT	Empty Round Trainer
ESG	Executive Steering Group
FAR	Federal Acquisition Regulation
FOT	Follow-on Terminal
FRP	Full-Rate Production
FUDS	Formerly Used Defense Sites
FYDP	Future Years Defense Program
IAMD	Integrated Air and Missile Defense
IBCS	IAMD Battle Command System
IFMC	Integrated Fires Mission Command
IPT	Integrated Product Team
IT	Information Technology
LRIP	Low-Rate Initial Production
MAG	Management Advisory Group
MCA	Major Capability Acquisition
MCX-POL	Petroleum, Oils, Lubricants – Mandatory Center of Expertise
MILCON	Military Construction
MIL-STD	Military Standard
MRT	Missile Round Trainer
MS	Milestone
MSE	Missile Segment Enhancement
MTA	Middle Tier of Acquisition
NAVFAC	Naval Facilities Engineering Command
OFPP	OMB Administrator for Federal Procurement Policy
OMB	Office of Management and Budget

OSD	Office of the Secretary of Defense
OUSD(R&E)	Office of the Under Secretary of Defense for Research and Engineering
PCO	Procuring Contracting Officer
PEO	Program Executive Office
POC	Point of Contact
PRC	Program Requirements Clause
R&D	Research and Development
ROI	Return on Investment
SAO	Senior Accountable Official
SLE	Service Life Extension
STORM	Strategic and Operational Rockets and Missiles
SWA	Software Acquisition
TDP	Technical Data Package
THAAD	Terminal High-Altitude Air Defense
UCA	Urgent Capability Acquisition
USACE	U.S. Army Corps of Engineers
USD(R&E)	Under Secretary of Defense for Research and Engineering
VE	Value Engineering
VECP	Value Engineering Change Proposal
VEI	Value Engineering Incentive
VEP	Value Engineering Proposal
VEPRC	VE Program Requirements Clause
VES	Value Engineering Study
VM	Value Methodology
VPgM	Value Program Manager

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