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INSTITUTE FOR DEFENSE ANALYSES

Value Engineering and Service Contracts

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PREFACE

The Institute for Defense Analyses (IDA) prepared this document for the Office of the Deputy Under Secretary of Defense (Acquisition and Technology) under a task titled "Total Ownership Cost Reduction." This document partially fulfills the task objective of supporting initiatives related to Reduction of Total Ownership Cost and Value Engineering by illustrating how and why Value Engineering in both hardware and service contracts is beneficial to both government and industry.

Stanley A. Horowitz of IDA was the technical reviewer for this document.

TABLE OF CONTENTS

A. Introduction 1
B. How VE Works 2
  1. VE Basics 2
  2. An Example VE Application on a Hardware Contract 4
  3. Summary of VE Benefits 5
C. Why VE Is Beneficial on Service Contracts 6
  1. Examples of VE on Service Contracts 6
  2. VE Contributions to Performance-Based Approaches 8
D. Problems with Using VE in Service Contracts 11
  1. Difficulties in Identifying Mechanisms for Sharing Savings 11
  2. Difficulties in Calculating Savings 13
  3. Possible Workarounds 14
E. Next Steps to Promote VE in Service Contracts 16
Abbreviations A-1

TABLES

1. Hardware Procurement Example Before a VECP Is Applied 4
2. Hardware Procurement Example After a VECP Is Applied 4
3. Janitorial Service Contract Example Before VECP Changes 6
4. Janitorial Service Contract Example After VECP Changes 7
5. Medical Service Contract Example Before VECP Changes 7
6. Medical Service Contract Example After VECP Changes 8
7. Data-Entry Service Contract Example Before VECP Changes 12
8. Data-Entry Service Contract Example After VECP Changes 12

A. INTRODUCTION

Value Engineering (VE) generates more than a billion dollars in savings and cost avoidance annually for the Federal Government.[1] Most VE savings, especially those that are contractor initiated, are based on savings in the acquisition of hardware. However, the government now predominantly spends its contract dollars on services. According to the Government Accountability Office, about 60 percent of the Federal Government's $400 billion in contract awards for fiscal year (FY) 2006 were for services.[2] The Center for Strategic and International Studies determined that for the past 13 years, services have expanded at a compound annual growth rate (CAGR) of 7 percent each year—from $102 billion in 1995 to $233 billion in 2007.[3] For the past 5 years (2003–2007) an even larger 9 percent CAGR was realized, probably in part due to the wars in Iraq and Afghanistan.[4] The government acquires all types of services, ranging from routine commercial purchases of courier services, janitorial services, and services of security guards to highly skilled technical, scientific, and engineering services in support of space launches or the development of major weapon systems.

This document identifies significant opportunities for using VE to save the government money in service contracts and suggests ways to capitalize on these opportunities. Section B provides background on VE and illustrates how and why VE is beneficial for both the government and industry in hardware contracts. In Section C, we show that VE can provide similar benefits for service contracts and that Performance-Based Acquisition or Performance-Based Logistics approaches cannot substitute for VE. Section D gives examples of the difficulties in applying VE to service contracts under the current Federal Acquisition Regulation (FAR) VE clause, but it also demonstrates that workarounds are possible. Finally, Section E makes some recommendations on actions that could be taken to improve the use of VE for service contracts.

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1 Based on Department of Defense Component responses to an annual data call to identify value engineering savings and cost avoidance using the form prescribed by the Office of Management Budget Circular A-131.

2 U.S. Government Accountability Office, "Federal Acquisition: Oversight Plan Needed to Implement Acquisition Advisory Panel Recommendations," GAO 08-160, December 2007, p. 1 (available at http://www.gao.gov/new.items/d08160.pdf).

3 David Berteau, Guy Ben-Ari, and Gregory Sanders, "Structure and Dynamics of the U.S. Federal Professional Services Industrial Base 1995–2007," Center for Strategic and International Studies, February 2009, p. 10 (available at http://www.csis.org/component/option,com_csis_pubs/task,view/id,5286).

4 Ibid.

B. HOW VE WORKS

1. VE Basics

The Office of Management and Budget defines VE as follows:[5]

> An organized effort directed at analyzing the functions of systems, equipment, facilities, services, and supplies for the purpose of achieving the essential functions at the lowest life-cycle cost consistent with required performance, reliability, quality, and safety. These organized efforts can be performed by both in-house agency personnel and by contractor personnel.

The FAR at 48.201(a) requires that a VE clause (found in FAR 52.248-1) be included in all contracts for supplies and services exceeding the simplified acquisition threshold (SAT) with the following few exceptions:

- Research and development contracts other than full-scale development;
- Engineering services from not-for-profit or non-profit organizations;
- Personal services;[6]
- Product/component improvement already on contract;
- Commercial products not involving packaging specifications or other special requirements/specifications; and
- When the agency head exempts a contract or class of contracts.

The VE clause may also be included in contracts of lesser value when its use is deemed appropriate.

Using VE on a contract is voluntary unless it is determined that "substantial savings to the Government may result from a sustained value engineering effort of a specified level."[7] In such cases, the FAR provides provisions for a mandatory VE program requirement. VE is implemented by approval of either a Value Engineering Proposal (VEP) (an internal government

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5 Office of Management and Budget, "Value Engineering," May 21, 1993 (available at http://www.whitehouse.gov/omb/circulars/a131/a131.html#4).

6 A "personal services contract" is one that, through its expressed terms or as administered, makes the contractor personnel appear to be, in effect, government employees by creation of an employer-employee relationship. Agencies must have specific statutory authority to obtain personal services by contract.

7 See section 48.201 of the FAR.

action) or a Value Engineering Change Proposal (VECP) submitted by the contractor[8] in accordance with the VE clause in the contract. The following discussion focuses on VECPs.

A VECP proposes a change that, if accepted and implemented through a contract modification, provides an eventual, overall cost savings to the government and provides the contractor with a substantial share in the savings accrued as a result of the acceptance of the change. The VECP provides a vehicle through which contract costs can be reduced while the contractor's rate of return is increased.

The contractor submits a VECP using the format prescribed by the appropriate FAR VE clause contained in its contract.[9] Any changes made must be technically compatible with contract requirements. While cost savings are required, the change may not impair essential functions or characteristics, and they may not be required by another contract provision.

While a VECP is submitted only under the current (also termed "instant") contract that authorized the work being changed, savings may be shared under other mechanisms as well—concurrent contracts, future contracts, and collateral savings—that will be impacted by the VECP.

- Concurrent contracts for the same items are ongoing at the time of VECP acceptance.
- Future contracts (as a follow-on to the instant contact) have not been awarded; they include the exercise of an option to buy follow-on lots.
- Collateral savings are typically for operation, maintenance, training, logistics support, or government-furnished property.

The reason for sharing savings on these other contracts is that a VECP may not provide for substantial savings on the instant contract (for example, if there are non-recurring engineering (NRE) or other expenses that add costs that must be offset before savings can be shared). While sometimes the government requires and pays for VE as part of a mandatory VE program with a specific line item for the cost under a contract, for the most part, the government encourages contractors to invest in VE using their own resources (the incentive program).[10]

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8 While the submission of a VECP is the responsibility of the contractor, many good VE ideas may also come from subcontractors.

9 There are separate clauses for Construction and Architectural Engineering contracts, which are not a source of discussion in this document.

10 When using the mandatory provisions of the VE clause (FAR 52.248-1, Alternative I), VE becomes a Contract Line Item Number (CLIN) in the contract and requires the contractor to propose VE changes that will save money. If only Alternative I is used, the contract would only have the mandatory VE requirement. Using Alternative II provides both the mandatory program and the incentive program.

2. An Example VE Application on a Hardware Contract

It is relatively straightforward to use VE for the development of a product, particularly when the size, weight, and composition of components can provide a multitude of opportunities for innovation and improvement. Table 1 portrays a hardware procurement example,[11] where the Department of Defense (DOD) is buying 500 units over 3 years for a unit price of $11,000, which includes a cost of $10,000 and a profit of $1,000. The total price of the contract is $5.5 million with a profit of $500,000.

Table 1. Hardware Procurement Example Before a VECP Is Applied

Quantity	Unit Cost	Profit	Original Unit Price	Total Cost
500 Units	$10,000	$1,000	$11,000	$5,500,000

Table 2 shows what would happen if the government accepted a VECP that reduces the unit cost to $6,000 after a $1 million NRE investment. Without the shared savings, the contract price would be $4.5 million, but the contractor would have no incentive to make the change. If we assume that the $1 million difference between this figure and the original contract price were split equally between the contractor and the government, then the new contract price would be $5 million. The $500,000 in shared savings could be paid to the contractor as a separate line item or the unit price could be changed to $10,000.

Table 2. Hardware Procurement Example After a VECP Is Applied

Quantity	Revised Unit Cost	Profit	Per Unit Share of NRE[a]	New Unit Price without Shared Savings	New Totals
500 Units	$6,000	$1,000[b]	$2,000	$9,000	$4,500,000
Total Savings = Original Price– New Subtotal ($5,500,000 – $4,500,000)					$1,000,000
Contractor Share of Savings Using a 50/50 Share ($1,000,000 × .5)					$500,000
New Contract Total ($10,000 × 500 Units)[b]					$5,000,000

[a] $1,000,000 ÷ 500 units.
[b] Profit is not reduced by the reduction in the cost base.
[c] The unit price with the VE savings is $10,000 since the new $9,000 unit price would be increased by $1,000 ($500,000 savings ÷ 500 units).

[11] The examples used in this document do not discount future dollar amounts to make them simpler to understand. While the use of discounting would have an effect on the specific numbers calculated, it would not change the conclusions drawn.

3. Summary of VE Benefits

The government and its contractors depend upon each other to improve their joint value proposition. While the value propositions are different, there is overlap; actions that benefit one can benefit the other. Typically, incentives are included in the contract to encourage the contractor to behave in a way that will enhance both value propositions. VE provides and is based on a shared value concept through incentives for the government, incentives for the contractor, and the equally shared incentive of providing the best possible capabilities, systems, and facilities to the government within the context of a successful business relationship. VE incentivizes industry to use its best engineering talent in a way that helps solve problems that are important to the government.

As stated earlier, VE generates more than a billion dollars in savings and cost avoidance annually for the Federal Government. In addition, the dollar savings/assets made available through VE successes may be reapplied to finance approved but previously unfunded requirements. From the contractor's perspective, the benefits of using VE are also substantial. The contractor:

- Shares in the savings that accrue from implementation, in that VECPs provide a source of profit not available under other provisions of the contract and excluded from profit limitations on government contracts;
- May increase the work to be performed on the contract if the government share is placed back on the contract for previously unfunded efforts;
- May secure a price advantage during system re-procurement after implementing a successful VECP on a previously completed system/item;
- Establishes a reputation as a cost-conscious supplier (the Department of Defense presents VE Achievement Awards to contractors);
- Improves communication with the customer;
- Receives reimbursement of development cost on approved VECPs;
- May obtain usable technology for other product lines; and
- Enhances the retention and growth of corporate technical expertise through advanced technology insertion and fostering a positive working environment.

C. WHY VE IS BENEFICIAL ON SERVICE CONTRACTS

1. Examples of VE on Service Contracts

If *the unit price can be changed to reflect the VECP*, then a service contract would operate much the same as a hardware contract and similar benefits to both the government and the contractor would accrue.

This is demonstrated in the following simple example of a janitorial service contract where the unit price can be calculated relatively easily. 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). See Table 3.

Table 3. 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 Oct 1, 20XX–Sep 30, 20XX	1,200	Days	$60.00	$72,000
0002	Mop 15,000 sq. ft. of office space weekly for the 5-year period Oct 1, 20XX–Sep 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 Oct 1, 20XX–Sep 30, 20XX	60	Months	$240.00	$14,400
	Total				$116,400

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 4 shows the assumed results of the VECP changes.

Table 4. 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 Oct 1, 20XX–Sep 30, 20XX	250	Weeks	$120.00	$30,000
0003	Shampoo carpet twice yearly for a 5-year period Oct 1, 20XX–Sep 30, 20XX	10	Each	$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

In this hypothetical example, the government saves more than 20 percent of the 3-year price, while the contractor's profits are increased by its share of the savings. Without VE, the change (and the savings) would be less likely to occur since it would be difficult to obtain funds for the $33,340 investment—which by itself is more than the 1-year funding in the instant contract.

The following hypothetical example assumes a 3-year contract (a base year plus 2 option years) for professional services of a physician to give full physicals for $100 each to 3,600 military personnel each year—that's 10,800 in total. The associated contract requirements are reflected in Table 5.[12]

Table 5. 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 these military people 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,

[12] This example depicts only one element of a larger contract. Obviously, 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.

anyone 26–35, every 2 years, and anyone over 36, every year.[13] Those 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 6 assume the military population is divided equally among the three age bands.

Table 6. 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

There are substantial benefits for the government—costs are reduced by more than 10 percent.[14] Without VE, however, there is no incentive to the contractor to propose such a requirements trade. To make it worthwhile for a contractor to propose a VECP in a service environment, a better mechanism of compensation may need to be found since a contractor needs some incentive to perform less work. When less work is performed, revenue is down, so there must be a balance or trade-off to increase profit to make this a worthwhile proposition for the contractor.[15] 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.

2. VE Contributions to Performance-Based Approaches

Initially called Performance-Based Service Contracting, the term Performance-Based Acquisition (PBA) was adopted via Federal Acquisition Circular 2005–7 on January 3, 2006, to recognize that performance-based techniques can apply to both supplies and services.

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13 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.

14 A secondary issue is that indirect rates may have to be increased if there is a significant reduction in the number of billed hours.

15 There also are collateral savings associated with the VECP depicted in Table 6. 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.

PBA means structuring all aspects of an acquisition around the results to be achieved as opposed to the manner by which the work is to be performed.

Another related PBA discipline is Performance-Based Logistics (PBL). PBL specifies outcome performance goals of weapon systems, ensures that responsibilities for these goals are assigned, provides incentives for attaining these goals, and facilitates the overall life-cycle management of system reliability, supportability, and total ownership costs. It is an integrated acquisition and logistics process for buying weapon system capability.

PBL suppliers may assume a number of functions normally performed by various DOD services or agencies. These functions may include such things as determining spare parts requirements, physical distribution, warehousing of material, depot-level maintenance, configuration management, and some engineering functions. PBL contracts are often long term and require that the provider manage many aspects of product support throughout the life cycle.

Because these types of contracts provide considerable latitude to contractors to determine the best way to achieve the contract requirements, there has been some question as to whether VE should even apply to PBA or PBL contracts. A VECP requires a change in the contract that saves money. With performance-based specifications, a change to the way a product is built or services are performed can usually be made without the need for a contract modification and, therefore, the contractor could keep all of the savings. However, this approach would not necessarily be the best business approach for the contractor. Disadvantages for the contractor to keep in mind include:

- The government has the right to use any cost savings idea in other contracts without sharing the savings with the original contractor.
- There would be no opportunity for sharing in collateral savings.
- Most importantly, PBA savings are only for the term of the contract. If an investment is required that would not be offset in the term of the PBA contract (as was the case with the instant contract in the janitorial services example), the government will use its cost and pricing data to negotiate a lower cost without a savings share as contract options are exercised. This may happen in both fixed-price and cost-reimbursement contracts.
- It is often desirable to obtain government concurrence on significant changes (especially ones involving cost savings) to maintain customer satisfaction and avoid surprises. A VECP provides an opportunity to do this.

There also are disadvantages to the government when the contractor does not use a VECP:

- For cost reimbursement contracts,[16] the contractor would get its allowable costs to resolve a problem, but no savings share or additional fee. That may mean that the contractor will take action to maximize availability of supply regardless of cost.
- The status quo would not be challenged and requirements trades could not be made. Under these types of contracts, the contractor typically would do what it always has done. While the cost is likely to go down, the contractor is unlikely to look for an innovative way to perform the service differently.

The following hypothetical example illustrates these points.

Assume a contractor has a cost-reimbursable PBL contract to maintain a specified availability of an item. Therefore the contractor would be required to assure that the supply system has sufficient stock on hand to meet the demand. For a reparable item, inventory would be maintained by repairing the item. While the item has many failures modes, this example focuses only on repairs resulting from a specific type of misuse in the field. Also assume the following:

- The number of items in the field (N) is 10,000.
- When the item fails because of the specifically identified misuse, the average cost to repair is $600.
- There are 1.5 failures per year on average from this misuse.[17]

This implies that after 3 years, approximately 45,000 failures[18] are expected with a corresponding repair cost of $27 million.

Suppose we also assume:

- The contractor could develop a modification to the item that virtually eliminates the specific misuse and the NRE associated with this development effort is $2.1 million.
- After the item fails from misuse, the cost to repair the item and modify it to eliminate that failure mode is $1,100.

If the contractor were to develop the modification and apply it when an item breaks from misuse, approximately 9,889 repairs/modifications would be expected over a 3-year period.[19] The corresponding cost to the government would be $10.9 million. This represents a net acquisition savings of $14 million after subtracting the nonrecurring costs. Using a VECP, these savings might be split evenly between the government and the contractor.

Without the VECP, the contractor would receive revenue of $27 million. If the fee were 10 percent of that, the profit would be $2.45 million. The contractor would not make the change on its own because its revenue would decrease by $16.1 million. With the VECP, while there would be a similar decrease in revenue, the contractor's profit would increase by $7 million if the savings were shared equally. Clearly this is financially superior to maintaining the status quo.[20]

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16 Some PBL contracts are cost reimbursable.

17 It can be characterized by an exponential distribution with a failure rate (λ) of 1.5 per year.

18 $3N\lambda$

19 $N[1 - \exp(-3\lambda)]$

20 The calculations could change if the PBL contract were fixed price and the contractor had configuration control and was not concerned about the government's reaction to the change. In this

While PBA and PBL are excellent programs, they should be used along with rather than as a substitute for VE. VE can change the business case by providing the proper incentives for the contractor to adopt an approach more beneficial to the government in the long term. VE is also more likely to find solutions with other collateral benefits because its methodology is designed to identify a broad range of potential solutions that have impact beyond the immediate problem at hand.

D. PROBLEMS WITH USING VE IN SERVICE CONTRACTS

While many types of service contracts offer savings opportunities, contracting officers dealing with such contracts often have little to no VE experience. In addition, these contracts present some inherent complexities in calculating how to actually share the savings. The problem with using VE in a service environment is that it is more difficult to:

- Identify the mechanisms for sharing savings, and
- Calculate savings with certainty.

These two issues are discussed in Sections D.1 and D.2. Section D.3 suggests some considerations for ways to work around these problems.

1. Difficulties in Identifying Mechanisms for Sharing Savings

A chief mechanism for sharing of VE savings in supply contracts is in the unit cost of production. In FAR 48.104-1, which describes how to determine the sharing period, paragraphs (b), (c), and (d) make reference to units, low-rate initial production, early production, and production. For production-based VECPs, the government and the contractor know how many units are going to be purchased.

There is not always an intuitive analog to the unit cost of production in service contracts. Services may be priced for each performance effort on an hourly basis, priced for a total job that covers a short time period, or priced for a total job that covers a lengthy time period.

The difficulties in calculating the unit price as a mechanism for sharing savings for a service contract are illustrated in the following two examples, which use the same figures as the hardware example in Section B.2.

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situation, the calculations would not be based on averages because the contractor would include a greater safety margin when negotiating the price.

For the example in Table 7, assume the Department of Defense enters into a contract to provide 500 person-months of 160 hours each over a 3-year period for medical records data entry for $5.5 million. The contractor's cost per person-month is $10,000 and the price with profit is $11,000 per person-month.

Table 7. Data-Entry Service Contract Example Before VECP Changes

Quantity	Unit Cost	Profit	Original Unit Price	Total
500 Person Months	$10,000	$1,000	$11,000	$5,500,000

Through a VECP, the contractor proposes to purchase software for $1 million, which would increase efficiency and reduce costs by 40 percent, thereby reducing the number of personnel involved. The contractor would need only 300 person-months of 160 hours each over the 3-year period. The savings would be calculated by reducing the quantity, but the original monthly cost and profit do not change. After deducting the new total and the cost of the software, the savings to be shared are $1.2 million. Split 50/50, each party receives $600,000. Therefore, under the VECP, the new unit price is calculated by adding in the contractor's share of the savings and dividing it by the number of person-months. This calculation is illustrated in Table 8.

Table 8. Data-Entry Service Contract Example After VECP Changes

New Quantity	Unit Cost	Profit	Per Unit Share of NRE	New Unit Price without Shared Savings	New Totals
300 Units	$10,000	$1,000[a]	$3,333[b]	$14,333[c]	$4,300,000
Total Savings (Original Price $5,500,000 – New Subtotal $4,300,000)					$1,200,000
Contractor Share of Savings using 50/50 share ($1,200,000 × .5)					$600,000
New Contract Total ($16,333 × 300 units)[c]					$4,900,000

[a] Profit is not reduced by the reduction in the cost base.
[b] $1,000,000 ÷ 300 units.
[c] The unit price with the VE savings is $16,333 since the new unit price of $14,333 would be increased by $2,000 ($600,000 savings ÷ 300 units).

In the hardware example, the unit price is reduced based on the VECP while the quantity remains the same. In the services example, the savings is achieved based on the quantity of hours being reduced. The unit price actually increases because of the addition of

the shared savings and the fact that the hours are more productive (compared to the original contract) as a result of the investment in software.[21]

The concept of paying more for the services rendered after acceptance of a VECP may seem to be a questionable result. However, a fair means of compensation for the contractor must be achieved.

2. Difficulties in Calculating Savings

The application of the principles of shared savings is even more uncertain in a service environment when time-and-material (T&M), labor-hour (LH), and Indefinite-Quantity-Indefinite-Delivery (IDIQ) contracts are used. T&M and LH contracts carry a greater degree of uncertainty in the amount of effort being procured; therefore, estimating the amount of savings for a VECP becomes more difficult. These contracts impose greater risk to the contractor because orders may be insufficient to recoup investments and greater risk to the government because it may not get the benefit of the VE.

Under IDIQ contracts, the contractor is paid only for the effort it expends at a generally preset rate or rates. This type of contract has an estimated number of hours upon which the per-hour prices are based, but that estimate is often a rough estimate that is frequently on the high side. Consequently, if the contractor generates an idea that results in savings, it would be hard to calculate with certainty how much was actually saved.

This uncertainty makes calculating savings for a future contract more difficult. Consider the situation of a follow-on 3-year contract for the medical service contract example in Tables 5 and 6. The calculations for that example would become more complex since, in the next 3-year contract, those receiving a physical every 2 years would be examined twice. As personnel age and new recruits come in, the age ratio may change significantly from the simple example here. Similarly, in the data- entry contract example, uncertainties would arise about the quantity of data to be processed and about the new productivity after the purchase of the new software.[22]

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[21] If the period of performance was not 3 years, but a base year with 2 option years, the calculations becomes even more complex and less intuitive because all of the NRE would be charged to the base year. In this case, the unit price for the base year would be $23,000 and it would be $13,000 for the 2 option years.

[22] The FAR guidance in 48.104–1 on determining the sharing period makes it obvious that the drafters intended this section to be used in a production environment: "the sharing period begins with acceptance of the first *unit* incorporating the VECP" and "for engineering-development contracts and contracts containing *low-rate-initial-production or early production units*, the end of the sharing

For production or hardware contracts, the FAR requires that collateral savings be calculated as a one-time payment of 20–100 percent of a typical year of savings. One problem is calculating what a typical year of savings will be. Another issue may be negotiating the percentage share. On hardware contracts, collateral savings are usually a smaller part of what the savings from the change will be, so little attention is paid to them. The FAR clause even has an option where they can be waived if the cost to calculate them is determined to be too high; however, because of the unique circumstances that may be found in service contracts, collateral savings may be significant. For example, in the medical services example, collateral savings could be calculated on the basis of military personnel being made available for additional work. In the data-entry example, collateral savings may result from fewer computer breakdowns. Both of these could be calculated but would be subject to uncertainty.

3. Possible Workarounds

We have shown that while the use of VE in service contracts is not prohibited by the FAR, the current language is not conducive to its use in the service environment. Furthermore, VE savings are difficult to administer and calculate under current rules. Consequently, the government is missing opportunities for VECPs.

Nevertheless, the difficulties identified for using VE in service contracts are not insurmountable. In Section D.1, we observed the counter-intuitive situation where the labor rate increased to pay the VE incentives to the contractor. However, alternative payment mechanisms exist. For example:

- A separate CLIN can be established to pay the contractor its share of the savings as the negotiated number of person-months is expended.
- The contract can be restructured to change the deliverables. Person-months can be converted into a mutually agreed upon quantity of output. In this case, the VE savings could be incorporated into the CLIN pricing for those results.
- Lump-sum-payment options could be agreed upon. In this case, the contractor and the government would agree on their relative shares of savings from future contracts (3 to 5 years). The contractor would be paid its share upon initialization of the improved service.

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period is based…on the number of units affected by the VECP that are scheduled to be delivered over a period of between 36 and 60 consecutive months…that spans the *highest planned production*." [Emphasis added.]

None of these potential solutions is new. Each has been used before and there are both pros and cons for each approach. Individual circumstances would determine the most appropriate course of action.

Section D.2 identified the problem of calculating savings with certainty. This issue is much more complex than finding a mechanism to share savings.

For example, workload on a contract could be different than what is expected. If the workload were much less than expected, the contractor might not be fairly compensated for its investment if VE savings were paid on some per-unit basis. The opposite would be true if a lump-sum payment option were used. In this case, the government may pay more than its fair share to the contractor.

The problems would not be as difficult if the workload were greater than expected. When paying the shared savings on a per-unit basis, the contractor would have greater revenue than expected. However, the government would have more opportunities for savings. Therefore, both parties would benefit. Under a lump-sum option, all of the unanticipated benefit would go to the government. However, the contractor would have achieved its expected return on investment.

In addition, efficiencies gained from the contractor's investment could be different than anticipated. If shared savings were being paid to the contractor on a person-hour basis, and the efficiencies were greater than expected, then the government would benefit from the uncertainty because the contractor would have to provide more labor hours (and more output) to be paid. For a fixed amount of work, this becomes financially analogous to the situation above where the workload is less than anticipated. However, under a lump-sum approach, or in the case where payment is based on some measure of output, the contractor benefits because its cost per unit of output is lower. The government would attain only its expected savings.

If efficiencies were lower than expected and payments were made on a person-hour or lump-sum basis, the contractor would benefit and the government would lose. This happens because the government would be required to pay for the labor hours and associated incentives even though the expected output is less. If payment were made on the basis of a measured amount of output, both parties would suffer because total savings would be less than expected.

These situations would be complicated further if both workload and efficiency were different than the original estimates.

Triggers could be built into the revised contract to mitigate these situations. For example, the size of the VE incentive could be changed as a function of workload or efficiency, or the lump-sum payment could be made incrementally where the size of follow-on increments could be a function of workload or efficiency.

It is important to keep in mind that the FAR encourages contracting officers to be innovative. FAR 1.102-4(e) states:

> If a policy or procedure, or a particular strategy or practice, is in the best interest of the government and is not specifically addressed in the FAR, nor prohibited by law (statute or case law), Executive order or other regulation, Government members of the Team should not assume it is prohibited. Rather, absence of direction should be interpreted as permitting the Team to innovate and use sound business judgment that is otherwise consistent with law and within the limits of their authority. Contracting officers should take the lead in encouraging business process innovations and ensuring that business decisions are sound.

Actions could be taken to support the use of VE in service contracts as long as they fall within the parameters of this FAR citation.

E. NEXT STEPS

The government normally relies solely on competition before contract award to reduce cost on service contracts. After award, we have seen that, without VE, there is little incentive for the contractor to lower costs to the government. If large scale use of VE in service contracts is viable, more experience is needed to deal with the situations described in this document. Ultimately, a body of knowledge must be developed from such experiences.

Therefore, an important first step for determining viability in service contracts would be government use of the mandatory provisions of the VE clause to build a history of ideas and experience to guide longer-term changes. While the sharing ratio is smaller for the contractor under the mandatory program, it provides more incentive to pursue innovation because it mitigates the risks involved for funding the VECP activity in the voluntary program. Mandatory VE also puts the contractor in the best position to advise the government on ways to save and improve services. Under mandatory VE, the government would create a CLIN with defined areas to study. The contractor would be required to prepare a report/VECP on them or show that they are too difficult.

To have an effective mandatory VE program for services, it is important to establish specific criteria that the contractor should be required to address in the VECP. For example:

1. *An expected outcome is clearly specified:* How the VECP savings will be realized must be determined. Will the savings eliminate inefficient business practices or

develop a new approach to the requirement? The contractor and the government must each have a clear understanding of what will be achieved with the VECP.

2. *Incentives are defined:* Both the contractor and the government need to analyze the incentives and probability of loss to achieve a balance between the level of risk and reward they are willing to pursue.
3. *Performance measures are established:* A VECP will not work properly without having a baseline and good performance measures to gauge exactly what savings or revenues are being achieved. Agreement must be reached on how metrics will be linked to performance. For some services, these may be relatively easy to define. For some more complex services, this can be a difficult task.
4. *Top management commitment is secured:* Government and contractor executives need to support their contracting and program staffs in these endeavors and provide them with the authority needed to carry out solutions, since change from the outside is often met with resistance. They also need to help sustain a partnership over time since relationships between the contractor and client can be tested in the face of changing market conditions, legal pitfalls, and other barriers.
5. *Where the money will come from is established:* In addition, the contractor could be required to offer ways to share the savings and to share the risk that the savings will be achieved.

Another near-term step would be the development of potential workarounds for issues associated with identifying mechanisms for shared savings and calculating the amount of savings to be shared, along the lines discussed in Section D.3.

For the longer term, to effectively use VE for service contracts, a number of steps need to be taken. First of all, guidance and training for VECPs in a service environment needs to be developed. The use of case studies and test cases could prove beneficial in expanding the use of VE for service contracts. Such case studies could also be used to determine a quantifiable basis for determining the amount of funding to be applied to the mandatory VE CLIN. A primer in mandatory VE could be developed.

Finally, there may be a need to develop a FAR or Defense Federal Acquisition Regulation Supplement (DFARS) case to explore changes to the current regulations that will support the use of VE for services. A good way to approach this would be to publish an Advanced Notice of Proposed Rulemaking and ask government and industry to weigh in on how VE could be promoted in a service environment. One issue to be considered is whether a new contract clause is needed to increase the use of VE in service contracts. Examples of expanded coverage that may be appropriate could deal with options to revisit the deal, sharing non-recurring engineering costs, changing the savings share period, changing the share percentage, expanding the sharing period, and changing collateral savings to address these issues better.

ABBREVIATIONS

CAGR	compound annual growth rate
CLIN	Contract Line Item Number
DFARS	Defense Federal Acquisition Regulation Supplement
DOD	Department of Defense
FAR	Federal Acquisition Regulation
FY	fiscal year
IDA	Institute for Defense Analyses
IDIQ	Indefinite-Quantity-Indefinite-Delivery
LH	labor-hour
NRE	non-recurring engineering
PBA	Performance-Based Acquisition
PBL	Performance-Based Logistics
SAT	simplified acquisition threshold
SE	Systems Engineering
T&M	time and material
VE	Value Engineering
VECP	Value Engineering Change Proposal
VEP	Value Engineering Proposal

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14. ABSTRACT

Value Engineering (VE) generates more than a billion dollars in savings and cost avoidance annually for the Federal Government. Most VE savings, especially contractor-initiated savings, accrue from the acquisition of hardware. However, the Government now predominantly spends its contract dollars on services ranging from routine commercial purchases to highly skilled technical, scientific, and engineering services. This document provides background on VE and illustrates how and why its use in both hardware and service contracts, including performance-based logistics contracts, benefits the government and industry. The document also gives examples of difficulties in applying VE to service contracts, demonstrates that workarounds are possible, and recommends ways to improve the use of VE for service contracts.

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