Value Engineering Applications in Service Contracts

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Outline

- **Introduction to VE and the VE methodology**
- **Using VE for systems engineering trades in hardware contracts**
- **Opportunities in service contracts**
- **Overcoming difficulties**

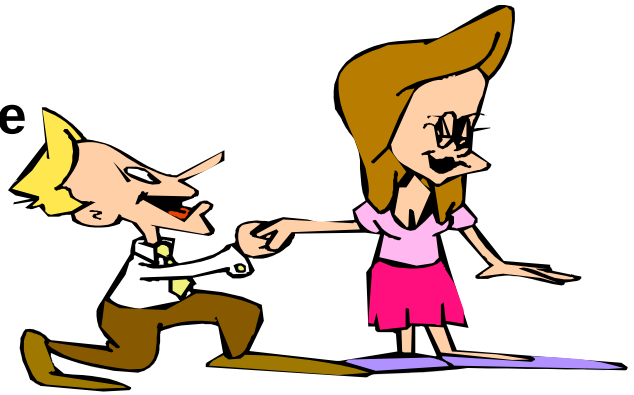
What is VE?

According to Public Law 104-106 value engineering means an analysis of the functions of a program, project, system, product, item of equipment, building, facility, service, or supply of an executive agency, performed by qualified agency or contractor personnel, directed at improving performance, reliability, quality, safety, and life cycle costs.

- **Characteristics**
  - **Systems engineering tool**
  - **Employs a simple, flexible and structured methodology**
  - **Promotes innovation and creativity**
  - **When contractually authorized, it incentivizes contractor to help government's value proposition**

VE Implementation Mechanisms

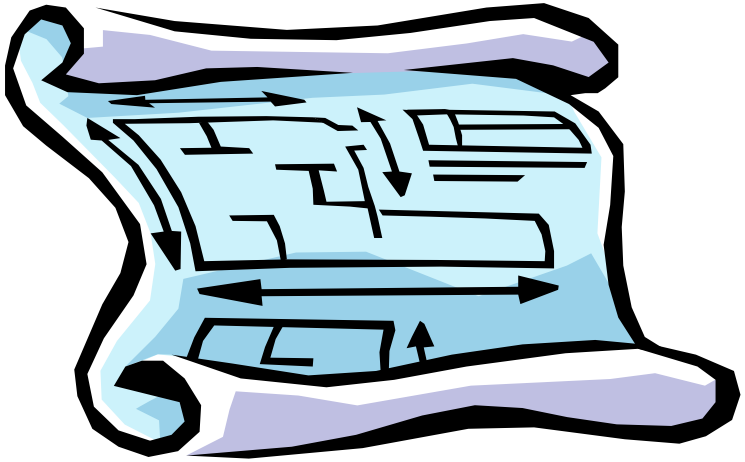
- **A Value Engineering Proposal (VEP) is a specific proposal developed internally by DoD personnel for total value improvement from the use of VE techniques. Since VEPs are developed and implemented by Government personnel, all resulting savings accrue to the Government.**



- **A Value Engineering Change Proposal (VECP) is a proposal submitted to the Government by the contractor in accordance with the VE clause in the contract. A VECP proposes a change that, if accepted and implemented, provides an eventual, overall cost savings to the Government. The contractor receives a substantial share in the savings accrued as a result of implementation. It therefore provides a vehicle through which acquisition and operating costs can be reduced while the contractor's rate of return is increased.**

Phases of the VE Methodology (Job Plan)

- Orientation Phase
- Information Phase
- Function Analysis Phase
- Creative Phase
- Evaluation Phase
- Development Phase
- Presentation Phase
- Implementation Phase



Often carried out in a Workshop format

Function Analysis System Technique (FAST) Basics

- **FAST (developed by Charles Bytheway in 1964) structures the subject matter by breaking it down into functions that enable the subsequent application of problem solving techniques**
- **Functions are expressed as an action verb and a measurable noun, e.g., control thrust**
  - **Verb answers the question "what does it do"**
  - **Noun tells what is acted upon**

- **FAST diagrams display functional relationships**
  - **Highest order functions represent the output of the subject under study**
  - **The basic function is essential to the performance of the higher order functions, they form the critical path**
    - **Moving from "left" to "right," successively answer the question how in a dependent relationship accomplished (the method selected)**
    - **Moving from "right" to "left" answers the question "why" (the goal)**
    - **E.g., control flight ⟷ control thrust ⟷ rotate propellers ⟷ accelerate engine**

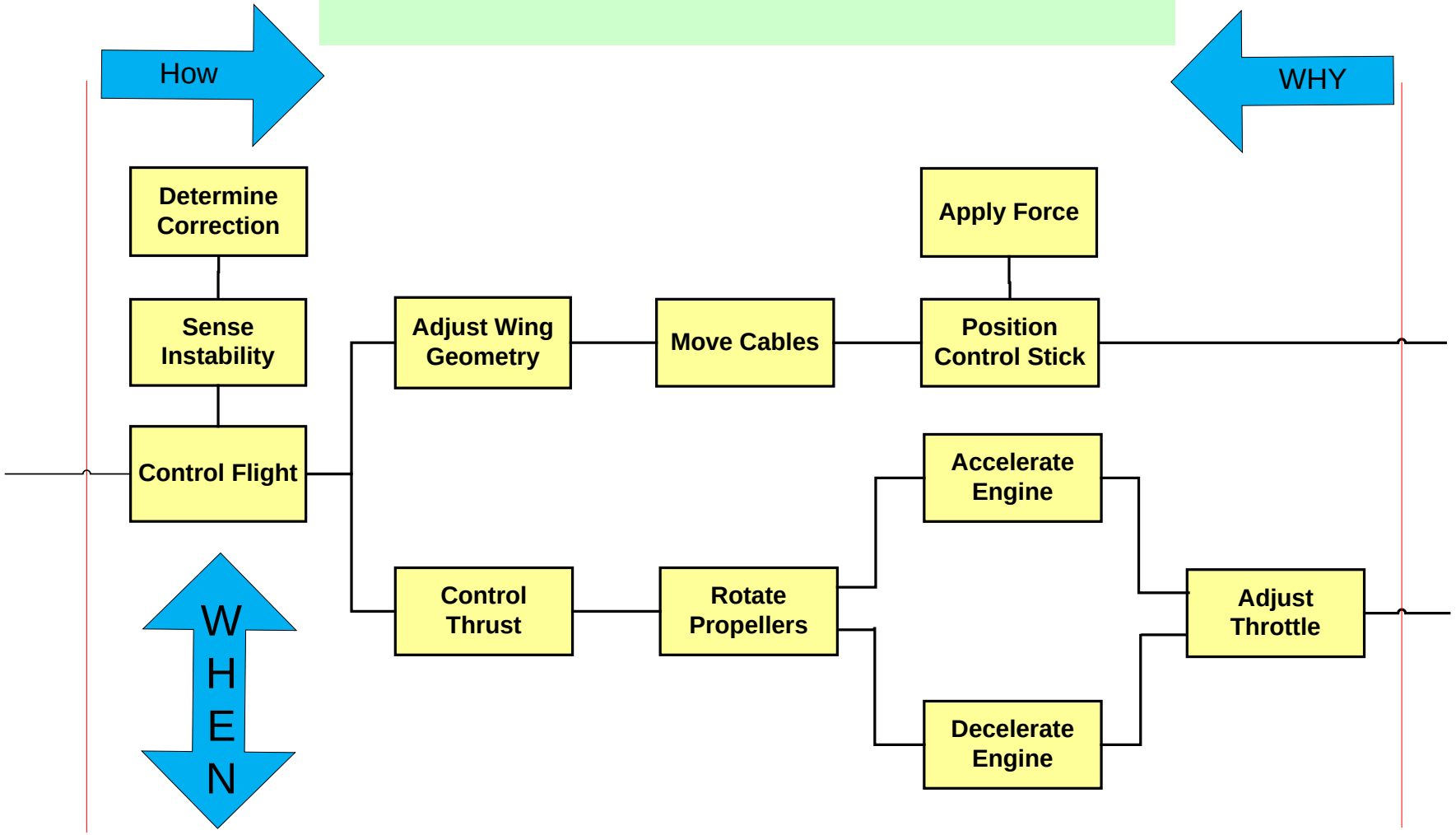
FAST Basics (cont'd)

- **FAST diagrams display functional relationships (cont'd)**

  - **Independent or supporting functions above the critical path explain "when"**
    - **For example**
      - **When you control flight, you have to sense instability**
      - **When you sense instability, you have to determine correction**
    - **A minor critical path may be built horizontally from these independent functions**
    - **Functions may be taken off (put above) the critical path if the answer to the "how" question is not important to the issue being examined**
  - **Activities are shown below the critical path**
    - **They represent the result of the function**
  - **Objectives and specifications for each function may be shown in matrix form at the bottom of the FAST diagram**

Simple FAST Example

The Wright Flyer



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VE in Systems Engineering

- **VE methodology is an effective tool for making systems engineering decisions**
  - **Reduce cost**
  - **Increase productivity**
  - **Improve quality related features**
  - **Improve processes/procedures**

While…meeting or exceeding functional performance capabilities

- **VE is applicable at any point in the life cycle**

How…making SE trades

Factors Leading to VE Changes

- Advances in technology
- Excessive cost
- Questioning specifications
- Additional design effort
- Changes in user's needs
- Feedback from test/use
- Opportunities for design improvements
- Need to improve reliability

Changes based on systems engineering trades

Hardware VE Example

ORIGINAL CONTRACT		CONTRACT AFTER VECP ACCEPTANCE	
Original Unit Cost	$10,000	Revised Unit Cost	$6,000
Original Unit Profit	$1,000	Original Unit Profit	$1,000
Original Total Cost	$11,000	Revised Total Cost	$7,000
		Non-Recurring Engineering $1 million 500	$2,000
		New Unit Price	$9,000
Original Qty	X500	Affected Qty	X500
Original Total	$5,500,000	Revised Total	$4,500,000
		Savings ($1,000,000)	
		Contractor share	$500,000
		New contract total	$5,000,000

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New VE Opportunities

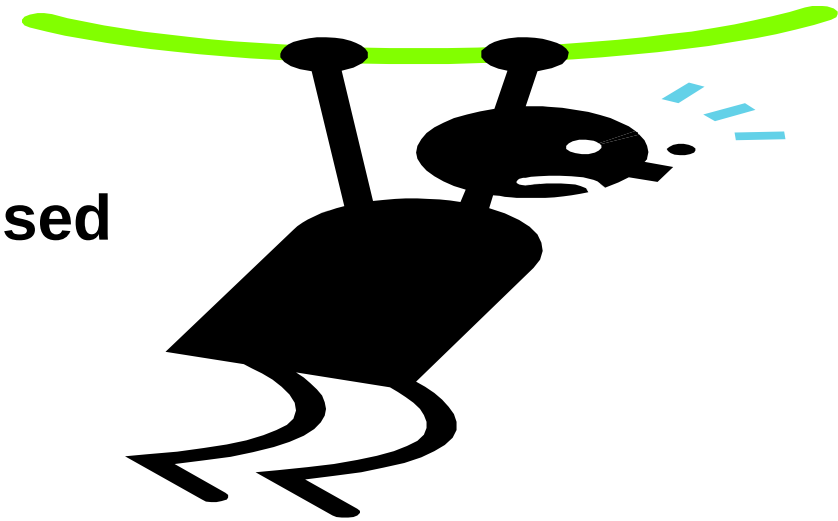
- **In the past, the government mainly purchased hardware where VE works well**
  - **Relatively straight forward**
  - **Based on the unit cost of production**
  - **Number of units to be bought is known**

- **The acquisition of services has increased substantially**
- **Services acquisition represents a large untapped source for VE**

but . . .

There are Difficulties in Pursuing these new Opportunities

- **Current FAR language not conducive for VE in services contracts**
  - **Difficult to administer**
  - **Difficult to calculate**
- **Opportunities are being missed**
- **Workarounds are possible**



VE Applicable to Services

- **Savings on a unit price basis operates like hardware as long as the unit price can be changed to reflect the VECP**
- **Business case for the contractor and the government is as attractive as the hardware case**
- **Provides a distinct incentive for the contractor to propose contract changes**

Performance-Based Service Contracts

- **Performance-based acquisition (PBA) structures all aspects of a contract around the results to be achieved**
  - **Not the manner by which the work is to be performed**
- **Performance based logistics (PBL) is a contractor based support strategy**
  - **Specifies the outcome performance**
  - **Contractor provides services to achieve that outcome**
  - **Includes incentives for achieving outcome performance levels above a baseline**
- **First PBL contract on a system often is cost-type to collect sufficient data to understand the risks**
  - **During contract execution, the government collects cost data for negotiating future contracts/options**
- **Follow-on contract should be firm-fixed price with incentives to provide optimal support**

Example of How VE May Affect the PBL Business Case (1 of 2)

- Assume
  - PBL contract to incentivize the availability of an item
  - It is first PBL contract to collect data, so it is cost type
  - One type of failure is from misuse in the field
- Contractor has a choice of two basic approaches to achieve/exceed the performance objective
  - Increase manning to repair items
  - Reengineer the item to reduce failures

- The business case underlying the choice is complex
  - How do the choices affect the rate of profit wrt PBL incentives?
  - How do the choices affect revenue and total profit?
  - How will the above answers change in future contracts?
- VE adds other considerations to the business case
  - Sharing savings in future contracts
  - Reimbursement for NRE
- VE adds similar considerations to fixed-price PBL contracts

Example of How VE May Affect the PBL Business Case (2 of 2)

- Assume there is a cost objective as well as a performance objective being incentivized in the PBL contract
  - E.g., cost per unit
- VE authorities add additional incentives that affect the business case in a way that may benefit all stakeholders
  - Reimbursement of NRE from the savings
  - Sharing savings in future contracts

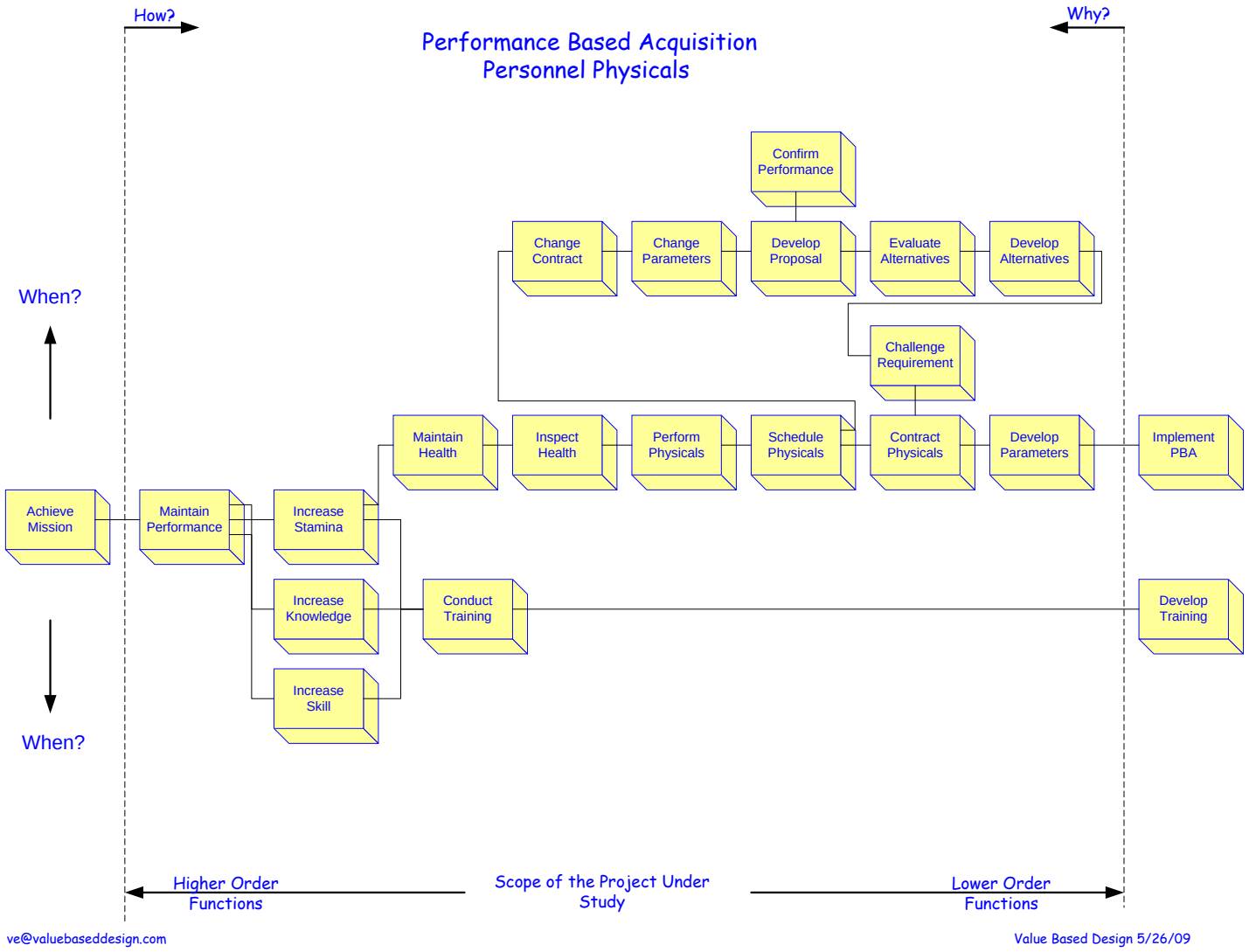
VE complements PBL contracts by adding cost-related incentives to the performance incentives thus enabling performance improvements to be made at lower cost

The Job Plan Applies to Service Contracts

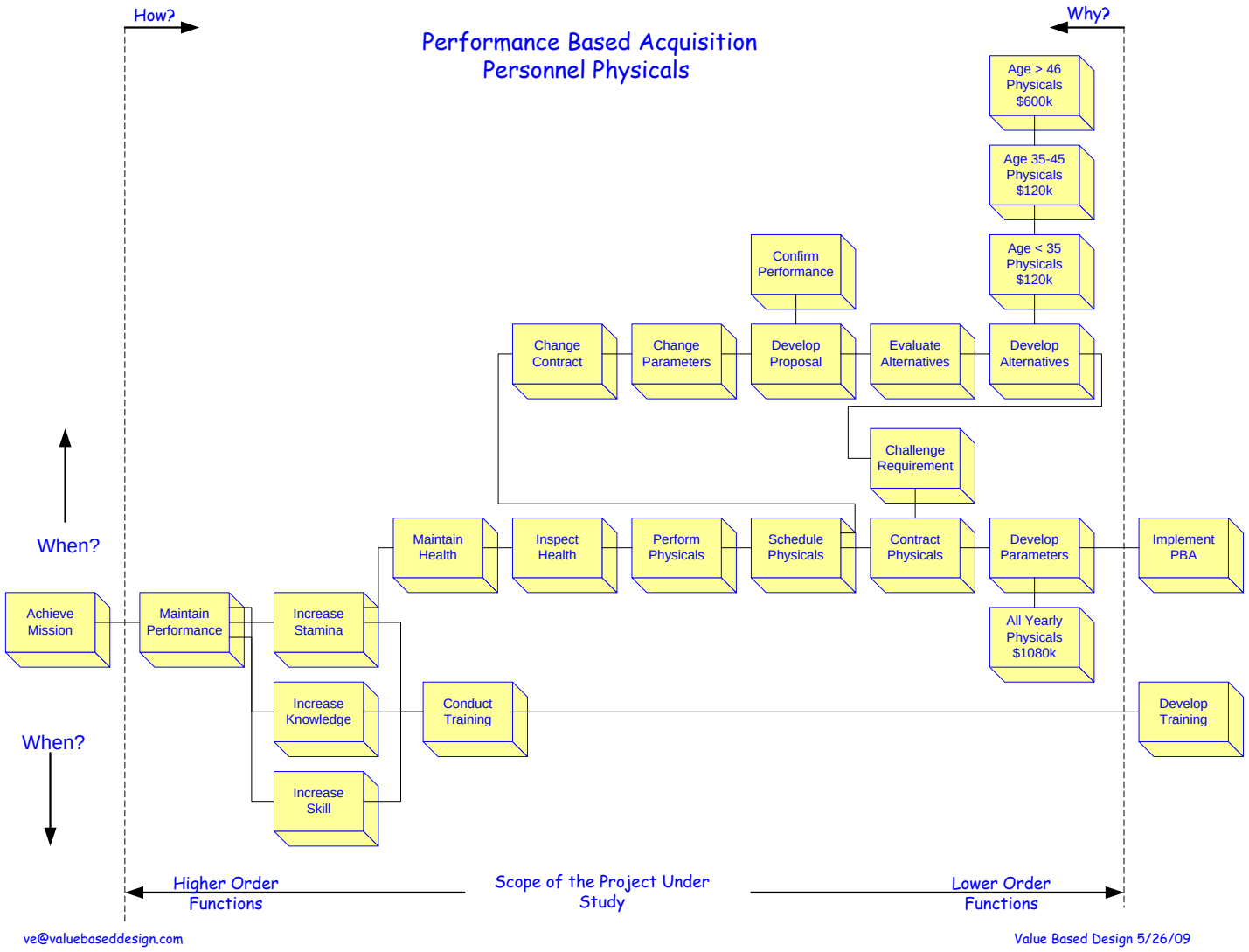
- **Processes can be vastly improved**
- **Repair procedures can be optimized**
- **Logistics applications can be streamlined**
- **Requirements can be challenged**

The very act of analyzing the proposed method in a structured process leads to real innovation resulting in improved performance, cost, and/or quality

Using the Job Plan on a Services Contract to Provide Physicals (1 of 3)



Using the Job Plan on a Services Contract to Provide Physicals (2 of 3)



Using the Job Plan on a Services Contract to Provide Physicals (3 of 3)

ORIGINAL CONTRACT		CONTRACT AFTER VECP ACCEPTANCE	
Provide a complete annual physical to military personnel	$100	Provide a **complete** annual physical to military personnel	$100
Original Qty	X10,800	Revised Qty	X6,000
		Revised Subtotal	$600,000
		Provide a **modified** physical to military personnel	$50
		Revised Qty	X4,800
		Revised Subtotal	$240,000
Original Total	$1,080,000	Revised Total	$840,000
		Savings ($240,000)	
		Contractor share	$120,000
		New contract total	$960,000

FAST Provides a Vehicle for Finding Opportunities to Improve System Value

- **FAST is a particularly powerful tool when used in conjunction with service contracts**
- **FAST enables**
  - **Questioning of the existing system**
  - **Critical thinking**
  - **Innovative solutions**
- **FAST assures areas of major expenditure receive attention in the early stages of a service contract**
  - **Not typically done for a service contract**

You can't improve the value if you don't look

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Medical Data Entry Example Showing Difficulties in Using Unit Price to Share Savings

ORIGINAL CONTRACT		REVISED CONTRACT	
		Purchase software	$1,000,000
Provide data entry services for medical records:		Provide data entry services for medical records:	
Unit Cost	$10,000	Unit Cost	$10,000
Profit	$1,000	Profit	$1,000
		Per unit share of NRE	$3,333
Original Unit Price	$11,000	Revised Unit Price	$14,333
Quantity	X500	Quantity	X300
Total	$5,500,000	Subtotal	$4,300,000
		Savings ($1,200,000 50%)	$600,000
		New Contract Total ($16,333 x 300 units)	$4,900,000

Hard to Identify Savings Mechanisms

- **Unit price may actually increase**
- **Savings based on reduced hours – increased productivity**

Hard to Calculate Savings

- **Indefinite Quantity Contracts**
  - **Uncertainty in amount of effort to be purchased**
  - **Risk to contractor for recouping investment**
  - **Risk to government to obtain benefit**

- **Collateral savings**
  - **Generally smaller in hardware contracts and may be waived**
  - **Could be significant in services**
- **Workload and efficiency issues**
  - **If workload is less and payment is "per unit," contractor may not be fairly compensated**
  - **If workload is less and "lump sum" payment is used, government may pay too much**
  - **If efficiency is less, contractor wins and government loses**
  - **If workload and efficiency are greater, it's less of a problem**

Initial Actions

- **Be innovative within current rules**
- **Utilize mandatory VE to build experience**
- **Establish specific mandatory VE criteria for services:**
  - **Clearly specify expected outcomes**
  - **Define incentives**
  - **Establish performance measures**
  - **Secure top management commitment**
  - **Determine source of the money**

Future Actions

- **Improve training and guidance**
  - **Case and test studies**
  - **Primer in mandatory VE**
- **Explore changing FAR to clarify how VE may be used in service contracts**
  - **New Clause?**
  - **Revisit the deal**
  - **Sharing non-recurring engineering costs**
  - **Changing the sharing period or percentage**
  - **Better address collateral savings issues**