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MANAGEMENT

Good Practice Guide
GPG-FM-011

Value Management

**"It's Not Just a Good Idea...
It's the Law"**

September 1997

Department of Energy
Office of Field Management
Office of Project and Fixed Asset Management

Value Management
Good Practice Guide

1.0 INTRODUCTION

This Guide was developed by the Department of Energy as part of a series for better management of projects undertaken by the Department. This Guide includes specific guidance and information on how to plan, apply and integrate value management processes and practices during life cycle of fixed assets.

The practices and processes associated with value management are among the most powerful available to the project management professional. Yet, they may be also among the least understood of the life cycle asset management tools. The metric for success of this guide will be if it has the explained value management processes and practices well enough so that appropriate and optimized use can be made of the described.

Value management methodology has been practiced under various names; the most common is value engineering. This guide will use the terms 'value management' and 'value engineering' interchangeably. At the heart of this management tool is focus on analysis of functions and requirements. Done properly, this seeks to achieve the most cost effective alternative, or best way to obtain all performance and capabilities at optimum price. This does not necessarily mean cost reduction. This tool is surrounded by folklore and misunderstanding. There are clear instances of success, and just as there are value studies which failed to yield a magic solution. Many say they practice value management, but have little understanding of how the process works. This is not to devalue good intent; merely to point out that value management is often deployed only as a tool of last resort — when everything has gone wrong and costs must be reduced above all. These have contributed to the perception that value management is arcane and ineffective. The dismissal of the value management tool because of reputation as a panacea has led to minimal emphasis in practice and negligible management support. In times of downsizing, the value management function is nearly always among the first to go.

Value management is distinguished from other project and fixed asset management disciplines by virtue of having a its own statutory mandate passed in early 1996. Further, with pay-as-you-go (zero-sum) budgeting and performance measurement being emphasized realities, the Office of Management and Budget is encouraging using value management practices and processes not only to ensure realistic budgets and reduce program and acquisition cost, but to be used to create cost savings which can be applied to other program areas. However, even with all the right conditions and best intentions, and without the right incentives, the current budget system dynamics still penalizes cost efficiency. There is also the unresolved issue of the relationship between performance-based acquisition and value management processes.

2.0 PRINCIPLES, PROCESSES, AND PRODUCTS

2.1 PRINCIPLES

2.1.1 What is Value Management?

Definition. The statutory and regulatory definitions encompass analysis of functions performed by a team of qualified personnel directed at improving performance, reliability, quality, safety, and life cycle costs of products, systems or procedures. The study of functions helps to achieve "best value" for resources involved by improving the relationship of worth or utility to monetary cost. The best value is associated with an item that has the ability of performing its function at an optimum level of quality, reliability, maintainability, and life-cycle cost. This analysis reduces processes, equipment, facilities, services, supplies, or products to their most basic functional elements and then looks for cost-efficient alternatives.

At minimum, proper value management practice will include all of following items:

- identified initiatives
- invested resources
- implementable recommendations
- identifiable return on investment

A summary view of value management is the systematic search for an undiscovered answer through the collective efforts of a team composed of experienced and highly qualified professionals. The goal of the VE analysis is to ensure that the owner, user, and other stakeholders, receive a product that provides the greatest "value," or return on their collective investment. Value management processes and practices emphasize the return on investment aspect in terms of life cycle costs to maintain or improve on desired levels of capability and performance during planning, acquisition, execution and procurement activities.

Integrated Product Team (IPT) approach. The reliance on a proper integrated product-oriented team to achieve valuable results cannot be overemphasized in any discussion of the definition of value management. Multiple teams may be assigned to review an identified item in a highly structured VE study session or workshop. Teams are comprised of knowledgeable staff representing many technical and operational disciplines, including someone well-versed in value management practices, as well as the client, user and other cognizant stakeholders.

Other Names. Terms such as function analysis, alternatives analysis, value analysis, value control, value improvement, value engineering and value management are synonymous, as long as the same industry-recognized techniques and principles are applied.

Related Methodologies. Value management may be used alone, or in conjunction with other management and productivity techniques and methodologies, such as: total quality management, business process reengineering, partnering, bench marking, and integrated product teams.

Related Good Practice Guides that include tools and practices closely allied with value management include: GPG-FM-03, Engineering Trade Studies; GPG-FM-007, Risk Analysis and Management; GPG-FM-10 Systems Engineering; and Utilities Option Study.

2.1.3 What Value Management is not

Value Engineering is not what good planners and designers do as a matter of routine, its not part of the typical design development process. A VE analysis is more rigorous than the typical project review. Each VE effort brings together an impartial team of professionals with a common purpose, improving the project design. The format and structure of the value management methodology serves to aid both the owner and designer with achieving their objectives.

Similarly, a VE analysis is not a traditional cost reduction approach. In a VE analysis, cost reduction is achieved by making a design more efficient without reducing essential performance, reliability, or maintainability. Conversely, traditional cost reduction efforts will concentrate on material substitutions, and reducing or eliminating specific elements. This approach frequently results with reduced quality, or diminished performance.

Performing a VE analysis is not the same as a typical Quality Assurance (QA) review. The traditional QA review will answer questions such as: does the design meet code requirements; will the design work; and does the design conform to accepted standards of practice? The VE analysis will answer these questions: what else will achieve the same function for lower life-cycle cost; and what functions are not germane to project performance?

A VE analysis is not intended to challenge or denigrate the efforts of the asset or process designer. VE is management tool that is intended to introduce further improvement into work already being done well.

2.1.4 Requirements & Policy

General. The practices and processes associated with value management are distinguished from other life cycle asset management tools by virtue of legislative mandate. This is due in part because the Federal government has acknowledged the merits and importance of implementing the methodology as a project management tool. The following summarizes VE specific requirements that are applicable to the US Department of Energy.

Legal. Public Law 104-106, enacted February 10, 1996, amended the Office of Federal Procurement Policy Act (41 U.S.C. 401 et seq.) by adding the following:

"Sec. 36. VALUE ENGINEERING.
(a) IN GENERAL. - Each executive Agency shall establish and maintain cost-effective value engineering procedures and processes.
(b) DEFINITION. - As used in this section, the term '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."

Regulatory. Office of Management and Budget (OMB) Circular A-131, "Value Engineering," May 21, 1993, requires Federal Departments and Agencies to use value engineering to identify and reduce nonessential procurement and program costs. Federal agencies are to establish and improve on their use of value management as a tool to ensure realistic budgets and reduce program and acquisition costs. OMB A-131 also says to include value management in:

- consonance with other cost-cutting techniques, such as life-cycle costing, design-to-cost and concurrent engineering. Use to reduce costs, increase productivity, and improve quality.
- approaching facilities acquisition to incorporate environmentally-sound and energy-efficient practices and materials. [see also ISO 14000]
- acquiring projects and programs; the resulting savings are reported annually to OMB and validated by the Inspector Generals.
- annual budget submissions to ensure agency efforts are properly resourced.

OMB Circular A-11, "Preparation and Submission of Budget Estimates", June 23, 1997, and the accompanying "Capital Programming Guide (CPG)", July 1997, rely on using value management processes and practices during the life cycle to:

- justify budget submissions using cost-benefit, life cycle, risk, and alternatives analysis [A-11, §300.7]
- participate as members of integrated product teams [CPG, p.5, 63]
- help answer the "three pesky questions" during planning to provide the best value alternatives [CPG, p.8, 10]
- be a methodology used through all life cycle phases [CPG, Appendix 9/p.81-82]

Department of Energy. The use of value management methodology to obtain results is implicit in the DOE Strategic Plan, Final Draft, August 1997, in particular regarding Objective 3 under "Corporate Management.'

Orders. DOE Order 430.1, "Life Cycle Asset Management, (LCAM)" requires the use of process tools, including value engineering, to improve efficiency and cost effectiveness. This performance-based order canceled DOE Order 4010.1A.

2.2 PROCESSES

2.2.1 When to Use Value Management

General. The application of value management has been generally restricted to and is well known in construction of individual fixed asset facilities in DOE. Typical application is during planning, to develop conceptual alternatives, and during design or construction for cost reduction efforts. Recently, value management applications have begun to include work processes, systems, and programs as part of any activity to achieve results needed by fixed funding or reengineering activities.

Thresholds. The statute and regulation provide individual agencies with authority to define opportunity criteria to apply value management. Within agencies, these opportunities exist in programs, projects, systems, products (including fixed assets) and services. Congress has suggested applying VM to the highest 20% ranked by dollar value within an agency. OMB A-131 uses a $1 million minimum threshold above which VM would be accomplished.

The establishment of thresholds based on absolutes have little relevance to results driven by performance. Therefore, each program, project, or operations office should establish their own trigger criteria by defining those applications which are expected to

most benefit a particular function. However, the following observations are based on actual experience in value management practice and hence may serve as guidelines:

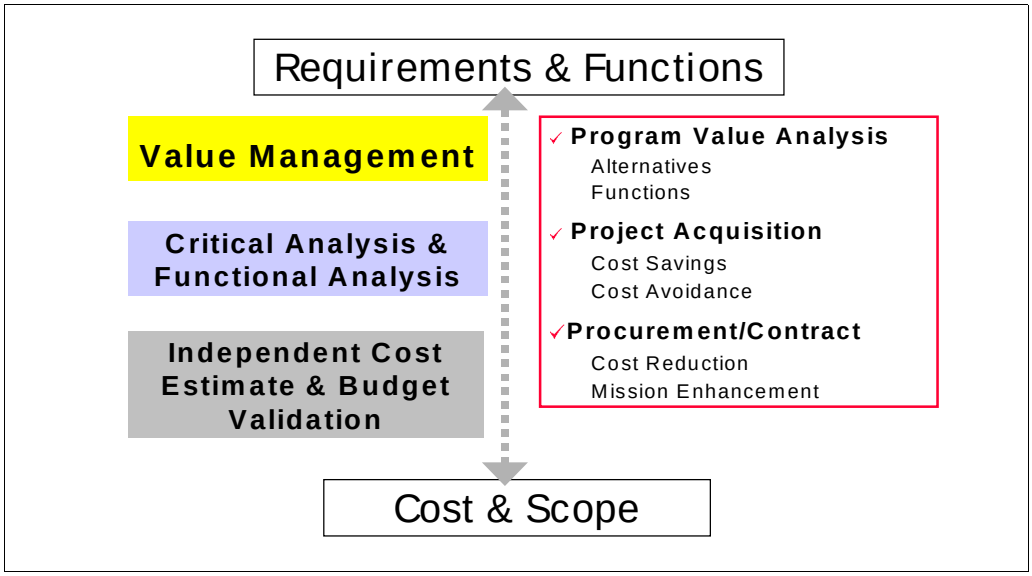
- value studies ideally are applied early in the program or project so that existing plans, processes and designs are disrupted as little as possible. Early phases (planning and design) of an acquisition yield the most cost reductions, usually as cost avoidance
- execution or operations phases and systems/procedure applications provide cost reductions usually expressed as cost savings
- the more complex or higher dollar item being examined requires more effort to implement because of the larger impact on resources and the number of diverse parties involved.
- relatively simple systems/processes or those items that have been subject to rigorous value management generally will indicate relatively small returns on investment; generally, disproportionate returns-on-investment indicate incomplete effort in the original system
- the industry benchmark for expected return-on-investment for value management application is between 10:1 and 20:1.

The guidance for general use is to do what makes the most sense. Special value studies could be done on projects or aspects with high visibility, complexity, or unresolved issues. A graded approach as diagramed below should be adopted. An emphasis is placed on the outcome that investment in value management application will return at least $10 for every $1 invested.

PROJECT TYPE & COST ($M)	PLANNING /EIS	CONCEPT /RIFS	DESIGN 35%	DESIGN 75%	EXECUTION /REMEDIATION	OPS & MAINT	DISPOSAL
Strategic System	●	●	●	●	●	●	●
MSA/MP	●	●	●	●	●	◙	◙
LI <$100	●	●	●	●	●	○	
LI/OPX <$20	○	◙	●	○	○		
LI/GPP/OPX <$5	○	○	○		○		
Key ● = mandatory ◙ = recommended as required ○ = optional good practice							

2.2.2 How Does Value Management Relate to Other LCAM Processes?

This is another life cycle cost tool. Some components and complementary value management processes and practices are shared with other life cycle activities. There is a special relationship between value management and systems engineering. Other life cycle management tools focus on functionality as part of the overall structure. Except for utilities options studies which use a best value approach, the other tools implicitly rely on system functional improvements to reduce cost.



2.2.3 What Makes Us Use Value Management?

A solid foundation for the use of Value management is built from knowing what attractions its practice hold for the Department .

Required to meet statutes and regulations. These all say: just do it. Noncompliance will be reflected in the annual report and will engage internal and external oversight entities. Reference the Army Corps of Engineers policy requiring next-higher level waivers not to study nor implement value management recommendations for each of their projects.

Agency Incentives. OMB's Office of Federal Procurement Policy (OFPP) previously has stated that any cost savings produced as a result of value management efforts will remain with the agency for its use. Within DOE, current Office of Environmental

Management policy is to redeploy cost savings at the field office level for program acceleration at the site.

Contract Incentives. This may be in the form of shared savings or enhanced scope between the contractor (or contractors at any level) and the DOE. The current Department of Energy Acquisition Regulation, (DEAR), since DOE does not have Federal Acquisition Regulation structured contracts, limits contractor savings for value engineering incentives to 25% and to extend no further out than two years. The relationship between performance-based contracts and incentives is currently being examined to result in more definitive cost reduction and incentives policy and guidance.

Individual Incentives. Current statutes and OMB OFPP policy permit the potential for individual monetary incentives for successful value management execution. However, only ad-hoc pilot processes currently exist in the Federal government. Several agencies are now exploring how to provide incentives and other positive personnel actions for achieving acquisition excellence. This would relate pay and promotions to performance contributions in achieving cost, performance, and schedule goals.

Benefits. The most common means to measure the effectiveness of value management is to calculate the return on investment (ROI): the ratio of life cycle savings to cost of study. The General Accounting Office (GAO) has reported that "VE generally produces a net savings of 3 to 5 percent of project costs while costing about 0.1 to 0.3 percent of total project costs" during fiscal years FY89 and FY90.[1] These GAO documented savings equate to an average ROI ranging from 10:1 to 50:1 for all construction projects that received a VE analysis during the audit period. However, not all value analysis will result with significant cost savings. Some value studies have determined that designs were under-funded with respect to the required performance, thus resulting in an increase to the design's cost.

A value analysis will always achieve the following regardless of cost savings realized:

- Provide an unbiased, outside opinion and senior expertise as inputs to the design process, thereby increasing the resources available to develop the project.
- Document that all reasonable measures have been taken to minimize project cost and maximize the return on investment for delivering the project. This

[1] "*Audit of Value Engineering in the Federal Government*," Page 6, President's Council on Integrity and Efficiency, August 1991.

documentation has been used as supporting information for appropriations requests submitted Congress .

- Identify design criteria that are poor value, or have a high cost-to-worth ratio, thereby allowing the project decision makers and stakeholders to re-evaluate project criteria.
- Provide independent review of concept, design, cost and schedule review.

2.2.4 Value Management Recommended Funding Criteria

For Program Office or Field Operations account funding, instant cost savings generated by implemented value study may be used to reimburse the source account. The costs shown below should be activity cost based (ABC); that is, include VM program management costs.

PROJECT Type & Cost ($M)	**VM BUDGET ($000 LCC)**	**VM STUDIES (Number)**	**FUNDING SOURCE**
Strategic System	200+	6+	Program Office + Project
MSA/MP	100-175	5+	Project
LI <$100	50-100	5+	Project
LI/OPX <$20	50	2+	Project or Operations Account
LI/GPP/OPX <$5	<50	1	Project or Operations Account

2.2.5 What Are Value Management Processes and Practices?

How does it work? A value analysis or study will address a series of questions regarding the item to be reviewed. These questions are intended to define the functions performed by the design, the cost to provide these functions, and the alternatives that will also provide the required function. The questions are as follows:

- What is it, the item or service to be provided?
- What does it do?
- What does it cost?
- What else will do the job?

- What would that alternative cost?

The value study depends on contributions made in a team environment. This team is led or facilitated by a value management professional. The team has multi-disciplinary subject matter experts, include a cross-organizational mix, and represents various elements and factions impacted by the study. A team can include users, suppliers, independent experts, regulators, stakeholders, and other affected parties. The typical value study team will convene at, or as near as possible, to the site. Design documents, such as constraints and performance requirements, are usually provided in advance of the study to the individual members of the team for their review and familiarization. The project user and designer will brief the team(s) on the design or concept of operations for the item being visited and will answer the study team's questions that resulted from reviewing the provided materials.

The team will establish targets for the analysis by defining the basic functions the project is to perform (such as "control environment" or "manage documents") and then identifying which basic functions are expensive, or have a poor value. The basic functions are identified and prioritized. This function analysis approach to arriving at primary and secondary priorities is depicted in the FAST (Functional Analysis System Technique) diagram that hierarchically arrays functions by value. The value team will then brainstorm to define as many ideas as possible that would also achieve the selected basic functions.

Alternatives that have a life cycle cost significantly less than the original basis are then proposed to the project's decision authority and project management team using a Review Board format. The project's management team will instruct the designer to incorporate the accepted alternative into the final design configuration if the management team accepts the proposed alternative. The designer verifies the viability of the alternative as part of the implementation process.

What Are the Value Analysis Study Steps? The following sequential activities are critical to success of a value study effort. The Implementation phase generally takes time to be realized--sometimes years--following the study. Additional details on the process steps are in Appendix A.

- Pre-study scoping, planning, and information gathering
- Value Study: an internationally-recognized value study process, consists of five formal phases
  - — Information
  - — Creative (or Speculation)
  - — Evaluation (or Analysis)

  - — Development (or Evolution)
  - — Presentation (or Reporting)
- Implementation (or Execution)
- Results Reporting and Documentation
- Lessons-Learned

2.2.6 What is Important in Implementing a Value Management Program?

Management support is vital. Because the benefits from value management may not be realized immediately, funds spent on it represent a an investment in the future. With many competing needs for limited resources, it is easy to delay spending money on value management and committing the time to apply it. The Federal Construction Council of the National Academy of Sciences recommends the following elements to form a strong foundation for an effective value management program at any level:

1. An effective organization
2. A clear statement of policy and expectation
3. Well-defined procedures
4. Specific goals and objectives;
5. Proper staffing
6. An effective training and education program
7. A high level of management support
8. Stable and adequate funding
9. An effective feed of results and lessons-learned
10. A credible records of savings.

Establish management structures to provide continuity. Suggested include:

- Value Management Program Reviews - periodic customer and management reviews of activities, organization, staffing, and training; program plans, schedules, and budgetary status; results from value studies; outstanding achievements and nominations for awards.
- Value Management Proposal Board - A group with decision-making authority to disposition value proposals and pursue implementation of accepted proposals. Membership of Proposal Board may vary for each study, although individuals might serve as frequent members.
- Value Management Steering Committee - committee to assist with integration, promotion, implementation, standardization, management, oversight and compliance issues. Committee could be chaired by the local value management program manager and members could includes points of contacts from program and project offices and selected contractors. To continuously improve the

program, training, and studies, customer satisfaction surveys could be conducted to identify areas needing improvement and seek information about lessons learned.

Audits and Annual Reports Due to externally driven requirements, value management programs are subject to Inspector General (IG) audits. Processes should allow oversight entities to:

- validate the accuracy of reported value engineering savings
- assess the adequacy of value engineering policies and procedures
- OMB Circular A-131 reporting and implementation.

Procurement and Contracting. The proper implementation of a value management study proposal relies on a clearly defined baseline and proper cost accounting. Value methodology was formally incorporated into the Federal Acquisition Regulations, Title 48 of the Code of Federal Regulations, during 1984. The Federal Acquisition Regulation (FAR) Clauses 48 and 52 contain contract language used for value engineering. These requirements are as follows:

- The Federal Acquisition Regulations, Part 48, *Value Engineering*, prescribes the policies and procedures for using and administering VE techniques in contracts, including sharing collateral savings. This FAR clause indicates that VE is required to be implemented as noted within Section 36 of the Office of Federal Procurement Policy Act. This FAR clause further describes the minimum acquisition threshold, below which VE is not required, for each type of procurement.
- The Federal Acquisition Regulations, Part 52, *Solicitation Provisions and Contract Clauses*, Sub-part 52.248, *Value Engineering*, provides guidance on the inclusion of VE incentive provisions within procurement documents. This FAR clause further describes the type of procurement, the applicable procurement incentives, and an abbreviated summary of the contractor's specific VE reporting requirements.

2.2.7 Value Management Professional Credentials

There is strong merit to being certified as a value management professional in the Department: many agencies have encouraged certification for those involved in value management or are serving as points of contact.

SAVE International bills itself as "The Value Society" is the only professional society in the United States for the advancement and promotion of value management in the public and private sectors. This organization has membership, technical committees, and technical exchanges and sets the standard of practice through publications, conferences and an internationally recognized certification program. Certification is at

three levels, each with their unique qualifying criteria and time period prior to a recertification requirement:

- *Value Method Practitioner* (VMP) is someone who has completed the basic workshop, has participated in a value analysis study, plus other experience, and has completed a value theory examination, but whose principle career is not value engineering.
- *Associate Value Specialist* (AVS) is the intermediate level in certification. Recognizes individuals who have completed 128 hours of value analysis study, but have not yet met all the experience and/or technical skills requirements for a CVS.
- *Certified Value Specialist* (CVS) Denotes full level of certification in the SAVE program. Requires 2 years of full time value work participated in SAVE activities, including completing an original paper, an all the experience and technical skill certification requirements established by SAVE.

2.3 Products & Results Value management results are the qualitative, quantitative, or intangible improvements realized from implementing study proposals.

3.0 MEASURING FOR RESULTS

Value management practice has been historically measured in terms of cost savings or cost avoidance. These measurements tend to be absolute and may not always reflect whether improvement or desired results are happening. Using other metrics may more accurately depict the benefits to be gained. For example, how would we put a price tag on the value of avoiding problems, better project definition in the conceptual stage, or having a more accurate estimate? Since efficiency and cost-effectiveness are intrinsic to value, the following set of general objectives, measures, and expectations (OMEs) may be useful:

OBJECTIVES	MEASURES	EXPECTATIONS
Use Value Management as a process tool to improve efficiency and cost effectiveness in acquiring and managing fixed assets.	A value management program is in place or value methodology has been applied to a project, system, or item. 1. Return-on-Investment for value studies. 2. Number of value studies conducted over number of studies planned	Annual report to DOE-HQ required for value management indicates value management practices and processes have resulted in improved life cycle fixed asset management
Use Value Management as a process tool to improve efficiency and cost effectiveness in programs, systems and processes.	Value management methodology has been identified by management as critical contributor to best management practice	Opportunities for value management practices and processes are actively sought.

4.0 INFORMATION SOURCES & LINKS

This information will be more fully developed on the internet version of this guide. The following is listed because of their relative permanence in value management or seminal influence:

Organizations

- SAVE International value management's professional certifying society (60 Revere Drive, Suite 500, Northbrook, IL 60006)
- Lawrence D. Miles Value Foundation to advance knowledge and use of Value Analysis and Value Engineering techniques (499 National Press Bldg., Washington DC 200455)

Recommended Reading

- *Value Methodology, May 1997*, SAVE International (60 Revere Drive, Suite 500, Northbrook, IL 60006).
- *Techniques of Value Analysis and Engineering*, Miles, L. D., 1961, McGraw-Hill Book Company, New York NY (Latest printing 1989. Published by Eleanor Miles-Walker. Sold through SAVE International).
- *Value Engineering in the Construction Industry*; Dell'Isola, A., 1982, Van Nostrand Reinhold Company, Inc., NY, NY.
- *Value Engineering for the Practitioner*; Kaufman, J.J., 1985, North Carolina State University, Raleigh, NC
- *Value Engineering, A Systematic Approach*, Mudge, A.E., J. Pohl Associates, 1989.

5.0 DEFINITIONS terms not found here are contained in the DOE Consolidated Glossary

Cost Avoidance An action taken in the immediate time that will decrease future costs. For example, an engineering improvement that increases the mean time between failures and decreases operation and maintenance costs is a cost avoidance action.

Cost Savings A reduction in actual expenditures without reduction in performance or capability below the projected level of costs to achieve a specific objective. Always computed with respect to an existing course of action.

Function A required performance action of a product, process or service, described in two words using an ***active*** verb and a ***measurable*** noun (e.g., contain heat, resist deterioration, receive power, etc.). See also Appendix on Functional Analysis System Technique.

Life-Cycle Cost (LCC) The total price of a system, building, or other product, computed over its useful life. It includes all direct, indirect, recurring, nonrecurring, and other related costs involved in acquiring, owning, operating, maintaining, and disposing of the system or product over a specified period of time, including environmental and energy costs. The net LCC savings is determined by subtracting the cost of performing the value function over the life of the activity or product from the value of total savings generated by the value function.

Value Desirability, utility, or importance of an item usually represented by money or price. The value of benefits, goods, and services is what a customer is willing to give up to have it.

Value Engineering Incentive Contract clause allowing voluntary participation by a contractor in development and submission of VE Change Proposals (VECP). When a VECP is accepted, any resulting savings are shared with the contractor on a pre-established (usually a percentage) basis established by the contract.

(Value) Mandatory Program Requirement Contract clause indicating a mandatory value management effort (used when the contracting officer has determined that substantial savings to the Government may result from sustained value effort of a specific level). The program requirement is shown as a separately priced line item in the contract schedule.

Value Study Performed by a Value Team on a selected activity, operation, or product using the VE Job Plan to review and analyze functions and provide recommendations for improvements and/or cost savings. See also Appendix on Running a Value Study.

6.0 ASSISTANCE

For assistance on this guide, the DOE value management program or its components, or for other value management issues in the Department of Energy, please feel free to contact the Office of Project and Fixed Asset Management:

U.S. Department of Energy
Office of the Associate Deputy Secretary for Field Management (FM-20)
1000 Independence Avenue SW
Washington, D.C. 20585

Daniel Sze, Principal Point of Contact
daniel.sze@hq.doe.gov
Voice: (202) 586-2621
Fax: (202) 586-7705

7.0 RELATED TRAINING

The value practitioner is represented and certified by the professional organization, SAVE International. This is a specialized community; less than 500 people in the United States hold the Certified Value Specialist designation.

Managers and staff should be sufficiently aware and sensitive to value management processes and practices to ensure that techniques and principles are understood and applied appropriately. Personnel responsible for coordinating and monitoring value efforts or for developing, reviewing, analyzing, evaluating, and implementing value proposals should receive training commensurate with their level of involvement. The four courses listed below will provide a core of basic knowledge.

Contractual Aspects of Value Engineering Offered by the Air Force Institute of Technology, Wright-Patterson AFB, Ohio, and variously by other DoD agencies.

Value Engineering Module I Workshop SAVE certified 40-hour workshop to educate potential users and customers, such as program, project, and line management and staff about the methodology, the benefits that can be obtained from its use, and the most appropriate areas for application. It provides a primer for team leaders and untrained personnel to participate in future value studies with brief hands-on practice in the use of value methodology. Participants gain experience using the value process and function analysis through the use of case studies. This course is required for those who wish to become certified specialists or have a strong working knowledge of study methodology.

Value Engineering Module II Workshop SAVE certified 24-hour workshop for those who manage or monitor value activities; routinely participate in value activities; and/or are to become CVS certified. Designed to expand the basic knowledge acquired in the VE Module I Workshop, a prerequisite for this class.

Executive Overview Department of Energy value management orientation for management and staff who might not participate on a study team but need basic understanding for budgeting, planning, organizational, and contract management responsibilities. Key points of interest should include policy and legal requirements mandating the use of value by federal agencies; a brief introduction to the value methodology; and descriptions of the most useful and effective application of value management.

8.0 EXAMPLES The variety and benefits of using value management can be seen in the following study summaries developed for the Fiscal Year 1995 Annual Report to OMB. Current and more recent examples will be maintained on the internet version of this guide:

Environmental Requirements

Study: Kerr Hollow Quarry Debris Management Project, Oak Ridge.

Sumary: Plant was to be constructed to crush/breach containers of hazardous wastes. Plant would have required eventual decontamination and decommissioning. VE study team decides containers could be stoed safely as-is. Revised closure plan was approved by DOE and the Tennessee Department of Environment and Conservation

Results: $15.5M Cost Avoidance

Decision-Making Methodology

Study: Decontamination Laundry Services, Hanford

Summary: New $24M facility was designed and close to construction. Ve study held to determine feasibility of using the non-Hanford private sector to provide laundry services. Commerce Business Daily announcement located a private vendor to provide this service.

Results: $80M Cost Avoidance over 20 years

Reengineering/Streamlining

Study: Westinghouse's Procurement Process

Summary: Two VE studies of Materials and Contract Management were conducted. Fifty proposals reduced cycle times from award of contract to delivery of material to user and for incorporating changes/modifications to purchase orders.

Results: 50 Percent reduction in cycle times due to elimination of rework, streamlined approvals, better defined requires, increased teaming, reduced process steps, and pre-approved vendor determination.

More Facility for Less Money

Subject: Westgate Badge Office - Lawrence Livermore

Summary: Title I design exceed the $1.1M TECC. 14 VE proposals reduced TECC to $882K, while adding and office and break room. Increased efficiency reduced power life cycle costs by $132K.

Results: $350K Cost Savings/Cost Avoidance and improved facility

APPENDIX A

Value Management Study Phases (Phases 2 - 6 are internationally recognized by SAVE)

1. Pre-Study
- a. Accept project or study from the customer and define as a Value Study
- b. Select the VE Team and obtain attendance commitment
- c. Determine study schedule and agenda
- d. Arrange for facilities and supplies
- e. Gather basic project or study data

2. Information
- a. Disseminate data to team members
- b. Identify functions and function relationships
- c. Establish function cost and select specific functions for examination

3. Creation
- a. Create conducive atmosphere
- b. Generate ideas for function alternatives

4. Evaluation
- a. Eliminate the obvious
- b. Sort and group ideas
- c. Determine the most practical ideas
- d. Determine and verify cost and/or schedule benefits/feasibility

5. Development
- a. Develop several alternatives into presentation format
- b. Develop an implementation plan

6. Presentation

Formally present recommendations on:
- Status and costs
- Recommended changes and costs
- Advantages and disadvantages

7. Implementation
- a. Obtain implementation commitment from responsible management and staff
- b. Develop appropriate documentation regarding funding, planning and report

8. Report Phase
- a. Document all data developed during the study
- b. Identify results and study documentation
- c. Incorporate into an official project file

9. Assessment Phase
- a. Review implementation of proposals completed
- b. Document results achieved versus projected
- c. Identify additional study requirements
- d. Periodically inform team members of implementation results
- e. Survey participants/customers regarding satisfaction with process and results

APPENDIX B

Value Study Report and Value Engineering Cost Proposal Content Guidelines

Value Study Reports illustrate use of value study phases (Appendix A) and contain formal implementable proposals. Standardized documentation for value management activities will facilitate retrieval of information for reporting, analysis, and auditing purposes, and for sharing with interested parties.

These reports should contain sufficient context and detail to stand alone. Information in the report should be complete, technically accurate, easily understood, and consistent with information provided to the study team by the customer. Value study reports generally include the following:

- Document Number and date
- Names of sponsoring company and performing Value Specialist
- Table of Contents, numbered pages and identifiable attachments
- Value Study General Information (list of team members and facilitator, study dates and location, total time spent on the project, etc.)
- Subject matter scope
- Executive Summary
- Background Information
- Function Analysis (including Function Analysis System Technique Diagram)
- Life Cycle Cost Analysis (unless inappropriate)
- Evaluation Criteria
- Developed VE Proposals
- Quantitative, Qualitative, and Intangible Results (value or worth to be measured in dollars if possible and appropriate)
- Implementation Plan

Value Engineering Cost Proposals (VECP) generally conform to FAR Clause stipulations. The FAR Clauses are particularized in prescribing processes and formats to be followed. Basic components in each VECP are typically:

- Description of existing and proposed requirements, along with benefits and disadvantages of the change
- Description of the scope of the changes, including regulatory or other waivers
- Detailed cost estimate and supporting data to be able to establish a baseline for the existing and proposed changed condition, including all costs associated with preparing and implementing the VECP.
- Schedule for acceptance and implementation focused on maximum cost reduction.
- Suggested cost sharing period for the VECP.
- Certification that the data submitted is accurate, complete and current as of the date of the final agreement of the net savings.

APPENDIX C

Performing a Value Study

Roles & Responsibilities

Project Manager The Project Manager needs to commit enough time to brief the VE Team leader, brief the VE Team, and answer individual VE Team members' questions. Once the study session is completed, the manager will also need to review the VE proposals, prepare responses to them, and participate in the debriefing meeting.

The VE Team The VE Team should be comprised of professionals who have credentials equal to or greater than that of those held by the design team's assigned staff. As a unit, the VE Team is conduct a thorough evaluation of the project without criticizing the design basis. The size of the VE Team should be limited to five (5) to eight (8) members total. Larger teams may be required depending an the nature of the design to be analyzed. However, larger groups are more difficult for a Facilitator to manage and have a potential for fractionalizing into smaller sub-groups. The VE Team will be facilitated and led through the VE analysis by a professional who is qualified to perform value engineering services. Typically, this individual will be a Certified Value Specialist (CVS).

VE Team Leader / Facilitator The VE Team Leader (VETL) is responsible for guiding the technical resources assigned to the VE Team through the VE methodology. As the Facilitator of the VE effort, the VETL is required to remain objective, and to sufficiently direct the VE Team to ensure that its efforts are productive and remain focused on the project. The VETL serves as the focal point for all communications between the VE Team, the project owner/user, and the design team. As noted above, the VETL typically has credentials as a Certified Value Specialist, as defined and recognized by SAVE International (formerly the Society of American Value Engineers).

VE Team Members Each VE team member must be both technically qualified in a particular discipline or area of expertise, and if appropriate, be licensed or otherwise accredited. Team members must be adept in analytical problem-solving. It is the responsibility of each team member to utilize their respective skills to develop technically feasible, cost-effective, and politically viable alternatives that will perform the same function(s) provided by the original design.

Value Engineering Job Plan

Approach The structured approach of the typical VE analysis, referred to as the VE Job Plan, is intended to provide a systematic project review that is efficient and consistent. The VE Job Plan consists of six distinct phases of activity that encompasses most of the VE study effort. The VE Job Plan phases are:

1. Information
2. Speculation, or Creative
3. Evaluation, or Analysis
4. Evolution, or Development
5. Presentation, or Reporting
6. Implementation, or Execution

The following discusses each of these phases in detail and present specific examples.

Information Phase This initial phase of a VE analysis is comprised of activities: Pre-study and Study session.

Pre-study
During the pre-study activities, the Facilitator will collect all pertinent data available about the project's background requirements and costs. The Facilitator will organize and summarize the data for the VE Team's review. Data will usually be provided by the design project manager. The data may require validation, adjustment, or refinement, once the VE Team defines which areas of the project present the highest potential for savings.

Study Session
The Facilitator shall arrange for the Project Manager and designer to give an oral briefing to the VE Team on the first day. The briefing's objective is to supplement the preliminary design documents and answer the VE Team's initial questions. The VE Team will generate more questions during the VE analysis. The Project Manager and designer may be contacted to address these questions as they arise.

Following the briefing, the VE Team shall strive to identify the basic and secondary functions of the design. The VE Team may establish cost-to-worth ratios for these basic functions. Their objective is to identify poor value (high cost-to-worth) functions.

Two techniques have been developed to identify the poor value functions, cost modeling and Function Analysis Systems Technique (FAST) diagraming. The cost model is not generally accepted as a stand alone technique. The cost model can be incorporated into the FAST diagram. Development of the FAST diagram locks the VE Team onto the appropriate study item and forces rapid in-depth exploration.

Speculation, or Creative Phase After the FAST diagram and/or cost models have been completed, the VE Team should begin to generate ideas for each of the poor value basic functions. The objective of brainstorming is to generate as many ideas as possible that could conceivably be developed into alternatives to the original concept. The typical brainstorming session consists of the VE Team spontaneously producing ideas related to the performance of the required function. The Facilitator's role during brainstorming is to encourage creative, divergent thinking by the team members. This may be especially critical when the team members, who have been selected for specialized technical expertise, have difficulty considering innovative or unique technical applications. The team leader must enforce the need to defer judgment on ideas until as many as possible are generated. Every idea must be recorded for future evaluation, even those which initially seem absurd.

Evaluation, or Analysis Phase During the Creative Phase, all critical comments and judgments are suspended in order not to inhibit the flow of ideas (no matter how wild). With that phase completed, the VE Team will consider the feasibility of each of those ideas. The objective of the Analysis Phase is to cull or filter the brain stormed ideas down to the most viable ideas. The ideas that pass the Analysis Phase will be carried forward to the development phase.

There are several filtering techniques that may be used in the Analysis Phase. Individual team leaders will use various combinations of techniques to fit their individual style. Astute team leaders will look at each idea positively, to see how it could be made to work, rather than critically for an excuse for rejection.

Despite which culling techniques is used by the VE Team, it is generally recognized that an advantage/disadvantage list should be prepared during the Analysis Phase. The VE Team can analyze the good and bad aspects of an idea by listing the relative advantages and disadvantages. The VE Team will provide input to help evaluate each individual idea's merits with respect to each member's specialty.

Evolution, or Development Phase The basic objective of the Development Phase is to determine if an idea is both technically and economically feasible. if so, then the idea warrants formal presentation as an alternative to the original design. If an idea has been determined to be not feasible during the previous evaluations, it will not be further analyzed during this phase.

A properly developed alternative idea will have been evolved to a level of detail sufficient to permit the Review Board to determine its disposition in an expeditious manner. The Review Board must be able to determine if the alternative will work and if it is more economical than the original design on a life-cycle basis.

It is critical that the same cost basis be sued to compare the alternative to the original. If the original design's cost estimate was based on detailed material quantity take-off, the developed alternative's cost estimate must also be based on similar detailed material quantity take-off. If the original deign was based on square footage, parametric, or any other means, so must the proposed alternative. The cliché of "comparing apples and apples," rather than "comparing apples and oranges" aptly applies to cost estimate development.

Presentation Phase When an alternative has been developed and still appears viable, the VE Team forms it into a proposal. The proposals should be presented in a consistent format. Copies of the proposals are compiled into a volume and then provided to the Project Manager, or other persons responsible for replying to the proposals such as the designer. This initial transmittal is typically called the *Preliminary Report*.

Review Board Meeting
The VE proposals will be presented to select representatives of the project's management team and designer, the Review Board. The Review Board will be encouraged to reach one of three decisions for each VE proposal: (1) Accept the proposal as presented; (2) Revise, accepted with modifications noted; or (3) Decline, rejected as presented. The Review Board may elect to use a fourth action: Table, defer disposition until additional information is obtained or more analysis has been completed.

The Review Board must explicitly state the reason(s) for each decision. If the meeting deadlocks on a proposal, then the proposal can be tabled for further review. The resolution of tabled proposals, however, must be made in a timely manner.

VE Study Reports
The VE reports are prepared to collect and document the activities of the VE Team. Some Federal agencies permit combining the *Preliminary Report* with the *Final Report*. This is the practice of the US Army Corps of Engineers, which typically requires only meeting minutes and a proposal disposition and summary table upon conclusion of the Review Board meeting.

Preliminary Report
The *Preliminary Report* is typically prepared during the VE analysis session. This document will contain all proposals developed by the VE Team. The *Preliminary Report* will include:

a. List of VE Team members.
b. Project description.
c. Scope of VE analysis.
d. Methodology used in analysis, including description of the team's responsibilities.
e. Summary of all brainstormed ideas, including dispositions.
f. Summary of all alternatives were rejected by the E Team as part of its evaluations.
g. Summary of VE proposals, including description of original and alternative designs.

Final Report
The *Final Report* will be prepared after all tabled proposals have been resolved, and will incorporate comments provided by the Review Board. This document will describe the disposition of all the VE proposals included in the *Preliminary Report*. The *Final Report* will include:

h. List of Review Board members.
i. Summary of cost savings as a result of the VE study.
j. Disposition of the presented proposals.
k. Implementation schedule and related costs.
l. Documentation of the Review Board's basis for the disposition.

Rejected VE proposals will be included in the *Final Report* with the basis for rejection. The rejection may be based upon cost-effectiveness, reliability, unusual operation and maintenance problems, or project delays.

Implementation Phase The VE analysis effort will have no value if the proposed and accepted recommendations are not implemented, or if implementation is delayed until few proposals are feasible. The Review Board must quickly decide the disposition of a VE proposal and direct the responsible staff to implement the accepted proposals. Occasionally during the implementation phase, the designer will determine that an accepted idea is not feasible for factors not previously known to the VE Team and the Review Board.

Duration of a Value Engineering Analysis
The typical VE analysis is commonly referred to as a 40-hour workshop. This describes the most common format of a typical VE effort, a five-day or week long study session. However, this five-day effort does not include the pre-study and post-study activities. The total duration of a VE Analysis may vary from as little as three weeks, to as long as several months. The optimal duration for a thorough VE analysis is approximately five weeks, a period that permits adequate pre-study preparation and post-study follow-up.

Pre-Study Efforts
The pre-study portions of a typical VE analysis occur one to two weeks in advance of the actual VE analysis effort. These preparatory activities include the information gather tasks, as well as addressing other basic needs. These basics include scheduling adequate facilities to convene the VE Team, and to make any travel arrangements that may be required. The typical duration of the pre-study efforts is five to ten working days.

Study Efforts The traditionally formatted VE analysis effort would span five consecutive working days, hence the 40-hour reference. However, a VE effort can be tailored to meet the needs of the required resources

and the effort required to adequately review and analyze the design. A VE effort can be completed in is a little as three consecutive days, or as long as ten consecutive days.

Alternate formats for a VE analysis would entail segmenting the VE effort into partial day segments which are then dispersed over a multi-week period. This format is less desirable as more time must be allocated to review the activities completed during prior session(s). The optimal format is the traditional five consecutive days schedule.

Post Study Efforts The post study efforts include the closure of any tabled proposals, the preparation of the Final Report, and the implementation of the accepted proposals by the design team as noted above. The duration of the post study efforts can vary from one week to several months, or more. The optimal duration is one to two weeks, which precludes the VE efforts from becoming "stale."

APPENDIX D

Value Management Tools & Techniques

The following summarizes some of the common tools and techniques used by value practitioners during the execution of a VE analysis. The tools selected for a particular VE analysis is made based upon the preference of the practitioner leading the effort, the particular needs of the design that will be evaluated. Not all tools are well suited for all VE efforts.

Function Analysis
Function analysis is one of the original techniques used during the early development of the value methodology. This technique is the most commonly applied tool used to commence the evaluation of a VE analysis subject. There are two forms of function analysis:

- Random Function Generation, or Listing
- FAST Diagraming.

Defining Functions
A function is defined by two words, a verb and a noun, which together describe an object. The verb answers the question of *"What does it do?"* The noun answers the question of *"What does it do to it?"* The verb should be in an active tense such as: *divide, interrupt, transmit, collect, prevent,* and so forth. The use of passive functions, such as *provide*, should be minimized or avoided in entirety if at all possible. The noun should be measurable, but not name the item defined by the function. Nouns such as *heat, light, force, load, radiation, current,* and so forth are measurable. Nouns such as *circuit, part, equipment, form,* and so forth are not readily measurable and should be avoided.

Random Function Generation
The example below, *Functions of a Wooden Pencil*, indicates the functions of a pencil, and its component parts, in tabular form. The wooden pencil is used to writing text or performing calculations. It is used to communicate both concrete and abstract information. A pencil can be used for editing (proof marks), verifying a bill of materials (check off), sketching a conceptual idea, directing attention to a specific element (pointing), or doodling.

COMPONENT	FUNCTION
Body (Barrel)	Support Lead
	Transmit Force
	Accommodate Grip
	Display Information
Paint	Protect Wood
	Improve Appearance
Band	Secure Eraser
	Improve Appearance
Lead (Graphite)	Mark Material
Eraser	Remove Marks
Pencil (Assembly)	Make Marks
	Record Data
	Communicate Data

Function Analysis System Technique, or FAST Diagrams

In essence, Function Analysis System Technique (FAST) is a method of stimulating organized thinking about any subject by asking thought-provoking analytical questions. These questions all begin with a key word such as how, why, when, where and what.

Functions, expressed in the usual verb-noun format, are examined by asking questions about the item and arranging the answers in diagrammatic form so that the relationship of functions becomes apparent. The diagram thus formed is called a FAST diagram. FAST diagrams, then, are graphic representations of functional logic developed by in-depth investigation of the item under study.

Logic

The basic logic used to construct FAST diagrams is the relationship of HOW and WHY. A function immediately to the right of any other function on a logic path describes HOW the function to the left is achieved. A function to the left of any other function on a logic path describes WHY the right function is performed. The function to the left on a logic path is the *Higher Order Function*; the function to the right on the logic path is the *Lower Order Function* or *Dependent Function*.

Uses

FAST diagrams have been used to communicate with subject matter experts; to understand the problems of users; to define, simplify and clarify problems; to bound the scope of a problem; and to iterate the interrelated string of functions needed to provide a facility, product or service. However, it should be noted that the value of a completed FAST diagram is somewhat insignificant contrasted with the value of the thinking and creativity performed in developing the diagram.

A FAST diagram demonstrates that the VE Team has thoroughly analyzed the design, or subject of the VE analysis effort. Many different FAST diagrams may be developed for any given subject and is dependent on several factors: the method selected to perform each function; the expertise of the VE Team; and the particular style used to construct the function model.

The VE practitioners have found specific benefits from using FAST for solving complex problems:

- Assistance in organizing random listings of functions. The diagram will arrange the verb-noun statements in proper order of indenture.
- Aid in identifying missing functions overlooked in the random list.
- Assistance in identifying the *basic function* and *scope* of the study.
- Increase in understanding the current design and problem areas selection.
- Assistance in developing valid creative alternatives.
- Strengthening the visual presentation to decision-makers.

Terms & Definitions The terms used to develop and describe a FAST diagram are as follows:

1. **Higher Order Function**: Any function to the left of another function and on the critical path is the *"higher"* order function. The objective of the basic function(s) and the subject of the study is the highest order function, and is found outside the left scope definition line on a FAST diagram.

2. **Basic Function**: A performance feature that must be attained to make the item work. The basic functions of he subject being studied cannot be changed. However, the dependent functions for that basic function can be modified, combined with other dependent functions, or eliminated in entirety.

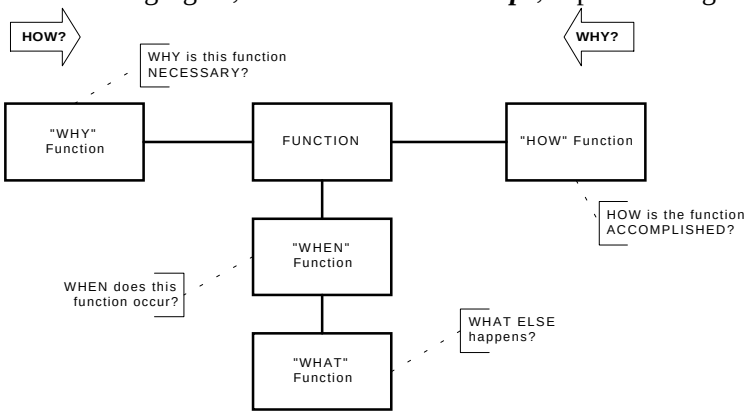
3. **Dependent Function**: A function to the immediate right of another function is dependent, or secondary, to the function to it's left. Each successive function is then dependent to the previous function. The dependency of this function becomes apparent when the *HOW* question is asked. Dependent functions exist as the result of the design methodology used to achieve the basic function.

4. **Causative Function**: Causative, or lower order, functions occur at the far right of a FAST diagram, just outside the right scope definition line. These functions represent the input, or elemental, side of the FAST diagram that initiates the subject under study.

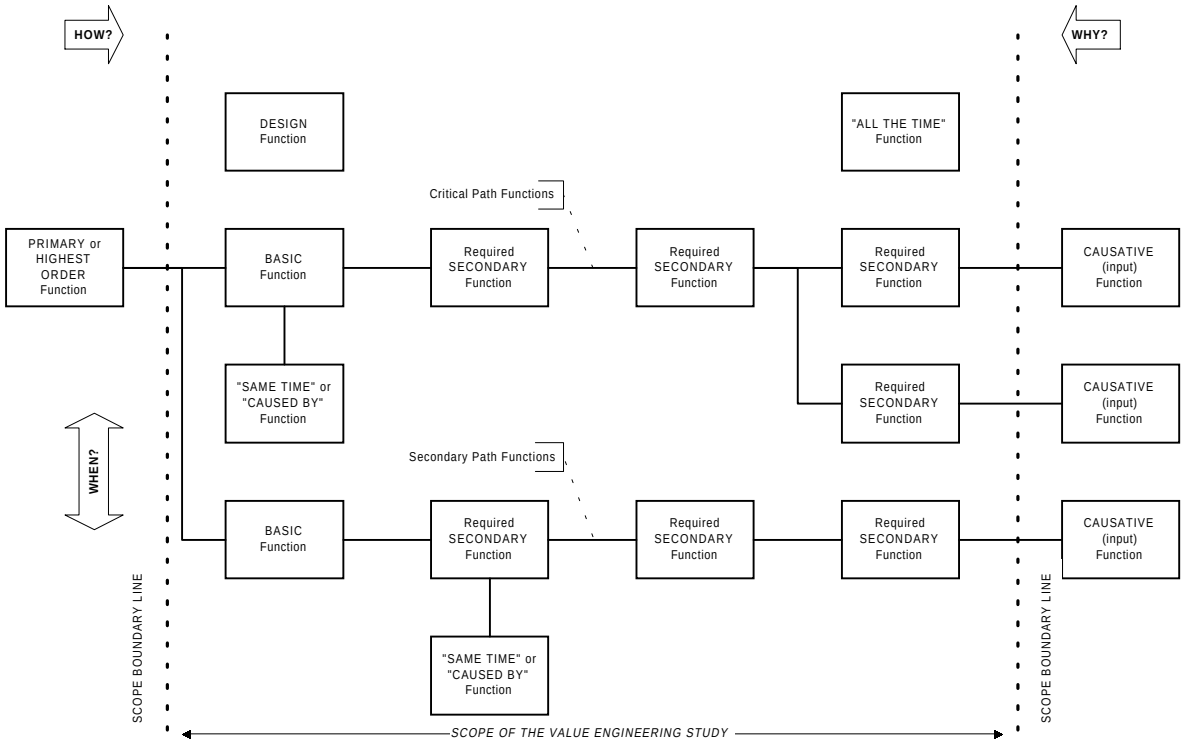
5. **Design Objective**: The design objective(s) are not functions but these objectives, or specifications, influence the method that is selected to satisfy the user's requirements and achieve the basic function(s).

6. **Scope Definition Line**: The scope definition lines establish the boundaries of the study for the subject of the study. The left scope definition line delineates the degree of abstraction while the right scope definition line establishes the elementary or causative functions.

The following figure, ***Function Relationships***, depicts the logic of the functions.



The figure below, ***FAST Diagram Rules***, depicts the relationship between the various types of functions (e.g., higher order, basic, and dependent).



Cost Modeling

There are several types of cost modeling techniques. The two most common styles are a tabular comparison and function oriented. A graphical comparison can readily be developed from the tabular cost model.

Function Oriented Cost Models

The function oriented cost models rely on completed cost estimates, either developed as part to the design development for construction projects or developed as part of a "time-motion" study for a repetitive process. Known costs are assigned to the *Input Functions* (outside the right scope definition line), and "rolled-up" or added to the left following the logic paths. The cost attributed to providing the *Highest Order Function* should be equal to the total estimated cost of the design. Developing a function oriented cost model very quickly highlights the high cost functions that should be analyzed in detail.

APPENDIX E

Basic Facilitation Techniques for Value Management

Brainstorming The most common technique for the generation of alternative ideas is brainstorming. There are three basic types of brainstorming techniques: freewheeling, "round robin" and associative. Either technique is valid well suited to the VE methodology. Many Facilitators will combine these techniques during the course of a VE analysis. The basic rules of brainstorming are relatively simple:

- All ideas are recorded, no matter how wild the ideas may seem.
- The more ideas the better. Quantify is most important at this stage of an analysis; quality will addressed as part of the idea evaluations process.
- There is no such thing as a "bad" idea.
- No criticism is permitted during the brainstorming session. Any criticism will quickly "kill" the creative thought process.
- Using another idea to generate a second concept is encouraged. This "piggy backing" of ideas usually produces a significant concept.
- Combining several ideas into one concept is encouraged. This "banking" of ideas usually produces a significant concept.
- Team members are encouraged to jot the ideas down on a note pad as they review the design information in preparation for the VE effort.
- The brainstorming lists are never closed to the addition of new alternative ideas.

Regardless of which technique is used, the Facilitator should establish a goal for the VE Team, typically 200 alternative ideas. Frequently VE Teams will generate between 300 and 400 alternative ideas for any given project. It is not uncommon for large VE Teams to generate in excess of 1,000 ideas for more complicated designs.

The brain-stormed ideas can be collected for the entire design (true random), or specific elements of the design (associative).

Random, or Free Wheeling This is the quickest way to collect ideas. Team members are encouraged to "free-wheel" and shout out their ideas as they are formed. All ideas are then recorded by the Facilitator in order as best as possible. There are two drawbacks to this approach. Some team members may not participate, letting the more vocal members of the VE Team put forth their ideas. Several ideas may be fired simultaneously, which may cause garbling of the stated concept.

Round Robin This approach is somewhat slower than random brainstorming. Each team member, in turn, is asked to put forward their individual ideas. The Facilitator will call on each team member, working around the assembled team in sequential order to ensure that no member is missed. The Facilitator will cycle through the VE Team at least twice during the brainstorming. The primary disadvantage with this approach is the idea collection is slower. However, this approach will call on the more introverted team members to ensure their participation in the alternative ideas generation. The round-robin approach is frequently used by Facilitators to ensure that as many alternative ideas as possible have been harvested when the random idea generation efforts have stalled.

Associative, or Function Focused Associative brainstorming is more focused than random brainstorming. Ideas are sought for specific elements, functions selected by the VE Team, that have the highest potential for

cost savings opportunities. Ideas are then collected either randomly through free-wheeling, or systematically through round-robin generation.

Evaluation Techniques There are several methods and techniques that can be used to evaluate the number of alternative ideas generated by the VE Team. Several tools may be used in combination to review the relative merits of each idea to ensure that all ideas are given ample opportunity.

Pass / Fail The pass / fail system is a simple and widely used culling technique. The VE Team will collectively "vote" on each idea, with only minimal discussion. An unanimous decision is required to fail an idea which then precludes it from further consideration. However, if even only one team member votes to pass an idea, the idea must survive for further evaluation. The VE Team can vote on several actions during their application of the pass / fail technique as follows:

- Pass -- the idea carries forward for further analysis.
- Fail -- the idea is dropped from any further analysis.
- Combine -- the idea will be analyzed with another similar concept or idea
- Duplicate -- the idea is redundant to another idea.
- Remand -- the idea is table for further review at a later date.

The last action applies to ideas and concepts that is beyond the scope of the defined VE efforts, or outside the expertise found within the assembled VE Team capabilities. This is the least desirable of all actions. The review action for remanded ideas should be noted to the project's management team, with a recommended response date.

Advantage / Disadvantage This approach to cull ideas is a more thorough than a simple pass-fail analysis. The A/D method is used to further cull down a large volume of ideas into a more manageable quantity. Ideas are discussed in some detail. The relative advantages, disadvantages, and risks (if known) are recorded for each idea.

Weighted Matrix Another filtering technique is to use a matrix or matrices. Matrices can be either the simple type where each criterion has an equal value or a weighted criteria matrix where each criterion has a different value. In either case the criteria should be measurable and apply to the desired goals of the project. On very complex projects a criteria evaluation matrix may need to be used to establish the relative values of the criteria to be used in the weighted criteria matrix.

Life Cycle Cost Analysis Justifying a proposal is best done by evaluating the impacts of all cost drivers for the proposal over the expected duration, life cycle, of the project. The comparison of the life cycle costs (LCC) for the final basis and proposed alternative for a design is called a *Life Cycle Cost Analysis*. The LCC for a proposal must account for factors such as energy efficiency, replacement, maintenance intervals, insurance, salvage value, and other significant costs that may be incurred over the duration of the design's expected life. The LCC analysis will amortized these costs, usually on a the Net Present Value (NPV) basis.

APPENDIX F

VM Configuration Management & Reporting

Ah yes... the annual report. The following activities and items are intended to assist in providing a standardized and consistent reference throughout the DOE. Generators of the data should retain the information for subsequent review by oversight entitites.

Milestone Events

- Value Study Final Report
- Evaluation of Value Study Proposals by project team or customer
- Implementation of Value Study Proposals
- Project Manager Reports during identified life cycle phase

Investment Metrics

- Value Studies Investment [dollars]
- Value Savings Implemented [dollars]
- Value Personnel [number/FTEs]
- Value Management Training [number/FTE]
- Value Proposals [number]

Program Metrics

- Schedule for value studies [by project]
- Functional area of studies [type]
- Value Management Training schedule

Format for DOE Annual Feeder Report The following page describes information to be submitted for the annual report to DOE Headquarters. The internet version of this guide contains downloadable formats and spreadsheets.

Value Management Annual Feeder Report

Submitted By : _____

Reporting period: FY _____

Contact Person and telephone number:_____

A. Estimated Total amount of funds invested[1] in VM this FY $ _____

1. Funds invested in DOE-sponsored programs $ _____
2. Funds invested by contractors (VECP costs) $ _____

B. Estimated Value Management savings[2] achieved this FY $ _____

1. Savings achieved by implemented DOE-sponsored studies $ _____
2. Savings generated by accepted VECPs $ _____

C. Total employees assigned to VM: Federal_____ Contractor____

1. Number of full-time employees Federal_____ Contractor____
2. Number of FTEs Federal_____ Contractor____

D. Number of Department employees receiving 8 hours or more of VE training this FY
Federal_____ Contractor ____

E. Number of Department employees receiving under 8 hours of VE training this FY
Federal_____ Contractor ____

F. Number of VE proposals received this FY VEPs _____ VECPs _____

G. Number of VE proposals approved this FY VEPs _____ VECPs _____

1. *Funds Invested*. Estimates should include salaries and overhead expenses of value engineering employees, value engineering training costs, costs for contracting for value engineering services, VEP or VECP development and implementation costs, and any other costs directly associated with the value engineering program. (Overhead may be estimated at 50% of salaries.)

2. *Savings*. Savings are defined as a reduction in or the avoidance of expenditures that would have been incurred except for the value engineering program. Savings should be reported in the year incurred; i.e., in the year that the reduction or cost avoidance actually occurs. Recurring savings resulting from a specific VE effort should be reported for a maximum of three years - the initial year and the two subsequent years. Procurement savings resulting from value engineering efforts should be calculated in accordance with FAR 52.248-1(g).