

# VALUE METHODOLOGY STANDARD



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# VALUE METHODOLOGY STANDARD

## FOREWORD

Since 1947 the methods, technology and application of the Value Methodology (VM) has greatly increased and expanded. VM includes the processes known as Value Analysis, Value Engineering, and Value Management. It is sometimes also referred to as Value Control, Value Improvement or Value Assurance. This Standard defines common terminology, offers a standardized Job Plan - while allowing the great diversity of individual practices that have been successfully developed - and is offered to reduce confusion to those being introduced to VM. The Standard includes the approved Job Plan, the Body of Knowledge as developed by the SAVE International professional Certification Board, typical profiles of the Value Specialist and Value Manager, duties of a Value Organization, a glossary, and an appendix of references.

## VALUE METHODOLOGY APPLICABILITY

- A. The Value Methodology can be applied wherever cost and/or performance improvement is desired. That improvement can be measured in terms of monetary aspects and/or other critical factors such as productivity, quality, time, energy, environmental impact, and durability. VM can beneficially be applied to virtually all areas of human endeavor
- B. The Value Methodology is applicable to hardware, building or other construction projects, and to “soft” areas such as manufacturing and construction processes, health care and environment services, programming, management systems and organization structure. The pre-study efforts for these “soft” types of projects utilizes standard industrial engineering techniques such as flow charting, yield analysis, and value added task analysis to gather essential data.
- C. For civil, commercial and military engineering works such as buildings, highways, factory construction, and water/sewage treatment plants, which tend to be one time applications, VM is applied on a project to project basis. Since these are one-time capital projects, VM must be applied as early in the design cycle as feasible to achieve maximum benefits. Changes or redirection of design can be accomplished without extensive redesign, large implementation cost, and schedule impacts. Typically for large construction projects, specific value studies are conducted during the schematic stage and then again at the design development (up to 45%) stage. Additional value studies may be conducted during the construction or build phase.
- D. For large or unique products and systems such as military electronics or specially designed capital equipment, VM is applied during the design cycle to assure meeting of goals and objectives. Typically a formalized value study is performed after preliminary design approval but before release to the build/manufacture cycle. VM may also be applied during the build/manufacture cycle to assure that the latest materials and technology are utilized.
- E. VM can also be applied during planning stages, and for project/program management control by developing function models with assigned cost and performance parameters. If specific functions show trends toward beyond control limits, value studies are performed to assure the function’s performance remains within the control limits.

## **VALUE STUDY TEAM**

A key to the successful application of a value study is the skills and experience of those applying the methodology. While the methodology can, and often is, used by individuals, for significant projects it has been proven that a well organized team obtains the best value for effort performed.

The Team Leader performs a key role and is a significant factor in the degree of success. The Team Leader must have thorough training in both the Value Methodology and team facilitation. The requirements include strong leadership, communication skills, and experience working with users/clients.

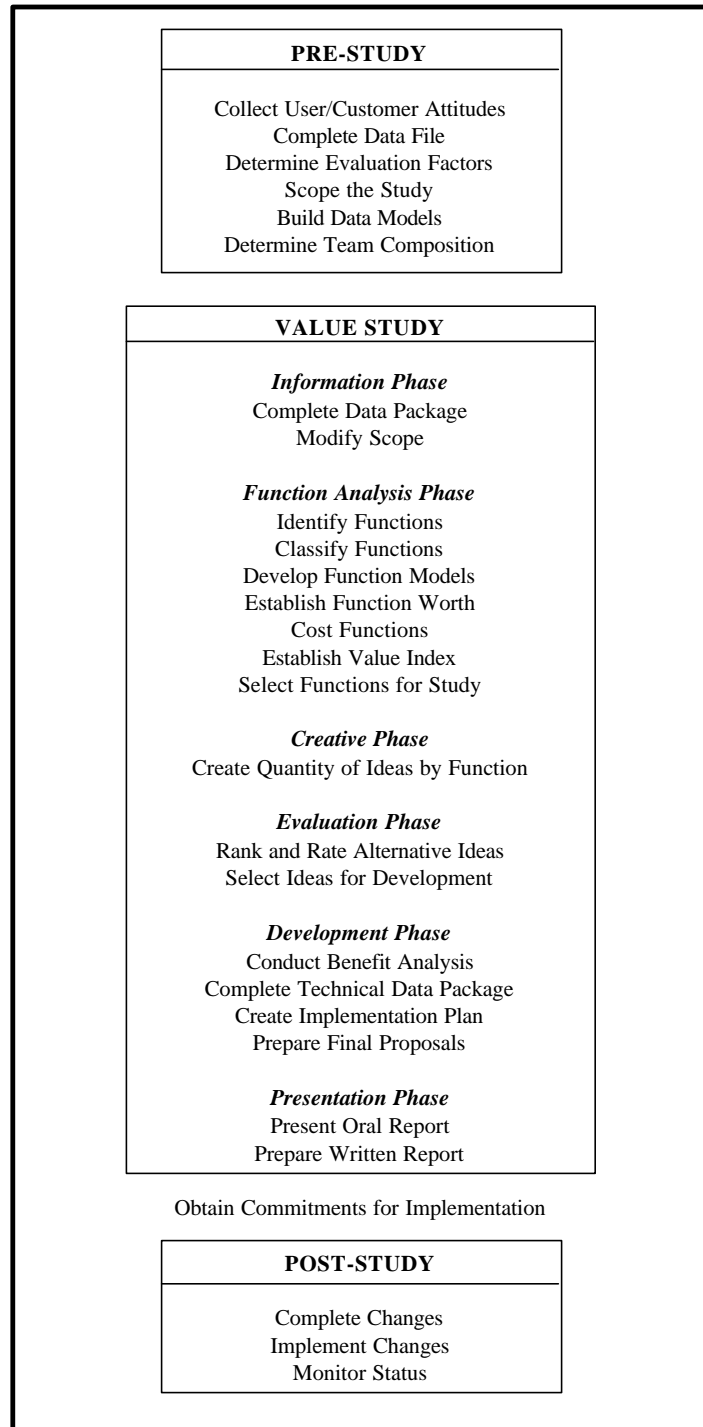
The size and composition of the team is project dependent. The members should represent a diverse background and experience that incorporates all the knowledge required to fully cover the issues and objectives of the project. Typically these include cost, estimating, procurement/materials, and those technical disciplines unique to the project such as design, manufacturing, construction, environmental, and marketing.

It is most advantageous for the team leader, or a team member, to implement the approved value proposals at study completion.

Decisions based primarily upon one technical discipline will often have significant effects on other disciplines within the project. In addition to being technically competent, team member selection should include individuals who represent the range of disciplines and end users the study results will impact. They must be individuals who generate positive attitudes and are willing to investigate new ideas and then rationally evaluate them.

## THE VALUE METHODOLOGY JOB PLAN

The Value Methodology uses a systematic Job Plan (figure 1). The Job Plan outlines specific steps to effectively analyze a product or service in order to develop the maximum number of alternatives to achieve the product's or service's required functions. Adherence to the Job Plan will better assure maximum benefits while offering greater flexibility.



### **Figure 1: The VM Job Plan**

The VM Job Plan covers three major periods of activity: Pre-Study, the Value Study, and Post-Study. All phases and steps are performed sequentially. As a value study progresses new data and information may cause the study team to return to earlier phases or steps within a phase on an iterative basis. Conversely, phases or steps within phases are not skipped.

#### **I. PRE-STUDY**

Preparation tasks involve six areas: Collecting/defining User/Customer wants and needs, gathering a complete data file of the project, determining evaluation factors, scoping the specific study, building appropriate models and determining the team composition.

##### **A. Collect User/Customer Attitudes**

The User/Customer attitudes are compiled via an in-house focus group and/or external market surveys. The objectives are to:

1. Determine the prime buying influence;
2. Define and rate the importance of features and characteristics of the product or project;
3. Determine and rate the seriousness of user-perceived faults and complaints of the product or project;
4. Compare the product or project with competition or through direct analogy with similar products or projects.

For first time projects such as a new product or new construction, the analysis may be tied to project goals and objectives.

The results of this task will be used to establish value mismatches in the Information Phase.

##### **B. Gather a Complete Data File**

There are both Primary and Secondary sources of information. Primary sources are of two varieties: people and documentation. People sources include marketing (or the user), original designer, architect, cost or estimating group, maintenance or field service, the builders (manufacturing, constructors, or systems designers), and consultants. Documentation sources include drawings, project specifications, bid documents and project plans.

Secondary sources include suppliers of similar products, literature such as engineering and design standards, regulations, test results, failure reports, and trade journals. Another major source is like or similar projects. Quantitative data is desired.

Another secondary source is a site visitation by the value study team. "Site" includes actual construction location, manufacturing line, or office location for a new/improved system. If the actual "site" is not available, facilities with comparable functions and activities may prove to be a valuable source of usable information.

##### **C. Determine Evaluation Factors**

The team, as an important step in the process, determines what will be the criteria for evaluation of ideas and the relative importance of each criteria to final recommendations and decisions for change. These criteria and their importance are discussed with the user/customer and management and concurrence obtained

#### D. Scope the Study

The team develops the scope statement for the specific study. This statement defines the limits of the study based on the data-gathering tasks. The limits are the starting point and the completion point of the study. Just as important, the scope statement defines what is not included in the study. The scope statement must be verified by the study sponsor.

#### E. Build Models

Based on the completion and agreement of the scope statement, the team may compile models for further understanding of the study. These include such models as Cost, Time, Energy, Flow Charts, and Distribution, as appropriate for each study.

#### F. Determine Team Composition, Wrap-Up

The Value Study Team Leader confirms the actual study schedule, location and need for any support personnel. The study team composition is reviewed to assure all necessary customer, technical, and management areas are represented. The Team Leader assigns data gathering tasks to team members so all pertinent data will be available for the study.

## II. THE VALUE STUDY

The value study is where the primary Value Methodology is applied. The effort is composed of six phases: Information, Function Analysis, Creativity, Evaluation, Development, and Presentation.

#### A. Information Phase

The objective of the Information Phase is to complete the value study data package started in the Pre-Study work. If not done during the Pre-Study activities, the project sponsor and/or designer brief the value study team, providing an opportunity for the team to ask questions based on their data research. If a “site” visitation was not possible during Pre-Study, it should be completed during this phase.

The study team agrees to the most appropriate targets for improvement such as value, cost, performance, and schedule factors. These are reviewed with appropriate management, such as the project manager, value study sponsor, and designer, to obtain concurrence.

Finally, the scope statement is reviewed for any adjustments due to additional information gathered during the Information Phase.

#### B. Function Analysis Phase

Function definition and analysis is the heart of Value Methodology. It is the primary activity that separates Value Methodology from all other “improvement” practices. The objective of this phase is to develop the most beneficial areas for continuing study. The team performs the following steps:

1. Identify and define both work and sell functions of the product, project, or process under study using active verbs and measurable nouns. This is often referred to as Random Function Definition.
2. Classify the functions as basic or secondary
3. Expand the functions identified in step 1 (optional)
4. Build a function Model - Function Hierarchy/Logic or Function Analysis System Technique (FAST) diagram.

5. Assign cost and/or other measurement criteria to functions
6. Establish worth of functions by assigning the previously established user/customer attitudes to the functions
7. Compare cost to worth of functions to establish the best opportunities for improvement
8. Assess functions for performance/schedule considerations
9. Select functions for continued analysis
10. Refine study scope

#### C. Creative Phase

The objective of the Creative Phase (sometimes referred to as Speculation Phase) is to develop a large quantity of ideas for performing each function selected for study. This is a creative type of effort, totally unconstrained by habit, tradition, negative attitudes, assumed restrictions, and specific criteria. No judgment or discussion occurs during this activity. The quality of each idea will be developed in the next phase, from the quantity generated in this phase.

There are two keys to successful speculation: first, the purpose of this phase is not to conceive of ways to design a product or service, but to develop ways to perform the *functions* selected for study. Secondly, creativity is a mental process in which past experience is combined and recombined to form new combinations. The purpose is to create new combinations which will perform the desired function at less total cost and improved performance than was previously attainable.

There are numerous well accepted idea generation techniques. The guiding principle in all of them is that judgment/evaluation is suspended. Free flow of thoughts and ideas - without criticism - is required.

#### D. Evaluation Phase

The objectives of the Evaluation Phase are to synthesize ideas and concepts generated in the Creative Phase and to select feasible ideas for development into specific value improvement.

Using the evaluation criteria established during the Pre-Study effort, ideas are sorted and rated as to how well they meet those criteria. The process typically involves several steps:

1. Eliminate nonsense or “thought-provoker” ideas.
2. Group similar ideas by category within long term and short term implications. Examples of groupings are electrical, mechanical, structural, materials, special processes, etc.
3. Have one team member agree to “champion” each idea during further discussions and evaluations. If no team member so volunteers, the idea or concept is dropped.
4. List the advantages and disadvantages of each idea.
5. Rank the ideas within each category according to the prioritized evaluation criteria using such techniques as indexing, numerical evaluation, and team consensus.
6. If competing combinations still exist, use matrix analysis to rank mutually exclusive ideas satisfying the same function.



7. Select ideas for development of value improvement.

If none of the final combinations appear to satisfactorily meet the criteria, the value study team returns to the Creative Phase.

#### E. Development Phase

The objective of the Development Phase is to select and prepare the “best” alternative(s) for improving value. The data package prepared by the champion of each of the alternatives should provide as much technical, cost, and schedule information as practical so the designer and project sponsor(s) may make an initial assessment concerning their feasibility for implementation. The following steps are included:

1. Beginning with the highest ranked value alternatives, develop a benefit analysis and implementation requirements, including estimated initial costs, life cycle costs, and implementation costs taking into account risk and uncertainty.
2. Conduct performance benefit analysis.
3. Compile technical data package for each proposed alternative:
  - a. written descriptions of original design and proposed alternative(s)
  - b. sketches of original design and proposed alternative(s)
  - c. cost and performance data, clearly showing the differences between the original design and proposed alternative(s)
  - d. any technical back-up data such as information sources, calculations, and literature
  - e. schedule impact
4. Prepare an implementation Plan, including proposed schedule of all implementation activities, team assignments and management requirements.
5. Complete recommendations including any unique conditions to the project under study such as emerging technology, political concerns, impact on other ongoing projects, marketing plans, etc.

#### F. Presentation Phase

The objective of the Presentation Phase is to obtain concurrence and a commitment from the designer, project sponsor, and other management to proceed with implementation of the recommendations. This involves an initial oral presentation followed by a complete written report.

As the last task within a value study, the VM study team presents its recommendations to the decision making body. Through the presentation and its interactive discussions, the team obtains either approval to proceed with implementation, or direction for additional information needed.

The written report documents the alternatives proposed with supporting data, and confirms the implementation plan accepted by management. Specific organization of the report is unique to each study and organization requirements.

### III. POST STUDY

The objective during Post-Study activities is to assure the implementation of the approved value study change recommendations. Assignments are made either to individuals within the VM study team, or by management to other individuals, to complete the tasks associated with the approved implementation plan.

While the VM Team Leader may track the progress of implementation, in all cases the design professional is responsible for the implementation. Each alternative must be independently designed and confirmed, including contractual changes if required, before its implementation into the product, project, process or procedure. Further, it is recommended that appropriate financial departments (accounting, auditing, etc.) conduct a post audit to verify to management the full benefits resulting from the value methodology study. Further, it is recommended that appropriate financial departments (accounting, auditing, etc.) conduct a post audit to verify to management the full benefits resulting from the value methodology study.

## **VALUE PROFESSIONAL PROFILE**

### **VALUE PROGRAM MANAGER**

Reports to:	General Manager or member of Executive Staff
Education:	4-year college degree or 5 years relevant experience Module I Value Methodology Workshop or equivalent Module II Advanced Seminar
Experience:	5 years (minimum) in specialized industry or government 2 years in Value Methodology
Qualifications:	Technical Aptitude Team Leadership Skills Effective Communicator Understands Manufacturing, Procurement, Contracts, Costs Training Aptitude
Personality:	Leader Resourceful Communicator

### **VALUE PRACTITIONER**

Reports to:	Value Program Manager
Education:	4-year college degree or 5 years relevant experience Module I Value Methodology Workshop or equivalent
Experience:	3 years (minimum) in specialized industry or government
Qualifications:	Technical Aptitude Creative Effective Communicator Understanding of Manufacturing/Construction, Procurement, Subcontracting, and Costs
Personality:	Team Oriented Not Easily Discouraged Resourceful Respected within Organization

## **CERTIFIED VALUE SPECIALIST**

SAVE International maintains a professional certification program, the function of which is to recognize individuals who use the value methodology in their principal career and who have met the approved education and experience standards. Those standards include:

1. Completion of Module I and Module II approved training courses.
2. A minimum of two years full time work experience in the VM field.
3. Demonstration of required performance in value studies.
4. Demonstration of continued growth through learning, teaching, presentations/writing, and contributions to the VM profession.
5. Submission of an original paper concerning any value related subject.
6. Successful completion of the Value Theory and Practice examinations.

To assist certification candidates, the Certification Board has issued a Body of Knowledge listing topical areas with which any qualified Value Specialist should be familiar.

### **BODY OF KNOWLEDGE**

#### **I. Fundamental Value Concepts**

##### **A. VM History and Characteristics**

1. Historical development of the Value Methodology
2. Types of value
3. Relation of quality and value
4. Primary VM questions (six): What is it? What does it do? etc.
5. Fundamental value principles and methods
6. Differentiating the Value Methodology from other methods

##### **B. Job Plans**

1. Three major stages and individual Job Plan phases
2. Objectives of each stage and Job Plan phase
3. Variations of Job Plans
4. What the VM team does during each phase of the Job Plan

##### **C. Function Analysis Basics**

1. Defining functions
2. Classifying functions
3. Types of function models

##### **D. Function/Cost**

1. Purpose
2. Allocating costs to functions
3. Pareto Analysis
4. Cost models vs. function-cost model

- E. Function Worth
    - 1. Cost-value relationship
    - 2. Good and poor value functions
      - a) Value index
      - b) Customer input
      - c) High cost and low cost functions
    - 3. Establish worth of functions
  - F. Creativity and Creative Processes
    - 1. Creating by function
    - 2. Techniques to help generate ideas
- II. Concept Application
- A. Defining Functions
    - 1. Verb-Noun language
    - 2. Higher orders of abstraction
  - B. Classifying Functions
    - 1. Basic function
    - 2. Secondary or supporting function
    - 3. Higher order function
    - 4. Assumed function
  - C. Allocating Costs to Functions
  - D. Determining the Value Index
    - 1. Relationships of Function Worth and Function Cost
    - 2. Good value and poor value
  - E. Function Modeling
    - 1. Basic types
      - a) Hierarchy models
      - b) Function Analysis System Technique (FAST)
        - (1) "Classic"
        - (2) Customer/User
        - (3) Technical
    - 2. Characteristics and Construction of FAST Diagrams
      - a) Scope lines
      - b) How? - Why? logic
      - c) Elements of a FAST diagram
      - d) Good relational logic paths of functions
      - e) Critical path of functions where applicable

- f) Placement of design objectives where applicable
  - 3. Allocating costs and other measures on function models
- F. Financial Analysis
  - 1. Cost estimating/control systems
    - a) Direct and indirect costs
    - b) Fixed and variable costs
    - c) Financial impact of VM proposals
    - d) VM's relationship to and use of financial systems
    - e) Contracting for Value services
      - (1) VM team
      - (2) Designers, architects, etc.
      - (3) Support personnel
  - 2. Contracting for Value Methodology
    - a) Calculating net savings
    - b) Sharing incentives
    - c) Types of clauses/contracts used in public and private sectors
  - 3. Break-Even Analysis
  - 4. Life Cycle Cost Analysis
  - 5. Value Studies
    - a) Net and gross costs
    - b) Return of study cost
    - c) Implementation and programmed costs
    - d) Hurdle rates

### III. Management of Value

- A. Organizing and implementing VM programs
- B. Management's role
- C. Value team composition
- D. Team leader skills
- E. Managing VM teams and studies

### IV. Value Analysis Education

- A. Basic Value Analysis Education
  - 1. Module I training workshop content
  - 2. Module II seminar content
- B. Related Programs

### **TYPICAL DUTIES OF A VALUE PROGRAM UNIT**

- A. Maintain up-to-date knowledge of the “State of the Art” Value Methodology theory and practice.
- B. Select specific projects for VM study and get them approved by management/customer and secure team members to perform the study.
- C. Lead and coordinate all VM studies
- D. Assist management in setting annual goals. Report monthly on progress on ongoing projects, projects completed and projects scheduled. Reports should demonstrate expenditures vs. benefits, line item status of each project, educational program status and return-on-expenditure history.
- E. Plan and conduct VM training courses to assure a cadre of basic trained personnel for studies.
- F. Conduct management orientations and briefings as appropriate. Be available for similar briefings in VM for customers and clients.
- G. Work with the procurement organization to involve vendors, suppliers and subcontractors in the VM program. Develop methods of inviting their suggestions for value improvements and a sharing arrangement for those suggestions. Support procurement in any VM oriented change proposal negotiations.
- H. Monitor the implementation of accepted VM proposals to assure maximization of potential benefits.
- I. Represent the organization in the community concerning value improvement. Contribute to the VM profession’s growth through participation in technical conferences, lecturing at colleges, etc.

# GLOSSARY

## COST

The expenditure necessary to produce a product, service, process or structure.

## COST, DESIGN TO

A procedure which establishes an estimated cost objective for each project, then designs to that cost objective to produce a reliable product or service.

## COST, LIFE CYCLE

The sum of all acquisition, production, operation, maintenance, use and disposal costs for a product or project over a specified period of time.

## COST MODEL

A diagramming technique used to illustrate the total cost of families of systems or parts within a total complex system or structure.

## COST/WORTH RATIO

The ratio used to determine the maximum opportunity for value improvement.

## FUNCTION

The natural or characteristic action performed by a product or service.

## FUNCTION, BASIC

The primary purpose or most important action performed by a product or service. The basic function must always exist, although methods or designs to achieve it may vary.

## FUNCTION, SECONDARY

A function that supports the basic function and results from the specific design approach to achieve the basic function. As methods or design approaches to achieve the basic function are changed, secondary functions may also change. There are four kinds of secondary functions:

1. Required - A secondary function that is essential to support the performance of the basic function under the current design approach.
2. Aesthetic - A secondary function describing esteem value.
3. Unwanted - A negative function caused by the method used to achieve the basic function such as the heat generated from lighting which must be cooled.
4. Sell - A function that provides primarily esteem value. For marketing studies it may be the basic function.

## FUNCTION MODELS

A graphical depiction of the relationships of the functions within a project. There are two commonly used styles:

1. Hierarchy - A vertical "tree" chart of functions. Recent practice has been to include within one branch user oriented functions such as assure convenience, assure dependability, assure safety, and attract user. Some practitioners prefer to lay out this model horizontally and refer to it as "user FAST."
2. Function Analysis System Technique (FAST) - A horizontal chart depicting functions within a project, with the following rules:
  - a. The sequence of functions on the critical path proceeding from left to right answer the questions "How is the function to its immediate left performed?"
  - b. The sequence of functions on the critical path proceeding from right to left answer the question "Why is the next function performed?"



- c. Functions occurring at the same time or caused by functions on the critical path appear vertically below the critical path function.
- d. The basic function of the study is always farthest to the left of the diagram of all functions within the scope of the study.
- e. Two other functions are classified:
  - 1) Highest Order - The reason or purpose that the basic function exists. It answers the “why” question of the basic function, and is depicted immediately outside the study scope to the left.
  - 2) Lowest Order - The function that is required to initiate the project and is depicted farthest to the right, outside the study scope. For example, if the value study concerns an electrical device, the “supply power” function at the electrical connection would be the lowest order function.

#### JOB PLAN

A structured discipline to carry out a value study.

#### PERFORMANCE

The physical characteristics required to meet the users needs. Factors such as reliability, maintainability, quality and appearance are typical.

#### PRICE

A fixed sum of money expended by the user/customer to purchase the product under study.

#### PRODUCT

For the purposes of value studies, a product is the subject of the study. It may be a physical product such as a manufactured item, or a structure, system, procedure, or an organization.

#### SCOPE

The portion of the overall project that is selected for the value study. The analysis accepts everything within the defined scope in order to focus attention on the functions within those limits.

#### VALUE

The lowest cost to reliably provide the required functions at the desired time and place with the essential quality and other performance factors to meet user requirements.

#### VALUE, MONETARY

There are four classes of monetary value:

1. Use Value - The monetary measure of the functional properties of the product or service which reliably accomplish a user's needs.
2. Esteem Value - The monetary measure of the properties of a product or service which contribute to its desirability or salability. Commonly answers the “How much do I want something?” question.
3. Cost Value - The monetary sum of labor, material, burden, and other elements of cost required to produce a product or service.
4. Exchange Value - The monetary sum at which a product or service can be freely traded in the marketplace.

#### VALUE METHODOLOGY

The systematic application of recognized techniques which identify the functions of the product or service, establish the worth of those functions, and provide the necessary functions to meet the required performance at the lowest overall cost.

#### VALUE METHODOLOGY PROPOSAL

A proposal by the value study team to its management to provide one or more functions for financial and/or performance improvements and is within the current terms and conditions of the contract.

#### VALUE STUDY

The application of the value methodology using the VM Job Plan, and people previously trained in VM workshops.

#### VALUE METHODOLOGY TRAINING

There are two levels of SAVE International approved training specifically designed to provide the minimum knowledge of VM practice. It is expected that VM professionals, as in all professional fields, will continue to keep themselves current through seminars, conferences, and associated educational opportunities.

1. Value Methodology Workshop - The objective is to provide Value Methodology education to the degree that participants will be able to successfully participate in future value studies under the guidance of a qualified Value Specialist with minimum additional training. This is called the Module I program.
2. Value Methodology Advanced Seminar - The objective of this seminar is to extend the knowledge base of those wishing to become professionals in the value methodology field. Topics include both advanced methodology and areas of management. This seminar is referred to as the Module II program.

The seminar requires a minimum of 24 class hours. Module I is a prerequisite, and it is expected attendees will have enough practical experience in VM to contribute to the seminar.

#### VALUE ANALYST

Synonymous with Value Specialist.

#### VALUE ENGINEER

Synonymous with Value Specialist.

#### VALUE ENGINEERING CHANGE PROPOSAL (VECP)

A formal proposal submitted to the customer/user which requires their approval before implementing the VA change. The result will be a modification to the submitter's contract.

#### VALUE SPECIALIST

One who applies the value methodology to study and search for value improvement.

#### WORTH

The lowest overall cost to perform a function without regard to criteria or codes.

## **APPENDIX**

### **Reference Materials**

#### Publications Catalog, SAVE International

Describes textbooks and educational materials on the Value Methodology and related programs. Includes videotapes and information on Value World, SAVE International's technical journal.

#### Annual Conference Proceedings, SAVE International

Includes all presentations given at each annual conference. Also available is a VM Bibliography, a compilation of all presentations since 1980, and articles from Value World. Each presentation shows Title, Author, Abstract, and Source. Papers can be individually ordered from SAVE International.

"Standard Practice for Performing Value Analysis (VA) of Buildings and Building Systems", American Society for Testing and Materials, Publication E-1699-95.

#### Value Methodology Certification Manuals, SAVE International

Certification Manual

Recertification Manual

Seminar/Workshop Manual

Certification Examination Study Guide

SAVE International Internet Web Site: <http://www.value-eng.com>

Lawrence D. Miles Value Foundation Internet Web Site: <http://www.valuefoundation.org>