

VALUE METHODOLOGY STANDARD



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On no account may any references be used from this work-in-progress consultation document.

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VALUE METHODOLOGY STANDARD

FOREWORD

This standard was originally drafted in May 1997, and it has been through a process of periodic updates to address changes in the business environment and technology, and to meet future integration with the International Standards Organization. The *Value Methodology Standard* is intended to provide a practical guide for use by practitioners and management to apply the principles of the value methodology (VM) in a consistent manner.

The VM process can be applied to a wide variety of applications, including industrial or consumer products, construction projects, manufacturing processes, business procedures, services, and business plans. For purposes of this standard, the subject of a VM study (a product, process or service) will be referred to as the “project”.

The value methodology is the systematic application of recognized techniques that identify the functions of the project, understand how the functions impact cost and performance and meet the user's wants and needs, and identifies different ways to perform key functions to order to improve project value. The value methodology is the basis for value analysis, value engineering, and value management.

The *value methodology* is used to identify new improvement ideas and develop these ideas into new and alternate proposals to the project's base case (i.e., a pre-defined starting point) which will enhance these products and processes. The methodology is applied using a function based “VM Job Plan” and is supported by many business and quality improvement techniques. An organization's internal and external business environment provides the context in which the value methodology is applied.

This standard has been prepared by the SAVE International Standards and Resources Directorship from within the Vice President of Education's team. It is approved by the SAVE International Board of Directors. It seeks to state the minimum expectations clients and providers should have of value analysis, value engineering, and value management, without limiting the development of VM itself.

This standard should be used to assist senior managers, value program managers, practitioners, and trainers to apply VM in their organizations in a consistent standard manner.

INTRODUCTION AND DEFINITION

The value methodology (VM) is the systematic application of recognized tools and techniques by a multidisciplinary team to identify and categorize the functions of a project and to create, select, and develop alternative approaches to cost-effectively deliver the functions and/or improve performance. It is applied in a logical process known as the “Value Methodology Job Plan” or “VM Job Plan”. The purpose of the job plan is to assist a study team to identify and focus on key project functions in a systematic manner, in order to create new ideas that will result in value improvements. Value may be defined as the relative worth, utility or importance of the project to a user. The VM Job Plan consists of the following sequential phases:

- Pre-VM Workshop Study Phase
- Information Phase
- Function Analysis Phase
- Creative Phase
- Evaluation Phase
- Development Phase
- Presentation Phase
- Implementation Phase
- Post-VM Workshop Phase

A unique feature of VM is the function analysis phase. During this phase, functions of the project under study are identified and described using a verb-noun pairing. The functions that appear to show a value mismatch between “*the function’s cost*” and “*the function’s worth,*” or *with apparent deficiencies in the function’s performance, either technical or customer,* are selected for brainstorming in the creative phase. The ideas generated then are evaluated, and those with the most potential to improve value are developed into alternatives to the original concept or base case. Implementation of these alternatives will improve the value of the project under study.

VALUE METHODOLOGY HISTORY

The value analysis concept was conceived by Mr. Lawrence D. Miles during the early 1940s. He worked for General Electric, a major defense contractor, which faced the scarcity of strategic materials needed to produce their products during World War II. Miles realized that if value and related innovation improvements could be systematically “managed,” then General Electric would have a competitive advantage in the marketplace. With that ambition in mind, Miles took the challenge and devised the function analysis concept, and integrated it into an innovative process that became known as value analysis (VA).

Miles understood that products are purchased for what they can do. These products can either do work or provide pleasing aesthetic qualities. From this realization he focused on understanding the function of the component being manufactured. Then he questioned whether it could be improved. Using an *active verb* and a *measurable noun* to characterize the benefit that a part’s function provides, he searched for other ways or methods to perform that intended function. Function analysis, the key foundation of VA, was developed and has become a tool to help individuals and teams manage the way a concept is understood. These teams typically address project-related issues such as increased sales revenue, improved product performance, and reduced resource usage.

The success that Miles unleashed was quickly recognized by other companies and the U.S. Navy. The result was that value analysis began to gain in popularity, eventually leading a group of practitioners to form a learning society to share insights and advance their innovative capabilities. Thus in 1959, the “Society of American Value Engineers” was incorporated in Georgia.

The change in context—from review of existing parts to improving conceptual designs – along with the different expectations of the new situations value analysis was arriving in, also marked the emergence of value engineering. Soon VM was used to improve value in government projects, the private sector, manufacturing, and the construction industry. VM spread out from the USA to North and South America, Europe, Australia, Asia, the Middle East, and parts of Africa. The international growth caused the membership of SAVE to reconsider the society’s name and was changed to “SAVE International” in 1996.

PURPOSE AND SCOPE OF THE STANDARD

This standard defines a generic methodology, common terminology, and standard practices that will guide practitioners and managers to effectively apply VM to improve the value of their project. The standard describes when, in a project’s life, VM should be applied in order to maximize the benefits of team innovation skills and maximize implementation of alternatives that add value to the project.

The standard also contains a description of the composition of a value study team, the VM Job Plan, a body of knowledge, typical value professional and value manager expertise profiles, typical duties of a value program organization, a glossary, and an appendix of references. The standard is to be used by both practitioners and managers as a guide for the application of VM. The standard allows for the tailored application of VM and practices to suit the intended application.

VALUE METHODOLOGY AND APPLICABILITY

The value methodology is a collection of techniques that are arranged to guide a team through a structured job plan, with the goal of improving value. The standard VM Job Plan is designed to lead a team to a point where they understand the fundamentals of the project, and know the purpose and functions of the project.

VM may be applied as a “quick response” type of study or as a deeply integrated part of an overall organizational desire to stimulate innovation and improve quality. Similarly, VM may be an integral part of the quality assurance, quality control programs, new product development, “Lean” manufacturing processes, concept development and “Lean” office systems. VM enables the management of the team’s thinking so that the best use of the knowledge and experience they have can generate new ideas to perform functions and propose alternatives to the original situation.

The foundation of the VM technique is known as *function analysis*. The identification and naming of functions strives for clear thinking by limiting the reference to an *active verb* that operates on a *measurable noun* to communicate what an item or activity does. This naming exercise helps multi-disciplined teams to build a shared understanding of how a system is thought to work; and, as a result, it allows them to identify where conflicts and improvement opportunities may exist and where an investment in innovation would lead to significant improvement. This is achieved because the design of complex products evolve, often one component at a time, without the opportunity to assess the impact of an incremental improvement on the entire product, process, or program in an organized effort.

Function analysis may also be performed by using a graphical mapping technique is known as the *Function Analysis System Technique* (FAST), which is used during the study to understand how the functions of a product, product, or process are related to each other. FAST, developed by Charles Bytheway in 1964, added a new enhancement to the function analysis phase.

This analysis of functions leads to the identification of functions and function applications providing poor or less-than-optimum value because the solution used to perform them could be improved, or perhaps be deleted. These are candidate functions for applying creativity techniques for new ideas that will yield better ways to perform the same function. Promising solutions are determined during evaluation and developed into alternatives for implementation. The VM study team leader facilitates the use of team skills and the expertise from many disciplines through an efficient and effective group decision-making process. A VM study provides a common understanding that yields practical solutions for users, stakeholders, sales, marketing, design, manufacturing, operations, and distribution organizations.

A fundamental tenet of the value methodology is that basic functions (the necessary purpose of the item) must be preserved. This is because the basic function reveals the usefulness of the project. For example, the basic function of a wristwatch could be “display time.” If ever the watch does not perform that function, then it has lost its usefulness as a watch. All other functions rely on the basic function for their justification. The other types of functions typically provide esteem value for the user. An example is a gold watchcase that performs aesthetic functions which please both customers and those whom they want to impress. Those other functions that build on the basic function are often used to distinguish product value or complexity, whether the product is feature-rich or a low cost, “no frills” solution.

The job plan can and does employ various tools and techniques such as cost modeling, strategic problem framing, Pareto analysis, paired comparison to weight, rank, and prioritize, evaluation metrics, quality function deployment, voice of the customer, design for Six Sigma, target costing, synchronous and “Lean” concepts, idea management, and action planning, after study review, and learning techniques to assist the team during the VM process.

VM can be applied during any stage of a project’s development cycle, although the greatest benefit and resource savings are typically achieved early in the development and conceptual stages. This is a point in time where the basic information of the intended product is established, but before major design and development resources are spent. That is because the manner in which the basic function of the project is performed has not been established, and alternative ways may be objectively identified and considered. Some specific examples are noted below.

- *Construction projects* may realize improvement during the concept development, preliminary design, final design, procurement, and construction phases.¹
- *Products*, whether consumer, industrial, or defense, may be studied with a focus on either the design or manufacturing process of that product. A product may be the subject of a VM study at any time during the product’s life. VM can be used at the onset of the product to better understand the customer’s needs, identify the functions necessary to satisfy those needs, and develop the initial concept. Throughout the design development, VM can be used to refine and enhance the concept, based on the latest facts. Even after a product has been introduced and is in

¹ The Function Analysis Concept Design (FACD) Study developed by the U.S. Naval Facilities Engineering Command, and Value-Based Design Charrette developed by the U.S. Army Corps of Engineers, use function analysis as a basis to define the project scope and concept necessary to satisfy the need, purpose, and budget for their projects.

production, VM can be used to further enhance the product and respond to changing customer and economic conditions.

Similarly, the manufacturing process, both macro and micro, along with the equipment and tools used to produce the product may be the subject of a VM study. VM can be used to either develop the new manufacturing process or refine an existing process to improve quality, efficiency, and cost characteristics of the project.

- *Business systems and procedures* may also be the subject of VM Studies. Any element of running a business or organization may be improved through the application of VM, from the development of business plans and organizational studies to improving existing business processes.

VM may be applied more than once during the life of the project. Early application of VM helps to get the project started in the right direction, and repeated applications help to refine the project's direction based on new or changing information. It is important to note that the later that a VM study is conducted, the higher the cost of change will be to implement the improvements.

MANAGEMENT'S ROLES

The aim of VM is to increase organizational value through a union of strategy, tactics, and operations with emphasis on the "customer need" and profitability. Senior management provides a clear leadership role when they make the strategic expectations explicit and in a purposeful and prioritized manner. The appointed value manager should confirm that VM activities are coordinated and performed effectively to meet the goals and objectives of the organization. Senior management should understand the potential benefit from a VM Study, approve the expenditure of resources necessary to support the study, and guide the implementation of approved and funded recommendations. The application of VM seeks to provide an organization with a competitive advantage by managing the practical intelligence that an organization possesses.

The use of VM will have an impact on the profitability of the business because the team develops ways to increase revenue, reduce cost, and optimize resources to ensure organizational success. The value methodology is also an excellent means to manage innovation within an organization, because it has a structured methodology that "demands" measurable results.

The VM study team leader's role is to manage the study. The leader will plan, coordinate, conduct, and follow up the results of the study.

VALUE STUDY TEAM

A key to the successful application of a value program and value studies is the effective management of individuals on the study team. The VM study should be applied using an organized and structured team approach under the guidance of a qualified team leader. The VM study team facilitator will help the members through the job plan by employing group dynamic techniques, which result in an effective use of team member skills.

The team facilitator shall be adequately trained in VM techniques and be competent to lead and facilitate the team members through the VM Job Plan. This individual shall be a Certified Value Specialist (CVS) or a Value Methodology Practitioner (VMP) if the studies are to be referred to as value

analysis, value engineering, or value management studies. A certified VMP shall work under the supervision of a CVS. This requirement is to ensure a minimum standard of structure, process, performance, and outcome that would match the expectations of a fully qualified SAVE International CVS and this standard.

Both the CVS and VMP should be certified by the SAVE International Certification Board (or another value society which has affiliated membership to SAVE International and thus has had its qualification processes examined and approved by SAVE International). The team leader requirements include a command of strategic goals, strong leadership, facilitation and communication skills, an in-depth working knowledge of VM and its principles and their practice, and extensive experience helping organizations to achieve greater value.

A value study team should consist of the above-mentioned study team leader and an appropriate number of experienced professionals drawn from different disciplines. The team member disciplines are to be relevant, based on the topic of the VM study. They are to be chosen based on their expertise and experience with the subject matter of the project. During the pre-study phase, the VM study leader and/or the sponsoring organization should be responsible for the selection of the team members. The requisite disciplines and knowledge necessary for the study's objectives are key to the success of the study. The members must possess adequate expertise in those disciplines necessary to address the subject matter of the study. It often is beneficial to use expertise not directly involved with the specific project. These members are encouraged to assist in the free development of ideas. The increasing involvement of customers in the VM study is a feature that helps a better definition of success to be articulated early in the organization's "research design and development" process. Team members should be willing to accept change and be open-minded in order to identify and develop ideas that could be much different from the original concept of the subject under study. Team members may be internal and/or external disciplinary experts and may include individuals who are customers, users, investors, stakeholders, constructors, operators, suppliers, or who are from regulatory organizations.

VALUE METHODOLOGY JOB PLAN

The value methodology shall be applied using a *VM Job Plan*. The job plan outlines sequential phases to be followed so as to achieve synergy by co-coordinating the times people think collectively within a structured process, as opposed to a collection of individual opinions. The activities conducted during each of the job plan phases will identify ideas and develop them into recommendations that are alternatives to the original concept or design. The job plan may be seen as a road map, through which a team's collective thinking and the theories it develops as a team are structured and developed.

The underpinning theory is that the intended function of the project must be understood and, with respect to the current product, the basic and secondary functions must be identified and understood. Basic functions must be preserved; otherwise, the intended goals are not accomplished. Secondary functions are analyzed and evaluated with regard to their contributions to the project objectives. By making functionality explicit via function analysis and FAST, organizations can manage innovation to provide a sustainable competitive advantage that leads to success in the marketplace and that leads to product and/or concept progress.

The functions of a product or service must be understood, in a collected and agreed sense, by the VM team. Basic functions must be preserved for they mark the core usefulness of a "thing". Secondary functions should to be considered as candidates for elimination, addition, or innovation.

Using function analysis and FAST, organizations can manage innovation as a capability that provides sustainable competitive advantage that leads to success in the marketplace and competitive advantage at the national economic level.

The VM Job Plan employs the phases and activities on the following pages. All phases are required and are performed sequentially. The activities performed in each phase may vary in number and rigor to fit the study topic or time constraints, but it is the outcome achieved at the end of each phase that marks the reliability and quality of the VM performance. During the conduct of a study, new data and information learned may require the study team to return to earlier phases or activities within a phase on an iterative basis to incorporate the new information. All VM phases should be performed in sequence—without skipping—because each phase provides information necessary for the next phase.

The standard VM Job Plan phases and related activities are as follows.

Pre-VM Workshop Study Phase

Fundamental Question: What strategically needs to be addressed by the value study?

Common Activities:

- Obtain senior management concurrence and support of the job plan, roles, and responsibilities.
- Obtain project data and information.
- Obtain key documents such as scope of work definition, drawings, specifications, reports, and project estimate.
- Identify and prioritize strategic issues of concern.
- Determine the scope and objectives of the study.
- Develop the study schedule.
- Undertake competitive benchmarking analyses.
- Identify Value team members.
- Review the project costs.
- Gather appropriate customer/user information about the project.
- If appropriate, invite customers or stakeholders to participate in the VM study.
- Distribute information to team members for review.
- Develop informational models and diagrams about the project.
- Clearly define, with senior management, the requirements for a successful VE study results.

Typical Outcome: Clear understanding of what senior management needs to have addressed, what the strategic priorities are, and how improvement will increase organizational value. It is during this phase that a view is formed as to whether subsequent phases are likely to yield sufficient value to justify the cost of the study within the terms set. It may be appropriate to increase or decrease study parameters at this time.

Information Phase

Fundamental Question: What is really going on in the tactical and operational contexts?

Common Activities:

- Project Team presents the original and/or present design/product/process concepts
- Identify program issues and constraints.
- Seek out evidence to confirm opinions.
- Confirm the most current project concept.

- Visit site or facility.
- Confirm success parameters.

Typical Outcome: Brings all team members to a common, basic level of understanding of the project. That includes tactical, operational, and specifics of the subject. The functional understanding establishes the base case to identify and benchmark alternatives and mismatches, and set the agenda for innovation.

Function Analysis Phase

Fundamental Question: What are the functions and how are they related?

Common Activities:

- Identify functions of the project.
- Classify the functions.
- Develop function models.
- Dimension the model with cost drivers and performance attributes.
- Select functions to focus the creativity phase.

Typical Outcome: Validation that the project satisfies the need and purpose of the project. Provides a more comprehensive understanding of the project. Identifies the function(s) on which to focus in order to improve the project.

Creative Phase

Fundamental Question: How else may the functions be performed?

Common Activities:

- Creative warm-up exercises.
- Explanations that establish rules that protect the creative environment being developed.
- Generate alternate ideas that may improve value.

Typical Outcome: A wide choice of ideas that provide a wide variety of possible alternative ways to perform the function(s).

Evaluation Phase

Fundamental Question: Of all these ideas, which are worth spending quality time to further develop?

Common Activities:

- Build shared understanding of what each idea is
- Discuss how ideas affect project, cost, and performance parameters
- Select and prioritize ideas for further development
- Explain how ideas are to be written up as standalone risk-reward investment proposals

Typical Outcome: A focused list of ideas that warrant quality time so that they can be made into reliable propositions.

Development Phase

Fundamental Question: What is an informed description of each selected idea, and which ones are mutually inclusive?

The selected ideas are developed into proposals that are clearly written so that the owner and other project stakeholders understand the intent of the proposal and how it benefits the project, and also to identify any potential negative factors associated with the proposal. The proposal should include text, sketches, diagrams, assumptions, supporting calculations, vendor information, cost comparison work sheets, and other information which may be necessary to convey the intent of the proposal. The text should also identify other proposals which may be enhanced or complemented by acceptance of the proposal. Issues addressed include reliability, customer convenience, quality control, capital cost, O&M cost, life cycle cost, schedule, risk, availability, political ramifications, and perception.

Common Activities:

- Present the study conclusions against the success requirements established during the *VM Workshop Study Phase*.
- Prepare a written proposal of ideas selected for further development.
- Assess and allocate risk judgments.
- Conduct benefit analysis.
- Generate sketches and information needed to convey the concept.
- Confirm that a proposal should be further developed.
- Finish initial proposal development.

Typical Outcome: Low-risk, medium-risk, and high-risk scenarios are created and are the minimum basis upon which senior management will be offered options that address the pre-Study strategic objectives.

Presentation Phase

Fundamental Question: How can we help the project team and senior managers make more informed decisions so that they can select ideas that fit their strategic plans?

Common Activities:

- Prepare presentation and supporting documentation.
- Offer management “risk-reward” innovation scenarios to select for implementation.
- Exchange information with the project team.
- Ensure management has full and objective information upon which they can make good decisions.
- Outline an anticipated implementation schedule.

Typical Outcome: Ensure management and other key stakeholders understand the rationale of the VM alternatives. Also generate interest to sanction implementation.

Implementation Phase

***Fundamental Question:** What are the program changes, and how will the project team manage them?*

Following delivery of the VM preliminary report, management and the project team must digest and agree upon the VM proposals to be implemented, and then *how* and *by when* the implementation will occur. In some instances, additional study and information may be required. Implementation of alternatives is the responsibility of management with assistance from the project and VM teams.

Common Activities:

- Review the preliminary report.
- Conduct an implementation meeting to determine the disposition of each VM Alternative. Establish action plans for those alternatives accepted and document the rationale for the rejected alternatives.
- Obtain commitments for implementation.
- Assign a timeframe for review and implementation of each VM recommendation.
- Track value achievement resulting from implemented alternatives.
- Sign off deliverables.
- Validate benefits of implemented change.
- Ensure that new practices become embedded by establishing and managing an implementation plan.

Typical Outcome: What is changed in the project as a result of a VM study? These are usually alternatives to the original concept or base case of a study that the project development will incorporate as changes in future design or product development activities.

Post-VM Study Phase

***Fundamental Question:** What have we learned about how best to create or improve value of the subject under study?*

Common Activities:

- Prepare a report of the results of the study, lessons learned, or other items to be recorded and/or tracked through implementation.
- Identify where opportunities were missed.
- Identify roadblocks to innovation and understand why they existed.
- Debrief and record lessons learned.
- Reflect on the value study and consider how the experience has developed new capabilities.

Typical Outcome: Individuals become better value creators by reflecting on theories they held before the value study. Comparing the way things turned out, and ascertaining how that knowledge affects the way they believed their own theories in the first place, is a key step in learning that will help the organization become better at managing the way it manages innovation.

CERTIFIED VALUE SPECIALIST REQUIREMENTS

SAVE International maintains a certification program. Its purpose is to ensure that individuals who use the value methodology in their principal career have met approved education and experience standards. The requirements for certification can be found at the SAVE International Certification Board's website (http://value-eng.org/education_certification.php).

BODY OF KNOWLEDGE FOR PRACTITIONERS OF THE VALUE METHODOLOGY

A VM practitioner should be competent in the following topics to effectively implement a VM Program.

- I. **Value management principles**
 - A. Historical development of the value methodology
 - B. The relationship between an organization's strategies and the value methodology
 - C. Fundamental value principles, methods, and job plans
 - D. The relationship between value, functions, and solutions
 - E. Function analysis
 - F. Types of value
 - G. Value drivers (e.g., cost, schedule, quality, risk, etc.)
 - H. Investment appraisal techniques
 - I. Key thought-provoking questions.

- II. **Value Methodology Job Plan**
 - A. Value creation templates and the VM intervention points (i.e., VIPs)
 - B. Major phases and activities in a VM Job Plan
 - C. Objectives of each phase of the job plan
 - D. Overview of techniques in a typical job plan.

- III. **Strategic Problem/Opportunity Framing**
 - A. Reviewing the business case
 - B. Discounted cash flow modeling
 - C. Analysis through key financial ratios
 - D. Strategic models, decisions, choices, and uncertainties
 - E. Identification of causal relationships and their modeling
 - F. Identification of attributes and value drivers
 - G. Analysis of performance attributes (non-monetary factors that affect value)
 - H. Defining the base case and benchmarking
 - I. Determining whether the remaining phases of the value study can justify the client's investment or whether what they have is good, as understood within the terms and references used.

- IV. **Function Analysis**
 - A. Purpose and need
 - B. A "thing" and its function
 - C. Defining functions with active verbs and measurable nouns
 - D. Function classification

- E. Levels of abstraction
 - F. Function Analysis System Technique; customer, technical, and classical
 - G. *How-Why* logic flow
 - H. *If-Then* and *Caused-By* logic flows of classical and technical FAST models, often termed "*When*"
 - I. The difference between various FAST diagrams and models.
- V. **Function-Worth and Cost and Customer Attitude**
- A. Purpose and need
 - B. Cost as resource expenditure
 - C. Cost-to-worth relationships
 - D. Cost-to-function allocation
 - E. Function worth
 - F. Cost-value relationship
 - G. Cost-value mismatches
 - H. Pareto analysis of cost drivers.
- VI. **Creativity**
- A. Purpose and need
 - B. Managing divergent thinking
 - C. Brainstorming techniques
 - D. Unrestricted idea generation setting
 - E. Large quantity of ideas is the goal
 - F. Suspending judgment
 - G. Other idea generation techniques.
- VII. **Evaluation**
- A. Purpose and need
 - B. Managing convergent thinking
 - C. Building greater understanding of other people's ideas
 - D. Techniques.
- VIII. **Proposal Development**
- A. Writing up standalone proposals
 - B. Investment appraisal
 - C. Technical implementation feasibility
 - D. Political implementation feasibility
 - E. Initial and subsequent revenue impacts
 - F. Initial and subsequent cost impacts
 - G. Initial and subsequent schedule impacts
 - H. Life cycle cost analysis (LCC)
 - I. Initial and subsequent impacts on other key attributes
 - J. Sketches and other communication aids.
- IX. **Presentation**
- A. Purpose and need
 - B. The relationship between VM and the needs of senior management decision makers
 - C. Presentation skills
 - D. Content organization
 - E. Implementation plan

- F. Change management strategies
 - G. Explanation of value tracking process.
- X. **Management of value programs**
- A. Management roles and responsibilities
 - B. Reporting responsibilities
 - C. Establishing links between Value Study outcomes and organizational results
 - D. VM training
 - E. Facilitation skills training
 - F. Organizing and implementing VM programs
 - G. Team Leader skill development
 - H. Strategic diagnosis and problem/opportunity identification techniques
 - I. Selecting and leading VM Studies
 - J. Coordinating VM Study logistics
 - K. Facilitator skills
 - L. Tracking VM Study implementation results and other reports as necessary
 - M. Coordinating with other organization or client quality improvement programs
 - N. Educating the organization in the VM methods
 - O. Recognizing VM's success and failures and how to learn as a team
 - P. Sharing VM's insights with the community and stakeholders
 - Q. Periodic VM Program review for continuous improvement.

APPENDIX A - GLOSSARY

AFTER STUDY REVIEW: An activity conducted after a value methodology study to determine lessons learned to improve the conduct of future value studies.

COST: (1) The expenditure of resources that are necessary to produce a product, service, process, or structure; (2) The sum of manufacturing, general and administrative, and selling cost; (3) The total expense to produce a product; (4) The transfer of money, labor, time, or personal items to achieve an objective; (5) One component of price of an item; (6) monetary expense needed to acquire materials of construction.

COST, DEVELOPMENT: (1) The amount spent on product research, design, models, pilot production, testing, and evaluation, (2) Cost normally considered product overhead and distributed as fixed cost over an estimated number of products to be produced.

COST, LIFE CYCLE: (1) The sum of all acquisition, production, operation, maintenance, use, and disposal costs for a product or project over a specified period of time; (2) The sum of all costs for the development, procurement, production, and installation of a product, as well as its financing, taxes, operation, logistical support, maintenance, modification, repair, replacement, and disposal over the period of its useful life; (3) In manufacturing, it is also referred to as the sum of development, production, and application cost; (4) The economic measure of value. Life cycle cost is often expressed in terms of net present value.

COST MODEL: A financial representation such as a spreadsheet, chart, and/or diagram used to illustrate the total cost of families of systems, components, or parts within a total complex system or structure.

COST/WORTH: The ratio used to determine the maximum opportunity for value improvement. It is usually identified in the function analysis phase and used as a benchmark for value change during the study.

FUNCTION: (1) The natural or characteristic action performed by a product, process, or facility; (2) In VM, a function is defined using a two-word, verb-noun context; e.g., a pencil will *make marks*; a light will *illuminate area*.

FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST): A graphical representation of the dependent relationships between functions within a project. Key elements of the FAST diagram include:

- The sequence of functions on the major logic path proceeding from left to right answer the question “How is the function to its immediate left performed?”
- The sequence of functions on the critical path proceeding from right to left answer the question “Why is the next function performed?”
- Functions occurring at the same time or caused by functions on the critical path appear vertically below the critical path function.
- The basic function of the project anchors the FAST diagram and the major logic path. It is located farthest to the left on the major logic path within the scope of the study.

FUNCTION, BASIC: The specific purpose(s) for which a product, facility, or service exists and conveys a sense of ‘need’. In ‘continuous innovation’ projects the basic function must always exist, although methods or designs to achieve it may vary. In ‘discontinuous innovation’ projects which seek to create new industries the existence and persistence of the basic function is itself the focus of challenge.

FUNCTION, HIGHER ORDER: The specific goals (needs) for which the basic function(s) exists to satisfy. It answers the “why” question of the basic function, and is located immediately to the left outside the study scope on a FAST diagram.

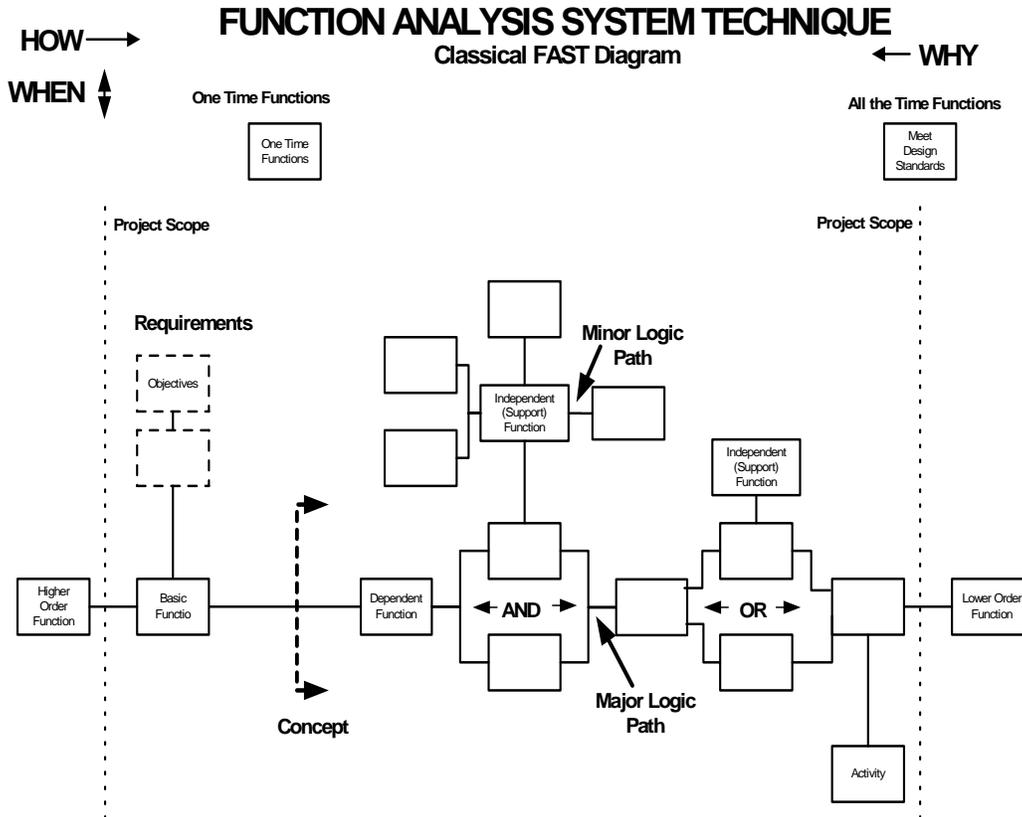
FUNCTION, LOWER ORDER or ASSUMED: The function that is selected to initiate the project and is depicted farthest to the right, outside the study scope. For example, if the value study concerns an electrical device, the *supply power* function at the electrical connection would be the lowest order function. Also referred to as an “assumed function.”

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

- *Aesthetic:* A secondary function describing esteem value.
- *Required:* A secondary function that is specified by the customer as a condition of acceptance or a preference.
- *Sell:* A function that provides primarily esteem value. For marketing studies it may be the basic function.
- *Unwanted:* (1) A negative function caused by the manner or way used to achieve the basic function, such as the heat generated from lighting that must be cooled. (2) Also referred to as an “undesirable function”.

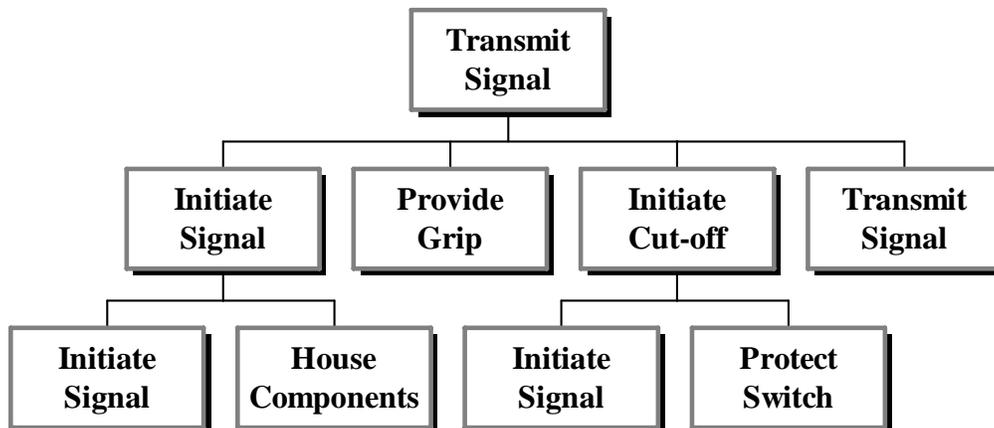
FUNCTION MODELS — (See FAST diagram) A graphical depiction of the relationships between functions within a project. There are several commonly used styles:

- *Classical FAST Model:* A function displaying the interrelationship of functions to each other in a “how-why” logic. This was developed by Charles Bytheway.

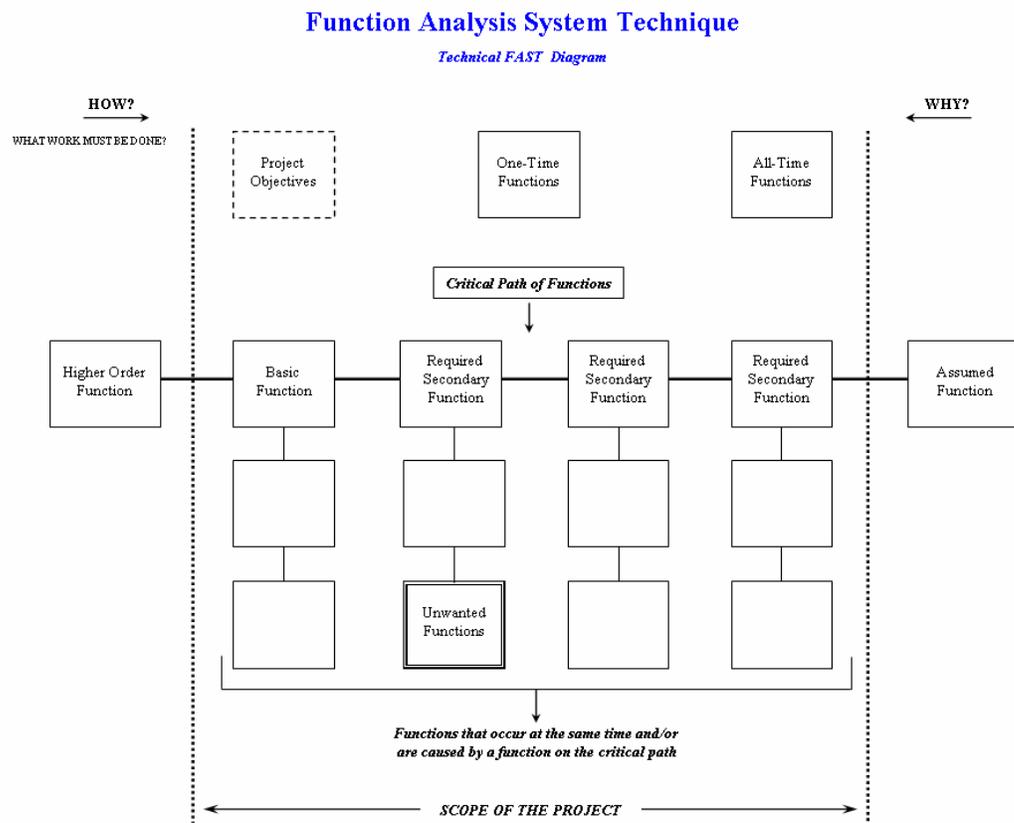


- *Hierarchy Function Model:* A vertical “tree” chart of functions. Recent practice has been to include within one branch user-oriented functions such as *assure convenience*, *assure dependability*, *assure safety*, and *attract user*.

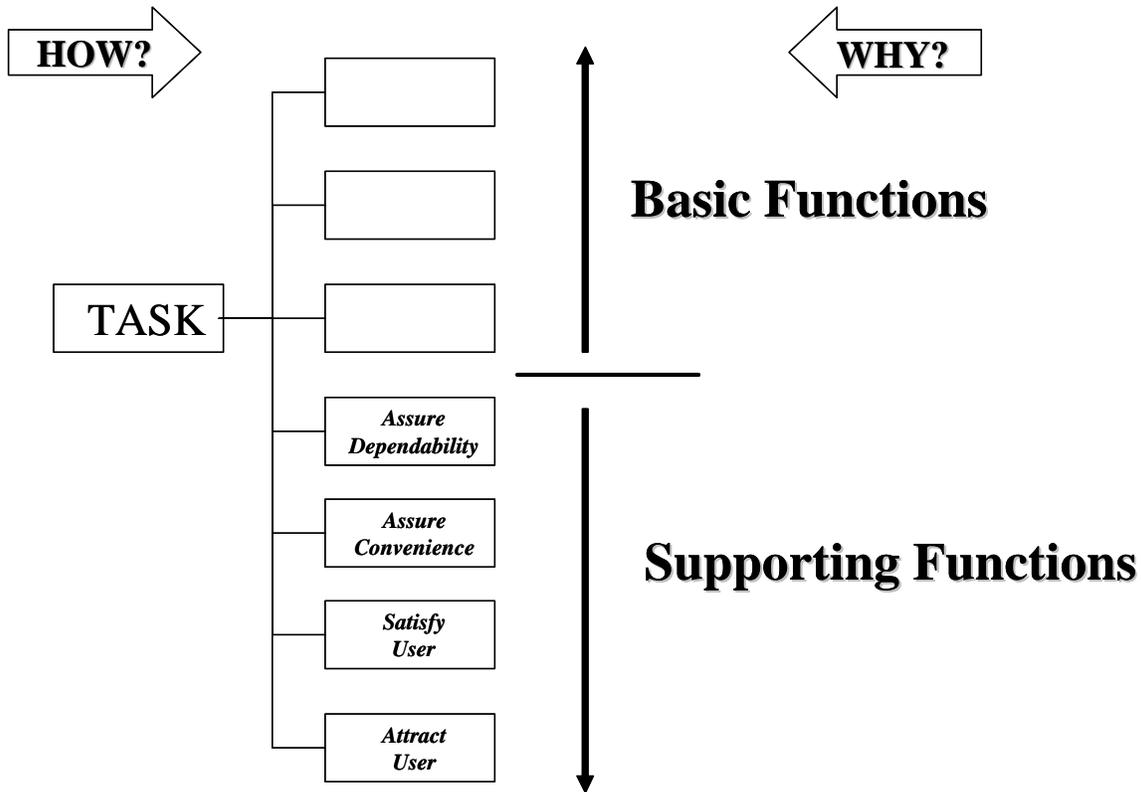
Walk Around Control Station



- *Technical FAST Model:* A minor variation to the traditional FAST developed by “Doc” Ruggles incorporates the concept of separating and displaying supporting functions, such as “One Time Functions” and “All Time Functions.” Technical FAST also includes key project criteria that affect how the functions are to be performed.



- *Customer-Oriented FAST Model:* This variation of the FAST diagram was developed by Thomas Snodgrass and Theodore Fowler to better reflect that it is the customer that determines value in the function analysis process. Customer-oriented FAST adds the functions: *attract users*, *satisfy users*, *assure dependability*, and *assure convenience*. The project functions that support these customer functions are determined by using the how-why logic.



JOB PLAN: A sequential approach for conducting a value study, consisting of steps or phases used to manage the focus of a team’s thinking so that they innovate collectively rather than as uncoordinated individuals. The steps include:

- *Pre-VM Study Phase:* Where “problem framing” and value are defined
- *Information Phase:* Where functionality is understood and innovative ideas are identified as candidates for innovation.
- *Function Phase:* Where product or process functions are identified in an active verb-measurable noun context. These functions are usually (but do not have to be) assembled by the team into a function diagram. The functions are sometimes dimensioned with cost or performance (non-monetary) success factors.
- *Creative Phase:* Where alternative ways to perform functions are generated.
- *Evaluation Phase:* Where individual ideas are assessed to cull poor prospects.
- *Development Phase:* Where ideas are researched and written up as possible investment proposals.
- *Presentation Phase:* Where a collection of risk-reward investment proposals are presented to senior management for budgetary approval.
- *Implementation Phase:* Where the accepted changes are implemented into the project and the benefits of the changes validated and tracked.
- *Post-VM Study Phase:* Where implementation is undertaken and value is captured and recorded, along with lessons learned.

PAIRED COMPARISON: A method used to determine the relative importance among several non-monetary factors. Each attribute is compared to each other attribute to determine which of the two being compared is most important. The number of times an attribute exceeds another is determined. Then this number is compared to the total number of comparisons to determine the relative percent weight for each attribute.

PARETO ANALYSIS: An investigation of the factors of a product or process to separate the “vital few” from the “trivial many.” This analysis is based on economic theory and principles noted by Italian economist Vilfredo Pareto. It is used in VM to determine the key cost drivers of a product or process.

PERFORMANCE or PERFORMANCE MEASURES: The capacity of a product to fulfill its intended function. Ideally, performance should be defined by the intended customer or user. Appropriate performance requires that the product, facility, or service have a predetermined level of quality, reliability, interchangeability, maintainability, producibility, marketability, and deliverability. These performance levels must match the customer’s requirements and may vary, depending upon the nature of the project.

PERFORMANCE ATTRIBUTE: Specific characteristics that are essential in achieving a product’s performance objectives. Performance attributes may possess a range of values and can be measured either objectively or subjectively.

PRICE: The sum of money expended by the user/customer to purchase the product under study.

PROJECT: (1) A temporary endeavor undertaken to create a unique product, service, or result; (2) For the purpose of value studies, a project 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.

PROCESS: A sequence of activities that delivers a product.

SAVE INTERNATIONAL CERTIFIED PROFESSIONAL: For the purpose of a value methodology study, the job plan shall be facilitated by a Certified Value Specialist (CVS), or a Value Methodology Practitioner (VMP) working under the supervision of a CVS. SAVE International Certification requirements are identified by the SAVE International Certification Board, which maintains a list of currently certified individuals.

SCOPE: The portion of the overall product 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.

STRATEGIC PROBLEM FRAMING: A method to improve a project by defining it in terms of the strategic problems and opportunities associated with the project.

VALUE: (1) The relative worth, utility, or importance of a product, process, or service to a user that allows individuals to prefer one solution over another; (2) The lowest life cycle cost to reliably accomplish a function that meets the expectations (or requirements) of the customer.

VALUE, MONETARY: There are four classes of monetary value:

- *Use Value:* The monetary measure of the functional properties of the product or service which reliably accomplish a user's needs.
- *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.
- *Cost Value:* The monetary sum of labor, material, burden, and other elements of cost required to produce a product or service.
- *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 tools by a multidisciplinary team to identify and categorize the functions of a project, product, or process and to create, select, and develop alternative approaches to cost-effectively deliver the functions and/or improve performance.

VALUE METHOD PROPOSAL: A proposal by the value study team to management to provide one or more functions for financial and/or performance improvements and which is within acceptable terms and conditions.

VALUE STUDY: The application of the value methodology by SAVE International certified professionals using the job plan.

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.

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

Appropriate training is a prerequisite to SAVE Certification Examinations.

VALUE ANALYST: Synonymous with value practitioner, value professional, or value specialist.

VALUE ENGINEER: Synonymous with value practitioner, value professional, or value specialist.

VALUE ENGINEERING CHANGE PROPOSAL (VECP): A formal proposal submitted by a contractor to a governmental agency or an owner that documents a process or design change and the related savings from the original contract. The VECP requires agency or owner review approval before implementing the change. If accepted, the result will be a modification to the

submitter's contract. Typically the savings are accrued to the government and contractor on a 50%/50% basis, but each owner establishes its own sharing arrangement.

VALUE PROFESSIONAL: (1) One who applies the value methodology to study and search for value improvement; (2) Synonymous with value analyst, value engineer, value practitioner, or value specialist.

WORTH: A comparison between one cost and the lowest overall cost to perform a function without regard to criteria or codes.

APPENDIX B - REFERENCE SOURCES

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 peer-reviewed, 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 may be individually ordered from SAVE International.

SAVE International website: <http://www.value-eng.org>

"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 (on SAVE International website/home/certification)

- Certification/Recertification Manual
- Certified Workshop Manual
- Certification Examination Study Guide
- SAVE International Internet Web Site: <http://www.value-eng.com>

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