

SAVE International

Certification Examination Study Guide



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Study Guide – March 2008

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Introduction

This study guide is written to assist certification candidates in preparing for their written examination. It is intended to assist candidates discover where their knowledge of the value methodology (VM) and its applications need to be strengthened. This guide includes the body of knowledge and the glossary of VM terms as currently found in the Value Methodology Standard. The material taught in the Module I Basic Certification Training Workshop and the Module II Advanced Certification Training Seminar courses closely parallels this body of knowledge. How well you do on the certification examination is a reflection on you, your course instructors and your advisor. The glossary of terms in the VM Standard is new in a few basic ways that will need some adjustment, with time, to be included in our day-to-day vocabulary. The examination however, as an encouragement to the use of standard terms, will follow the definitions listed in the VM Standard.

Certification examinations are given each year preceding the SAVE International Annual Conference. At other times, candidates may arrange to have the examination proctored locally by an individual approved by the SAVE International Certification Board. The details of arranging for a proctored examination are described in the Certification Manual.

Examination Objectives

The certification examination is designed to test the candidate's knowledge of fundamental VM concepts through the use of a variety of question formats. Candidates for the different levels of certification (AVS, VMP, or CVS) will find themselves being asked questions appropriate to that level of certification. (See Figure 1) In addition, the essay portion of the examination for CVS candidates tests the ability to articulate comprehensive VM knowledge in response to a particular question. This is intended to measure effective communication abilities as well as knowledge of VM.

Exam Category	AVS	VMP	CVS
Part I. Fundamentals 50 True or False	100 points 30 minutes	100 points 30 minutes	100 points 30 minutes
Part II. Function Analysis Identify and classify functions, Function Analysis 40 multiple choice questions	100 points 60 minutes	100 points 60 minutes	100 points 60 minutes
Part III. FAST Identify and classify functions, Function Analysis; Draw a FAST diagram	Not Applicable	100 points 30 minutes	100 points 30 minutes
Part IV. Team Building 25 questions (True or False)	Not Applicable	100 points 30 minutes	100 points 30 minutes
Part V. Certification 20 questions (True or False)	Not Applicable	Not Applicable	100 points 15 minutes
Part VI. Financial Identify VM opportunities, first costs, annual costs, and break-even point	Not Applicable	Not Applicable	100 points 30 minutes
Part VII. Essay Choose topic and prepare essay demonstrating VM principles	Not Applicable	Not Applicable	100 points 45 minutes
Total Exam Time	1 1/2 hours	2 1/2 hours	4 hours
Score to pass: 70 % 70% achievement is required for each category. Grades will not be averaged.			

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Figure 1 Examination Matrix

Examination Requirements

Figure 1 shows that each of the three levels of certification have different examinations. The AVS candidate is required to take the first two parts, the VMP candidate the first four parts, and the CVS candidate all seven parts. Each part is graded separately on the basis of 100 points. A minimum of 70 percent is required to successfully pass each part. Candidates will be required to retake only those parts failed. Re-examinations can be taken at the candidate's discretion, not to exceed 1 yr. from the previous examination. However, the policy is that no more than two re-examinations will be allowed. A CVS candidate who is currently certified as an AVS or VMP is required to take only those sections of the examination not previously completed.

Completion times shown in the individual parts of the examinations are shown only as a guide. The candidate may allocate time as required to each part so long as the examination is completed in the total allowed time.

Preparation for Examination

Part I. Fundamentals - The 50 true or false questions test your comprehension of the history of the value methodology, including the job plan, function analysis, FAST diagramming, function cost, function worth, creativity, evaluation techniques, and implementation techniques. There also are questions concerning program management and certification program requirements.

Sources:

1. Review text materials from the Module I course.
2. Review the *Certification & Recertification Manual*, the *Workshop/Seminar Manual*, and this *Study Guide*.

Part II. Function Analysis - The 40 questions require the candidate to express

the common object illustrated in function terms; classify the functions as basic, secondary and higher order functions, allocate costs to functions, identify worth corresponding to the function costs and calculate the corresponding value indices.

Sources:

1. Review Module I function analysis text materials and exercises.
2. Practice with your advisor to gain proficiency. Strive to use action verbs and measurable nouns.

Part III. FAST Diagramming - You will be asked to prepare a FAST diagram. One of the reasons for preparing a FAST diagram is to add, modify or combine functions so as to better portray the product, system or procedure in logical functions. Fifty percent (50%) of the FAST diagram grading is on logic. Work with the functions, changing them if necessary, until the logic is meaningful. The balance of the grade is on the placement of functions, and identifying the diagram parts by labeling them. Be sure the elements of the FAST diagram you are using are labeled. Identify the type of FAST diagram, whether it is classical, technical or customer/task.

Sources:

1. Review Module I and Module II texts and class exercises.
2. Practice with your advisor, using all three (3) types.
3. Learn the labeling by studying the material in Appendix B.

Part IV. Team Building - This part of the examination recognizes the vital role that it plays in successful VM studies and implementation of value proposals. The 25 questions are aimed at testing your knowledge of attributes of team members, team dynamics, consensus building, habits and attitudes, roadblocks to creativity, and making an effective presentation.

Sources:

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1. Review text materials from Module I and Module II courses.
2. "Contemporary Value Management Leadership Characteristics", R.A. Fraser, Ph.D, 1996 SAVE International Proceedings
3. "Using Function Analysis to Give Criticism and Influence the Behavior of Teams", Rea Gorin Cook, CCC, CTM, 1997 SAVE International Proceedings

Part V. Certification Program - These 20 questions are aimed at testing your understanding of the general requirements for certification, recertification, workshops and seminars.

Source:

1. Review the *Certification & Recertification Manual*, *Workshop/Seminar Manual*, and *Study Guide*.

Part VI. Financial - Currently there are two sets of questions. One set (eight questions) addresses industrial financial analysis. These questions test categorizing costs, calculate VM study costs and returns, prioritizing value objectives using calculated value indices and break-even analysis. The second set (four questions) addresses construction financial analysis. These questions test categorizing contractor costs, calculate VM study costs and returns, prioritizing value objectives using calculated value indices, life cycle costs and break-even analysis.

Source:

1. Review Module II text and class exercises.

Part VII. Essay - The candidate is asked to prepare an essay on one of seven VM questions. As an aid in preparing for this question, the criteria used in grading the question is:

Content Relevance (60%) - Has the essay demonstrated a comprehensive knowledge of the subject?

Ingenuity of Presentation (20%) - Has the essay presented the material in an

interesting format that will inspire the reader?

Clarity of Presentation (20%) - Has the essay presented the material logically and in an easily understood order?

Sources:

1. Read a text on creative writing and prepare several essays relating to the unique concepts of the value methodology.
2. Review Appendix C: "What is an Essay?"

Comprehensive Review

While there are number of extremely valuable texts available in the value methodology, the one that stands out for covering all aspects of VM is *Value Engineering Theory*, by Donald E. Parker (available from the SAVE International bookstore) and its companion, *Instructor's Guide for Value Engineering Theory Course*. It provides not only a comprehensive text, but it will furnish excellent review questions and answers for each of its 11 basic lectures.

In addition, there are several other texts that will be valuable in understanding the value methodology and passing the examination. All are available from SAVE International.

Value Engineering for the Practitioner, by J. Jerry Kaufman is aimed at productivity improvements by increasing the value of products and services to the markets and communities.

A third one to consider is *Value Analysis in Design* by Theodore C. Fowler. Fowler's focus is on how modern methods emphasize customer needs to prevent product denigration by inappropriate cost reduction.

If you want to search for specific aspects of the value methodology, the SAVE International Knowledge Bank offers a comprehensive collection of conference technical papers, *Value World* papers, and newsletter articles. The Knowledge Bank is located on the SAVE International website.

Body of Knowledge

The information contained in this Body of Knowledge is a general guideline and is not meant to be either fully inclusive or exclusive of all possible techniques. Differences in the application of techniques used to accomplish VE Phases will be based on the nature of the project and the preference of the value practitioner.

History of the Value Methodologies

Value Analysis was conceived in the early 1940s by Lawrence D. Miles while he was employed by General Electric, a major defense contractor which was facing the scarcity of strategic materials needed to produce their products during World War II.

Mr. 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 in mind, Mr. Miles accepted the challenge and devised the function analysis concept, which he integrated into an innovative process he later termed value analysis.

Mr. Miles understood that products are purchased for what they can do—either through the work they perform or the pleasing aesthetic qualities they provide.

Using this as his foundational information, he focused on understanding the function of the component being manufactured. He questioned whether the design could be improved or if a different material or concept could achieve the function.

To focus on the function itself, he used an *active verb* and a *measurable noun* in combination to characterize the *benefit* that a part’s function provides. He then searched for other ways or methods to achieve the benefit of that intended function. From this research, function analysis, the key foundation of value methodologies, was developed and has become a tool to help individuals and teams manage the way a concept is understood. These specialized teams typically address project-related issues such as increased sales

revenue, improved product performance, and reduced resource usage.

The U.S. Army and Navy, and other companies, soon realized the success of Larry Miles’ methods. As the application of value analysis expanded, there was also a change in context—from review of existing parts to improving conceptual designs. This was one of two factors that marked the emergence of value engineering. The other was a desire by the U.S. Navy to use the Value Analysis techniques for project improvement in the early 1950s when there was a moratorium on hiring “analysts.” Since engineering positions were available, individuals practicing this new discipline were employed as “Value Engineers.” As the value methodology gained in popularity, a group of practitioners formed a learning society to share insights and advance their innovative capabilities. Thus, in 1959, the “Society of American Value Engineers” was incorporated in Washington, DC.

Soon, the value methodology was used to improve the value of projects in government, the private sector, and the manufacturing the construction industries and value concepts spread worldwide.

Concurrent with this growth, a number of other value improving tools, techniques, and processes emerged, many of which were complementary to and were integrated with the value concepts. In an effort to attract the developers and practitioners of these emerging methods to our membership, the name of the society was changed to “SAVE International” in 1996.

Overview

The value methodology is a systematic process used by a multidisciplinary team to improve the value of a project through the analysis of its functions. Value is defined as a fair return or equivalent in goods, services, or money for something exchanged. Value is commonly represented by the relationship:

Value ≈ Function/Resources

where **function** is measured by the performance requirements of the customer and **resources** are measured in materials, labor, price, time, etc. required to accomplish that function. A value methodology focuses on improving value by identifying alternate ways to reliably accomplish a function that meets the performance expectations of the customer.

Function Analysis is the foundation of a value methodology and is the key activity that differentiates this body of knowledge from other problem-solving or improvement practices. During the Function Analysis Phase of the Job Plan, functions are identified that describe the work being performed within the scope of the project under study. These functions are described using two word, active

verb/measurable noun pairings, for example one function of a hammer is to *apply force*. The team reviews the project's functions to determine those that could be improved. These may be project functions that seem to be performed inefficiently or with more than expected cost. These functions become the focus of the value methodology team in their endeavor to improve the project.

The identification and naming of project functions enables clear thinking by limiting the description of a function to an *active verb* that operates on a *measurable noun* to communicate what work an item or activity

performs. This naming process helps multidisciplinary teams build a shared understanding of the functional requirements of the project and, as a result, it allows them to identify where opportunities for value improvement exist in the project.

Function analysis can be enhanced through the use of a graphical mapping tool known as the *Function Analysis System Technique* (FAST), which allows team members to understand how the functions of a project relate to each other.

A fundamental tenet of a value methodology is that basic functions (the necessary purpose of the project) must be preserved. This is because the basic function reveals the usefulness of the project and the reason for its existence. For example, the basic function of a wristwatch

could be "indicate time." Other secondary functions support the basic function. These secondary functions typically provide esteem, dependability, or convenience value for the user.

An example is a

gold watchcase that performs an aesthetic function which pleases both customers and those whom they want to impress.

The value methodology is applied using a process known as the "Job Plan." The purpose of the Job Plan is to guide the Study team through the process of identifying and focusing on key project functions in order to create new ideas that will result in value improvements.

While a Value Study is guided by the function-based Job Plan, it can be further supported by many commonly used business improvement techniques (See Activities section for examples).

**Value is defined as a fair
return or equivalent in goods,
services, or money for
something exchanged.**

Applicability

Value methodologies can be applied during any stage of a project's development cycle, although the greatest benefit and resource savings are typically achieved early in development during the conceptual stages. At this point, the basic information of the project is established, but major design and development resources have not yet been committed. The reason this is the best time to apply a value methodology is because the manner in which the basic function of the project is performed has not been established, and alternative ways may be identified and considered.

Examples of these applications are:

- *Construction projects* could benefit by identifying improvements for various project phases: concept development, preliminary design, final design, procurement and construction.
- *Manufactured 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 value study at any time during the product's life. A value study can be applied at the onset of the product development to better understand the customer's needs, identify the functions necessary to satisfy those needs, and develop the initial concept. Throughout the design development, value methodology can be used to refine and enhance the concept, based on the latest facts. Even after a product has been introduced and is in production, a Value Study can be used to further enhance the product and respond to changing customer and economic conditions.

A value methodology can be used to either develop new ways to manufacture a product or change an existing process.

- *Business systems and processes* may also be the subject of Value Studies. Many elements of a business or an organization may be improved through the application of a value methodology. This may be from the development of business plans and organizational studies to improving existing business processes.
- *Service organizations* can benefit from the use of value methodologies. In the past value methodologies have been used to improve processes and procedures in the medical industry (operating rooms, emergency rooms, etc.) and the legal system (police systems).

Value methodologies may be applied more than once during the life of the project. Early application of a value methodology 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. The later a Value Study is conducted in project development, more likely implementation costs will increase.

A value methodology may be applied as a quick response study to address a problem or as an integral part of an overall organizational effort to stimulate innovation and improve performance characteristics. Value methodologies may be used to enhance an organization's quality programs, new product development activities, manufacturing processes, and architectural and engineering design.

Study Duration

A value study generally encompasses three stages. (See Figure 1, page 13):

1. Pre-Workshop (Preparation)
2. Workshop (Execution of the six phase Job Plan)
3. Post-Workshop (Documentation and Implementation)

The duration for executing the Job Plan in a value study depends on several factors: the size and complexity of the project, the stage of project development, the estimated cost of the project, etc.

A typical duration for the Workshop Stage is five-days, which does not include the Pre-Workshop and Post-Workshop efforts.

Projects with a concise scope or a low level of complexity may be performed in less time. Sufficient time should be allotted to adequately apply the value methodology process and document the team's findings. Shortening the time needed to execute the Job Plan phases may result in a less-than-optimal result. Projects of very large scope or complexity may require 10-15 days or more to achieve the study's objectives. Consideration of these factors is important to ensure that the proper time is allocated and needs to be addressed as part of the upfront planning for a value study.

Job Plan Techniques

The value methodology is a structured, disciplined procedure aimed at improving value. That procedure is called the **Job Plan**. The Job Plan outlines sequential phases to be followed which support team synergy within a structured process, as opposed to a collection of individual opinions. The activities conducted during each phase of the Job Plan will stimulate the team to identify ideas and develop them into alternatives to the original concept or design.

The team and the project stakeholders should identify and understand the project's basic and secondary functions. Basic functions must be maintained; otherwise the intended study goals will not be 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.

Figure 1 illustrates the Job Plan process flow. Each of the Job Plan phases must be performed in sequence because each phase provides information and understanding necessary for the successful execution of the next phase. As the team gains additional knowledge about the project, a previous phase may be revisited.

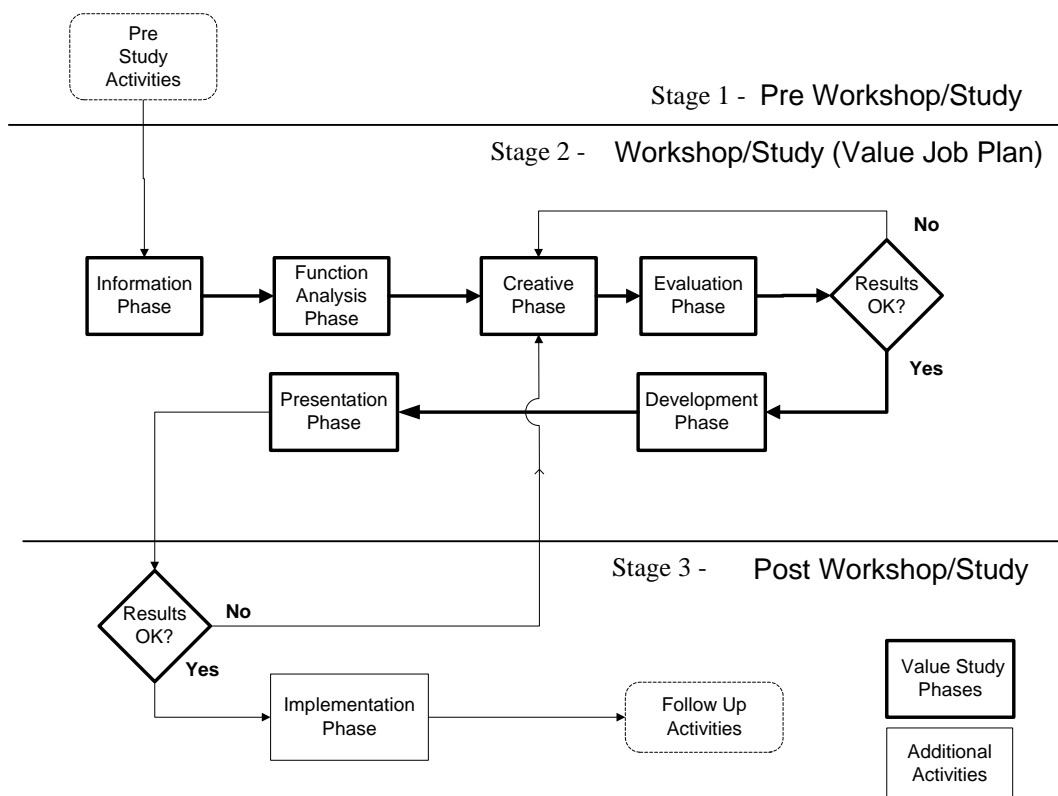


Figure 1.
Value Study Process Flow Diagram

Workshop Activities

The standard Three-Stage of Pre-Workshop, Workshop and Post-Workshop; and Six-Phase Workshop Job Plan Activities; are described on the following pages with related activities and suggested tools and techniques.

Pre-Workshop Activities

Purpose:

Plan and organize the Value Study

Fundamental Question:

What has to be done to prepare for a Value Study?

Common Activities:

- Obtain senior management concurrence and support of the job plan, roles, and responsibilities.
- Develop the scope and objectives for the Value Study
- 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
- Obtain commitment from the selected team members to achieve the project objectives
- Review the project costs
- Gather appropriate customer/user information about the project
- If appropriate, invite suppliers, customers, or stakeholders to participate in the Value Study
- Distribute information to team members for review

- Develop informational models and diagrams about the project
- Determine the study dates, times, location and other logical needs
- Clearly define, with senior management, the requirements for a successful Value Study results

Typical Outcome:

The desired outcome is a 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. Team members are knowledgeable of and committed to achieve the project's objectives.

Workshop (Job Plan) Activities

Information Phase

Purpose:

Understand the current state of the project and constraints that influenced project decisions.

Fundamental Question:

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

Common Activities:

- Obtain project data and information and key documents such as scope of work definition, drawings, specifications, reports, detailed project cost information, quality data, marketing information, process flow charts, etc.
Tools: Quality Function Deployment, Voice of Customer
- Identify and prioritize strategic issues of concern. Further define the scope and objectives (management expectations) of the study
Tools: SWOT (Strengths, Weaknesses, Opportunities and Threats); Project Charter
- Project Team presents the original and/or present design/product/process concepts
- Perform competitive benchmarking analysis
Tools: Benchmarking, Tear Down Analysis, Pareto Analysis, Design for Assembly
- Determine the study schedule; dates, times, location and other logistical needs
- Distribute information about the project for team member review
- Understand project scope, schedule, budget, costs, risk, issues, and non-monetary performance.
- Confirm the most current project concept

- Identify high-level project functions
- Visit site or facility
- Confirm success parameters

Typical Outcome:

This phase brings all team members to a common, basic level of understanding of the project, including 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

Purpose:

Understand the project from a functional perspective; what must the project do, rather than how the project is currently conceived.

Fundamental Question:

What are the functions and how are they related?

Common Activities:

- Identify the project functions (team format strongly encouraged)
Tools: Random Function Identification
- Classify project functions
- Develop function models
Tools: Function Analysis System Technique (FAST), Function Tree
- Dimension the model with cost drivers, performance attributes and user attitudes to select value mismatched functions to focus the creativity phase
Tools: Cost to Function Analysis (Function Matrix), Failure Measurement Error Analysis (FMEA), Performance to Function Analysis, Relate Customer Attitudes to Functions
- Estimate worth of functions to select value-mismatched functions on which to focus the creativity phase.
Tools: Value Index (function cost/function worth)

Typical Outcome:

This phase focuses the team on validating that the project satisfies the need and objectives of the customer. It provides a more comprehensive understanding of the project by focusing on what the project does or must do rather than what it is. The team identifies value-mismatched function(s) on which to focus in order to improve the project.

Creative Phase

Purpose:

Generate a quantity of ideas related to other ways to perform functions

Fundamental Question:

How else may the functions be performed?

Common Activities:

- Conduct creative warm-up exercises
- Establish rules that protect the creative environment being developed

Tools: Creativity “Ground Rules”

- Employ group idea stimulation techniques
- Generate alternate ideas that may improve value.

Tools: Brainstorming, Gordon Technique, Nominal Group Technique, TRIZ, Syntetics

Typical Outcome:

The team develops a broad array of ideas that provide a wide variety of possible alternative ways to perform the function(s) to improve the value of the project.

Evaluation Phase

Purpose:

Reduce the quantity of ideas that have been identified to a short list of ideas with the greatest potential to improve the project

Fundamental Question:

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

Common Activities:

- Clarify and categorize each idea to develop a shared understanding
- Discuss how ideas affect project cost, and performance parameters.

Tools: T- Charts

- Select and prioritize ideas for further development

Tools: Pugh Analysis, Kepner-Tregoe, Life Cycle Costing, Choosing by Advantages (CBA), Value Metrics

- Explain how ideas are to be written as stand-alone risk-reward investment proposals

Typical Outcome:

The team produces a focused list of concepts that warrant quality time to develop into value-based solutions that can be implemented into a project or a project feature.

Body of Knowledge

Development Phase

Purpose:

Further analyze and develop the short list of ideas and develop those with merit into value alternatives.

Fundamental Questions:

What is an informed description of each selected idea? What is the rationale for making this change? Which ones are mutually exclusive and are independent?

The selected ideas are developed into value alternatives that are clearly written so that the owner and other project stakeholders understand the intent of the alternative and how it benefits the project. Write-ups also identify any potential negative factors associated with the alternative. The alternative 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 alternative. The text should also identify other alternatives which may be enhanced or complemented by acceptance of an alternative. Issues addressed include reliability, customer convenience, quality control, capital cost, O&M cost, life cycle cost, schedule, risk, availability, political ramifications, and perception. Ideally, an action plan is developed for each alternative. The action plan should, at a minimum, include what needs to be done, who will do it, and when it will get done.

Common Activities:

- Compare the study conclusions to the success requirements established during the *Information and Function Analysis Phases*
- Prepare a written value alternative for each idea selected for further development
- Assess and allocate risk judgments and costs, where appropriate
- Conduct cost-benefit analysis
- Generate sketches and information needed to convey the concept
- Confirm that an alternative should be further developed
- Finish initial alternative development

- Develop an action plan to define implementation steps, dates, and responsibilities for each value alternative

Typical Outcome:

The Value Study team creates alternatives and low-, medium-, and high-risk scenarios and offers these alternatives to senior management as options that address the Pre-Workshop strategic objectives.

Presentation Phase

Purpose:

Present value alternatives to management team and other project stakeholders or decision makers.

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
- Compare the study conclusions to the success requirements established during the Information and Function Analysis Phases
- Offer to management “risk-reward” innovation scenarios to select value alternatives for implementation
- Exchange information with the project team
- Ensure management has full and objective information upon which they can make decisions
- Outline an anticipated implementation plan
- Prepare formal report

Common Value Study products include a briefing document, risk analysis; cost vs. worth comparisons; Present worth analysis; advantages vs. disadvantages

Typical Outcome:

Ensure management and other key stakeholders understand the rationale of the value alternatives. Also generate interest to sanction implementation.

Post-Workshop Activities

Implementation Activities

Purpose:

Ensure accepted value alternatives are implemented and that the benefits projected by the Value Study have been realized.

Fundamental Question:

What are the program changes, and how will the project team manage them?

Following delivery of the value study preliminary report, management and the project team should consider and agree upon the value alternatives 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 value teams.

Common Activities:

- Review the preliminary report
- Conduct an implementation meeting to determine the disposition of each value alternative.
- Establish action plans for those alternatives accepted and document the rationale for the rejected alternatives
- Obtain commitments for implementation
- Set a timeframe for review and implementation of each value alternative
- 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:

The project stakeholders determine what will be changed in the project as a result of

the Value Study. These are changes to the original concept or base case of a study, resulting from the value alternatives, that the project development will incorporate in future design or product development activities.

Value Study Follow-Up Activities

Purpose:

Follow up on implementation of the Value Study results and improve the application of a value methodology for future studies.

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
- Integrate Value Study results into organization's lessons learned or program reporting
- 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. This is a key step in learning what will help the organization become better at managing innovation.

Body of Knowledge

Roles and Responsibilities

Management

The aim of a value methodology is to increase organizational value through a union of strategy, tactics, and operations with emphasis on “customer need,” cost effectiveness, and/or profitability. The link between the Value Study and the organization is the role of management in value improvement. Two key management roles exist: Senior Management and the Value Manager.

Senior Management responsibilities are to provide clear leadership and make strategic expectations explicit in a purposeful and prioritized manner. Senior management should understand the potential benefit from a Value Study, approve the expenditure of resources necessary to support the study, and guide the implementation for approval of required funding necessary to realize the recommendations.

The roles and responsibilities of the Value Manager (an organization’s designated manager of value) vary throughout the life of the project. At all times the Value Manager should confirm that value methodology activities are coordinated and performed effectively in order to meet the goals and objectives of the organization. A value methodology can be used throughout project development with a different focus at each stage.

At the conceptual stage, a value methodology can be used to determine the cost versus the worth of basic project functions. At this early stage it is the Value Manager’s responsibility to ensure that all parties who have a vested interest in the project participate in the Value Study, including suppliers, customers, clients, end users, and possibly outside interests, in order to gain the total perspective of real ‘needs’ vs. ‘wants’ so as to provide the maximum value for the project being studied.

As the project approaches the design phase, a value methodology focuses more on the functions of each element or component within the detailed design, with the results of function analysis and creativity being more limited since

resources have been allocated and money spent. It is senior manager’s responsibility during a Value Study at this stage of the project to assess which value alternatives are economically feasible based upon the requirements of the customer or client. As a project moves into the implementation phase (construction or production), a value methodology process works to ensure changes are made. Although many projects can still benefit from a Value Study at this stage of a project, it is the responsibility of the Value Manager to encourage early involvement of the organizations that are affected by the changes to ensure the maximum benefit for any Value Study. For any given project, it is important that the senior management team be made aware that the earlier a Value Study can be performed, the more potential benefit there will be for the client or customer.

The roles and responsibilities of the Value Manager vary throughout the life of the project.

Another role of the Value Manager is to ensure that the proper amount of Pre-Workshop activities take place prior to any Value Workshop. These Pre-Workshop activities may not need the attention of the whole team. However, a successful Value Study is unlikely without proper planning and information

sharing so all interested parties have a clear understanding of the purpose and details of the project. This, again, is the responsibility of the Value Manager in charge of the project. If these details are properly communicated with the clients and customers involved, the potential for a successful Value Study is greatly increased.

Executive Review Board: Senior managers set the initial strategic goals for the Value Study and, at a later date, decide which outputs will be invested so they can be implemented. These managers do not always participate in the day-to-day working of the Value Study but are part of the overall value program.

Sometimes managers are designated as Sponsors or Champions to support a value study

and/or the value program within an organization.

Technical Champions: Those members of the Value Study team who are selected because of their technical expertise.

Value Team Members

Value Team members are expected to participate in a Value Study in the following ways:

- ◆ Participate in all meetings
- ◆ Gather information as requested
- ◆ Analyze information
- ◆ Identify functions
- ◆ Contribute ideas
- ◆ Evaluate ideas using their experience and expertise
- ◆ Develop alternatives
- ◆ Present results

Team Members' Responsibilities

1. Keep accurate notes as assigned by team leader
2. Consult with team leader on any problem that may handicap progress
3. Show respect through timely attendance
4. Share workload equally whenever possible
5. Be willing to admit if they don't know; but strive to get the answer. Don't be afraid to make mistakes
6. Stay focused - avoid tangents - follow the basic problem-solving steps and get help from Value Team Leader on what techniques may be most suitable for the particular problem
7. Don't waste time discussing whether or not a step should be used; do it and evaluate it all after the entire workshop
8. Understand the approach being taught and its purpose, including the reason for each step and the technique being applied
7. Do the job together as a team. Don't force individual solutions - sell them! Remember, there can be more than one solution to a problem

8. Be a good listener; don't cut people off and don't second guess what other people are going to say and what they are thinking

-
9. Bring all data that bears on the problem – some objective, some subjective. Keep an open mind and don't be a roadblock
 10. Be enthusiastic about the project and what it is that you are doing
 11. Do not attempt to take over as a Team Leader – be as helpful as possible. Remember, the leader already has a difficult job in trying to guide, control and coordinate the overall effort

Team Leader

The Value Team Leader will plan, lead, and facilitate the Value Study. Other key responsibilities are noted below.

This individual is also expected to have numerous skills and experience that are listed in Key Competencies for Value Practitioners (See Key Competencies for Value Practitioners). To ensure that the Team Leader is trained and qualified to lead the team, that person shall be a CVS (Certified Value Specialist) as certified by SAVE International, or equivalent, as defined elsewhere in this Standard.

Team Leader's Responsibilities

1. Ensure proper application of a value methodology and follow the Job Plan
2. Guide the team through the activities needed to complete the pre-study, the Value Study and the post study stages of a Value Study.
3. Delegate responsibilities as appropriate
4. Schedule follow-up team meetings and prepare the agenda
5. Keep team focused on specific topic
6. Keep team members involved in the discussion and the work that needs to be done
7. Keep all team members together whenever possible. It is desirable that everyone breaks together, to maintain team continuity
8. Be a catalyst to keep team moving and motivated. Be diplomatic; not dictatorial.

Standard Revision Process

The SAVE International *Value Standard* is intended to provide a practical guide to apply the principles of a value methodology in a consistent manner. It may be used by both practitioners and management.

The Value Standard, originally drafted in May 1997, 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. Prior to 2007, a formal process for reviewing and updating the Standard did not exist. As part of the 2007 Value Standard update, the following process was developed and adopted to address future updates.

Standard Responsibility

The SAVE International Director of Standards has the primary responsibility for managing the review process and updating the Value Standard and Body of Knowledge. The Director of Standards appoints and maintains a Standards Review Team of experienced practitioners, one member of which (excluding the Director) should be a Fellow of SAVE International who is actively practicing a value methodology full time. Another member will be a member of the Certification Board. The team shall have a minimum of three members (including the Director of Standards) and a maximum of seven members. This team will perform a review of the document and recommend improvements/changes to the Board of Directors.

The Standard and Body of Knowledge will be reviewed for possible updating every four years, concurrent with the installation of a new SAVE International President. The Director of Standards and the Standards Review Team will review the current Standard and report to the Executive Board any actions necessary to update the Standard. This action will be completed by the fall Board of Directors Meeting following the installation of the new President.

SAVE International members in good standing can, at any time, provide the Director of Standards with a written request to modify or update the Value Standard or Body of Knowledge. When this occurs, the Director of Standards and the Standards Review Team will review the request and provide a recommended plan of action to the Board of Directors.

Once the Board of Directors approves an action to update the Value Standards and Body of Knowledge, the following process will be used to amend the wording or content of this document:

1. The Board of Directors approves the specific areas of the Value Standards and Body of Knowledge to modify.
2. The membership of SAVE International is notified of the scope of changes under review via *Interactions*, a magazine published by SAVE International. The membership will direct all comments to the Director of Standards.
3. The Director of Standards may add up to a total of seven members to the Standards Review Team in order to ensure the proper expertise is present on the team to develop the changes.
4. The Director of Standards and the Standards Review Team will:
 - a. Develop specific changes to the Standards to address the areas approved by the SAVE Board.
 - b. Review the rest of the Standard to ensure that the changes do

not conflict with the rest of the document.

5. A Board of Director's Oversight Team comprised of the President, Executive Vice President, and VP of Education will review, provide comments, and issues a preliminary approval of the change.
6. Once the Oversight team has approved the changes, the changes will be submitted to the Certification Board, whose members will review, provide comments, and approve the changes.
7. Any changes recommended by the Certification Board are to be agreed to by the Director of Standards, Standards Review Team, and Board Oversight Team before the changes are taken to the SAVE International Board for final approval
8. The SAVE International Board of Directors will review, provide comments, and issue

the final approval of the change after any comments are addressed. Any changes made by the SAVE International Board of Directors will be resubmitted to the Certification Board for approval.

9. If, after going through this process, full agreement has not been reached, a special committee will be formed to resolve this issue. This committee, chaired by the President and comprised of the Certification Board Chair, the Executive VP, the VP of Education, the Dean of the College of Fellows, and the Director of Standards, will resolve any disputes.
10. Final revision will be posted on the SAVE International website followed by membership notification of the change.

Key Competencies for Value Practitioners

A Value Practitioner should understand the following principles and be able to effectively communicate them to management and team members. Mastery of these competencies will help ensure effective leadership of a wide range of multidisciplinary Value Study teams.

Value Principles

- Historical development of the Value Methodologies
- The relationship between an organization's strategies and a value methodology
- Fundamental value principles, methods, and job plans
- The relationship between value, functions, and solutions
- Function analysis
- Types of value
- Value drivers (e.g., cost, schedule, quality, risk, user attitudes etc.)
- Investment appraisal techniques
- Key thought-provoking questions
- Analysis through key financial ratios
- Strategic models, decisions, choices, and uncertainties
- Identification of causal relationships and their modeling
- Identification of attributes and value drivers
- Analysis of performance attributes (non-monetary factors that affect value)
- Defining the base case and benchmarking
- 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

Value Job Planning

- Major phases and activities in a Value Job Plan
- Purpose and objectives of each phase of the job plan
- Overview of techniques in a typical job plan

Strategic Problem/Opportunity Framing

- Reviewing the business case
- Discounted cash flow modeling

Function Analysis

- Purpose and need
- A "thing", "process", "product" or "project" and their functions
- Defining functions with active verb and measurable noun context
- Function classification
- Levels of abstraction
- Function Analysis System Technique (using how-why logic)

-
- If-Then and Caused-By logic flows of classical and technical FAST models, often termed “When”
 - The differences among various FAST diagrams and models (customer, technical, classical, hierarchical)
-

Function, Performance, Worth, Cost and Customer Attitude

- Purpose and need
 - Cost as resource expenditure
 - Performance-to-cost relationships hitchhiking
 - Cost-to-worth relationships
 - Cost-to-function allocation
 - Function worth identification and understanding
 - Cost-value relationships
 - Cost-value mismatches
 - Pareto analysis of major cost drivers
-

Creativity

- Purpose and need
 - Managing divergent thinking
 - Brainstorming techniques
 - Unrestricted idea generation
 - Large quantity of ideas is the goal
 - Suspending judgment until the evaluation phase
 - Other idea generation techniques
-

Evaluation

- Purpose and need
 - Managing convergent thinking
 - Building greater understanding of other people's ideas
 - Evaluation methods and techniques
-

VM Study Recommendation

Documentation

- Document the key information related to a Value Study recommendations
 - ◆ Original Concept
 - ◆ Proposed Change
 - ◆ Discussion of benefits of the change
 - ◆ Cost impact analysis
 - ◆ Sketches
 - ◆ Implementation considerations
 - ◆ Follow-up actions
 - Investment appraisal
 - Technical implementation feasibility
 - Political implementation feasibility
 - Initial and subsequent revenue impacts
 - Initial and subsequent cost impacts
 - Initial and subsequent schedule impacts
 - Life cycle cost analysis
 - Initial and subsequent impacts on other key attributes
 - Sketches and other communication aids
-

Presentation

- Purpose and need
-

-
- The relationship between a value methodology and the needs of senior management decision makers
 - Presentation skills
 - Content organization
 - Implementation plan
 - Change management strategies
 - Explanation of value tracking process

- Educating the organization in the value methods
- Recognizing Value success and failures and how to learn as a team
- Sharing value insights with the community and stakeholders
- Periodic Value Program review for continuous improvement

Management of Value Programs

- Management roles and responsibilities
- Reporting responsibilities
- Establishing links between Value Study outcomes and organizational results
- Value training
- Facilitation skills training
- Organizing and implementing Value programs
- Team Leader skill development
- Strategic diagnosis and problem/opportunity identification techniques
- Selecting and leading Value Studies
- Coordinating Value Study logistics
- Facilitator skills
- Tracking Value Study implementation results and other reports as necessary
- Coordinating with other organization or client quality improvement programs

VM Glossary

In 1985, the Lawrence D. Miles Foundation created the College of Fellows of the Society of American Value Engineers (SAVE), now SAVE International, with the specific intent of developing a Glossary of Terms related to value. Over a two year period, approximately 10 Fellows worked individually and in teams to

define, refine and finalize a glossary of value related terms. In 2006, the Glossary was reviewed by the Certification Board and those definitions most essential to the current application of value methodologies were identified and refined where necessary.

ASSOCIATE VALUE SPECIALIST (AVS)	AVS is a recognition designed for individuals who are new to the value methodology. An AVS is encouraged to progress to VMP or CVS certification.
CERTIFIED VALUE SPECIALIST (CVS)	CVS is the highest level of certification attainable through SAVE International. Designation is reserved for Value Specialists and Value Program Managers who have demonstrated expert level experience and knowledge in the practice of the value methodology.
COST:	The expenditure of resources needed to produce a product, service, or process.
COST, LIFE CYCLE:	The sum of all development acquisition, production or construction, operation, maintenance, use, and disposal costs for a product or project over a specified period of time.
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 product, system, structure or facility.
FUNCTION:	The original intent or purpose that a product, service or process is expected to perform. It is expressed in a two-word active verb/measurable noun structure.
FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST):	<p>A graphical representation of the dependent relationships between functions within a project.</p> <ul style="list-style-type: none"> ▪ <i>Classical FAST Model:</i> A function displaying the interrelationship of functions to each other in a "how-why" logic. This was developed by Charles Bytheway. ▪ <i>Hierarchy Function Model:</i> A vertical "hierarchical" chart of functions. This places the basic function at the top. The function of each major system is placed beneath the basic function. The functions that support each of these functions are then placed on the next row. This process is continued until the team feels the level of detail is sufficient for the intent of the study. ▪ <i>Technical FAST Model:</i> A variation to the Classical FAST that adds "all the time" functions, "one time" functions and "same time" or "caused by" functions. ▪ <i>Customer-Oriented FAST Model:</i> This variation of the FAST diagram was developed to better reflect that it is the customer that determines value in the function analysis process. Customer-oriented FAST adds the supporting 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.
FUNCTION ANALYSIS:	The process of defining, classifying and evaluating functions.

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 COST:	The expenditure of resources to perform the function.
FUNCTION, HIGHER ORDER:	The specific goals (needs) for which the basic function(s) exists.
FUNCTION, LOWER ORDER (ASSUMED or CAUSATIVE):	The function that is selected to initiate the project and is outside the study scope.
FUNCTION, SECONDARY:	A function that supports the basic function and results from the specific design approach to achieve the basic function.
FUNCTION, SELL:	A function that provides a subjective expression of something that is to be achieved. In Function Analysis, sell functions are qualitative and are described using a passive verb and a non-measurable noun. Sell functions are also sometimes referred to as "aesthetic" functions.
FUNCTION, WORK:	A function that provides an objective expression of something that is to be accomplished. In Function Analysis, work functions are quantitative and are described using an active verb and a measurable noun. Work functions are also sometimes referred to as "use" functions.
FUNCTION WORTH:	The lowest overall cost to perform a function without regard to criteria or codes.
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.
PERFORMANCE:	The capacity of a product to fulfill its intended function. Factors such as reliability, maintainability, quality and appearance are some examples.
PROJECT:	A temporary endeavor undertaken to create a unique product, service, or result. 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 or project.
SAVE INTERNATIONAL CERTIFIED PROFESSIONAL:	For the purpose of a Value 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 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:	An expression of the relationship between function and resources where function is measured by the performance requirements of the customer and resources are measured in materials, labor, price, time, etc. required to accomplish that function.
VALUE ANALYSIS:	The application of value methodology to an existing project, product or service to achieve value improvement.
VALUE ANALYST:	See VALUE PROFESSIONAL.
VALUE ENGINEER:	See VALUE PROFESSIONAL.
VALUE ENGINEERING:	The application of value methodology to a planned or conceptual project or service to achieve value improvement.
VALUE INDEX:	A ratio that expresses function cost ÷ function worth. This ratio is used to determine the opportunity for value improvement, which is usually identified in the Function Analysis Phase.
VALUE MANAGEMENT:	The application of value methodology by an organization to achieve strategic value improvement.
VALUE METHODOLOGY:	A systematic process used by a multidisciplinary team to improve the value of projects through the analysis of functions. See Value Engineering, Value Analysis and Value Management.
VALUE METHODOLOGY ALTERNATIVE (or ALTERNATIVES):	An alternative or alternatives prepared by the value study team and presented to management to provide financial and/or performance improvements and which is within acceptable terms and conditions of the Value Study.
VALUE METHODOLOGY PRACTITIONER (VMP):	VMP recognizes individuals with basic value training and some experience in the application of the methodology. Value methodology practitioners participate in or lead Value Studies.
VALUE PROFESSIONAL:	One who applies the value methodology principles to study and search for value improvement. Synonymous with value analyst, value engineer, value practitioner, or value specialist.
VALUE PRACTITIONER:	See VALUE PROFESSIONAL.
VALUE STUDY:	The application of a value methodology by SAVE International certified professionals using the Value Job Plan.

References

Publications Catalog, SAVE International: Describes textbooks and educational materials on Value Methodologies and related programs. This catalog 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 value 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.

Value 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.org>

Lawrence D. Miles Value Foundation Internet website: <http://www.valuefoundation.org>
Techniques of Value Analysis and Engineering, Lawrence D. Miles

Appendix A – FAST Diagramming

In Value Methodology, functions are defined with two words, a verb and a noun. This enhances specific understanding. The noun, if possible, should be measurable and thereby permit quantification for establishing worth.

EXAMPLES

<u>Items</u>	<u>Activity</u>	<u>Function</u>	<u>Unit of Measure</u>
Table	Holds Items	Support Weight	pounds
Screwdriver	Insert Screws	Transmit Torque	ft/lbs.
Electric Wire	Connect Parts	Transmit Current	amperage
Structural Beam	Hold Floor	Support weight	pounds
Report	Mail Report	Communicate Data	words

The first step is to define all the functions that the VM study team believes are involved in the project. Then functions are classified as basic or secondary. For small projects, this is a relatively easy task. For complex projects it becomes more involved and literally hundreds of function can be defined on this random basis. It was for these complex projects, that FAST diagramming was developed.

FAST (Function Analysis Systems Technique) is a technique which specifically illustrates the relationships of all functions within a specific project utilizing a How-Why logic pattern based on intuitive logic. The original FAST is referred to as Classical FAST. The second, known as Technical FAST, was developed to separate functions occur only one time, and those "all the time" functions that are active whether the system is operative or not. These "all the time" functions are shown separately from the main function logic. The third and latest, User/Customer FAST, is always headed by four supporting functions, Assure Convenience, Satisfy User, Assure Dependability and Attract User.

The following pages illustrate the format and labeling of the three types of FAST diagrams.

**For membership information
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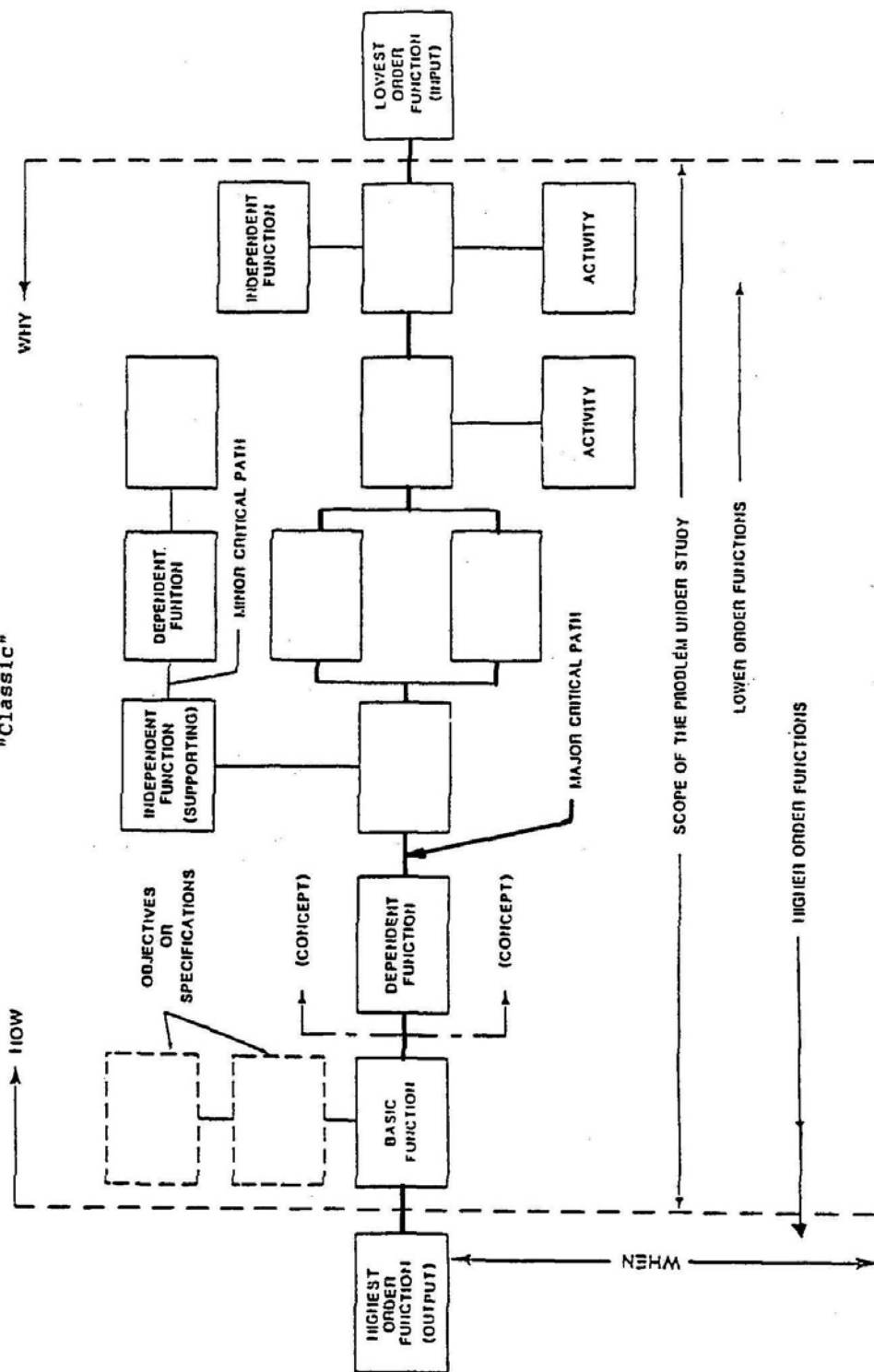
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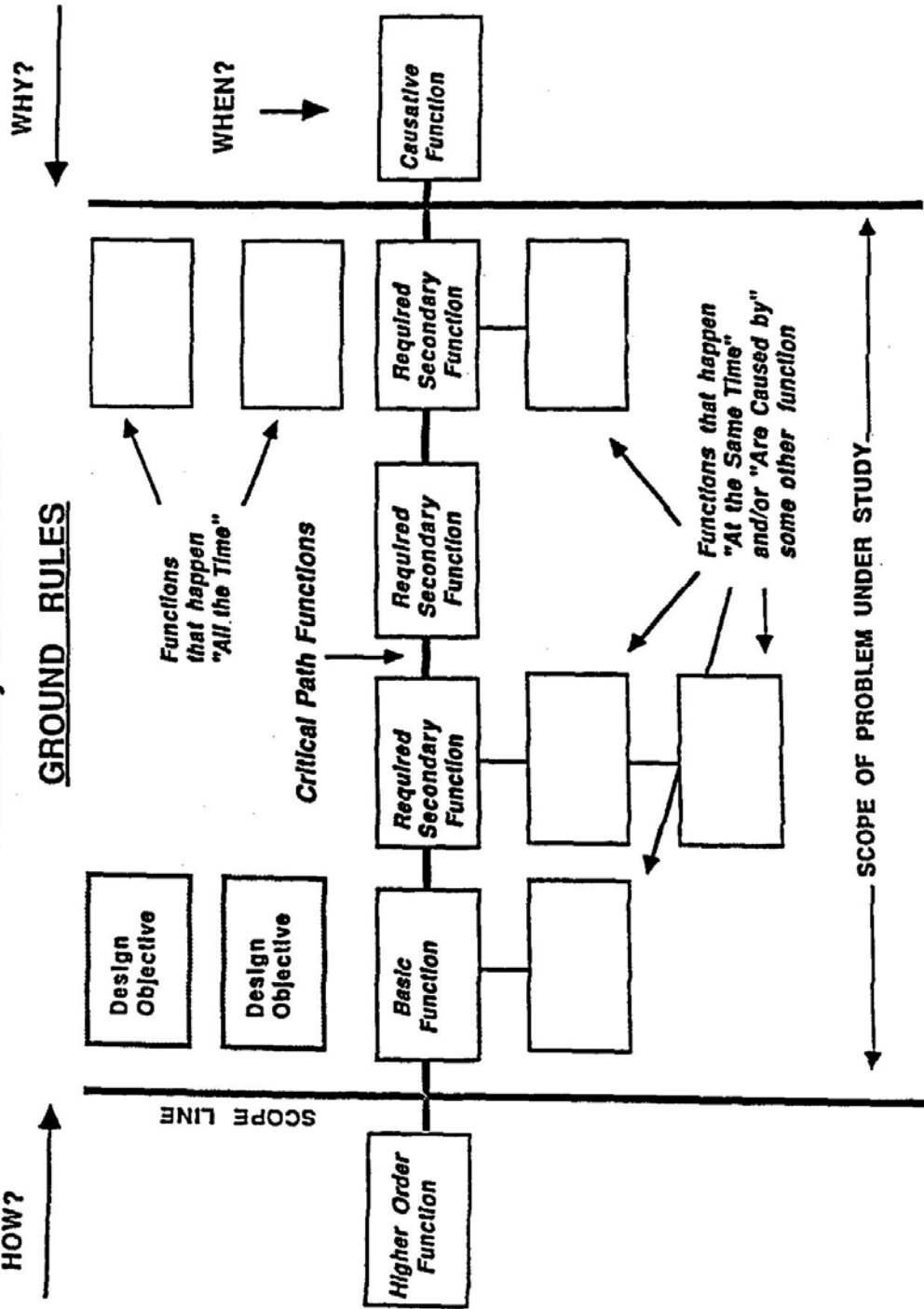
Come visit our home page at: <http://www.value-eng.org>

THE BASIC FAST MODEL

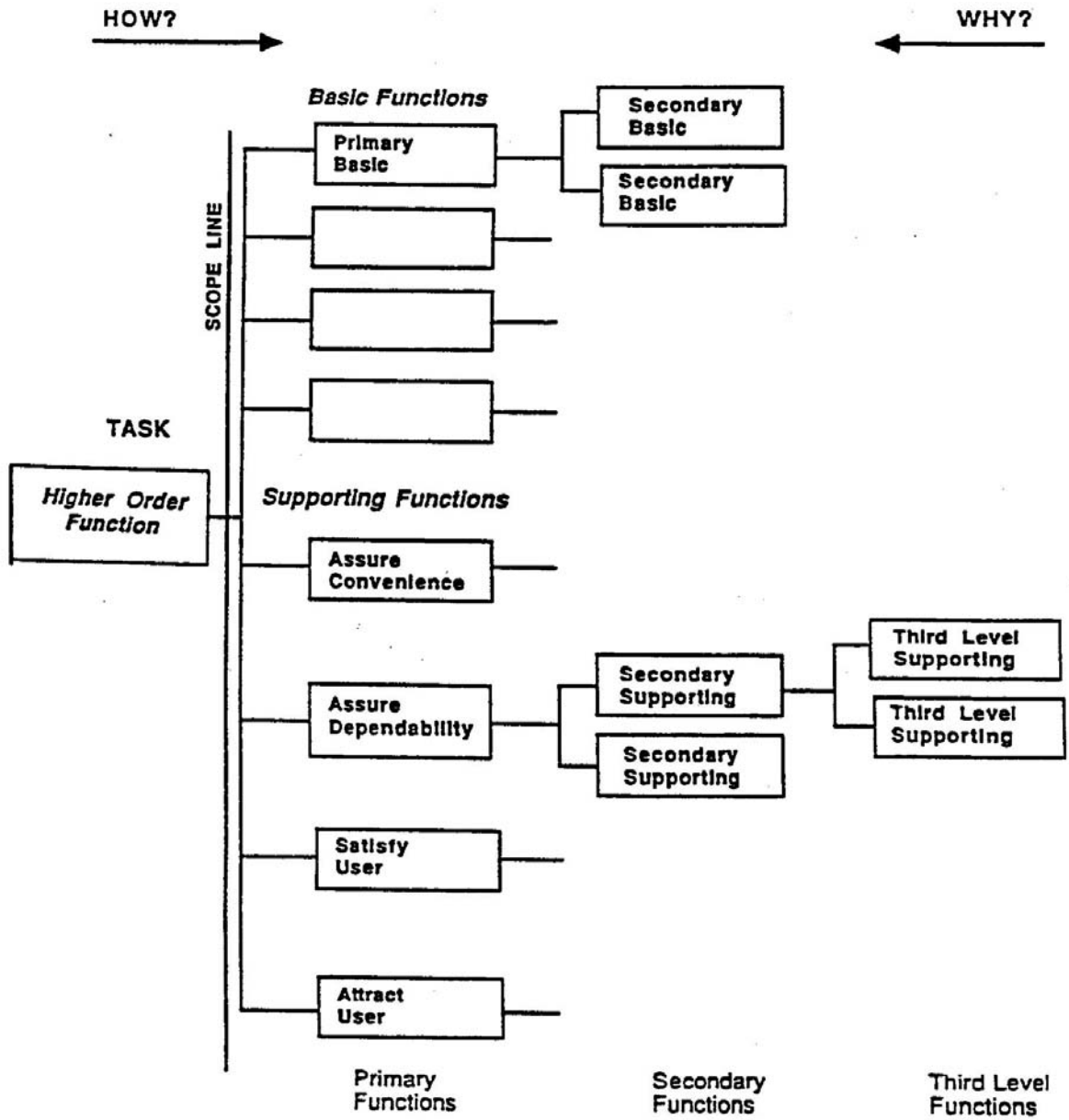
"Classic"



FUNCTION ANALYSIS SYSTEMS TECHNIQUE
Technically-Oriented FAST



FUNCTION ANALYSIS SYSTEMS TECHNIQUE Customer-Oriented Fast



What is an Essay?

Introduction: Statement of Thesis

Essays like paragraphs develop one main idea. The main idea of an essay is called a *thesis statement*, and it is expressed in the introduction, usually at the end of the introduction. Like the main idea of a paragraph, a thesis is a general statement. The statement that serves as a thesis for an essay is often more general than the topic sentence of a paragraph but not as general as a thesis of a book.

An *introduction* serves as a contract between a writer and his or her readers. In the introduction, a writer makes specific commitments that must be fulfilled. The most important of these is the thesis statement, which commits the writer to a specific focus. In effect, it provides the reader with an accurate expectation of what the writer plans to do – the main idea that the writer plans to develop.

In general, a good introduction accomplishes three purposes:

1. It attracts the reader's interest,
2. It provides the reader with background definition,
3. It focuses the reader's attention on the main idea of the essay.

Body: Development of Thesis

The body of a unified coherent essay consists of a number of related paragraphs that develop the thesis.

The individual sentences within each paragraph support the main idea (topic sentence) of the paragraph and the paragraphs support the main idea (thesis) of the essay.

A writer develops the topic sentence of a paragraph by discussing, explaining and expanding the idea that it expresses. A writer develops the thesis of an essay in the same way. Both topic sentences and thesis statements are general statements that must be supported by specific facts, details, and examples. In an essay, a writer usually devotes a paragraph to each major supporting point. Each of these supporting points is directly related to the thesis and helps develop it. But each major supporting point is also developed individually as a paragraph.

Writers often develop the paragraphs that make up the body of an essay by using the familiar methods of development – narration, description, illustration, comparison/contrast, classification, cause and effect, and definition. Although sometimes you may use a single method for an entire essay, it is much more likely that you will use a combination of methods.

Conclusion: Re-emphasis of Thesis

The conclusion of an essay, like the conclusion of a paragraph, gives the reader a sense of completion. Conclusions usually refer back to the introduction or, at least re-emphasize in some way the thesis stated in the introduction. Often the conclusion briefly summarizes the thesis and the major supporting points. A good conclusion always confirms the audience's understanding of what they have read by reminding them of the writer's purpose. Like introductions, conclusions provide readers with an overview.
