



Designation: E1699 – 10

# Standard Practice for Performing Value Analysis (VA) of Buildings and Building Systems and Other Constructed Projects<sup>1,2</sup>

This standard is issued under the fixed designation E1699; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This practice covers a procedure for defining and satisfying the functions of a project.

1.2 A multidisciplinary team uses the procedure to convert stakeholder constraints, needs, and desires into descriptions of project functions and then relates these functions to revenues and cost.

1.3 Examples of costs are all relevant costs over a designated study period, including the costs of obtaining funds, designing, purchasing/leasing, constructing/installing, operating, maintaining, repairing, replacing and disposing of the particular building design or system (see Terminologies E631 and E833). While not the only criteria, cost is an important basis for comparison in a value analysis study of a project. Therefore, accurate and comprehensive cost data is an important element of the analysis.

1.4 This is a procedure to develop alternatives that meet the project's functions. Estimate the costs for each alternative. Provide the owner/user/stakeholder with specific, technically accurate alternatives, appropriate to the stage of project development, which can be implemented. The owner/user/stakeholder selects the alternative(s) that best satisfies their constraints, needs and desires.

1.5 Apply this practice to an entire project or to any subsystem. The user/owner/stakeholder can utilize the VA procedure to select the element or scope of the project to be studied.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>3</sup>

E631 Terminology of Building Constructions

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.81 on Building Economics.

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<sup>2</sup> Value analysis (VA) is also referred to as value engineering.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

E833 Terminology of Building Economics

E917 Practice for Measuring Life-Cycle Costs of Buildings and Building Systems

E1369 Guide for Selecting Techniques for Treating Uncertainty and Risk in the Economic Evaluation of Buildings and Building Systems

E1557 Classification for Building Elements and Related Sitework—UNIFORMAT II

E2013 Practice for Constructing FAST Diagrams and Performing Function Analysis During Value Analysis Study

## 3. Summary of Practice

3.1 This practice outlines the procedures for developing alternatives to a proposed design that best fulfill the needs and requirements of the owner/user/stakeholder of the building or building system. The practice shows how to identify the functions of the project and its systems; develop alternatives to fulfill the project's functions; and evaluate the alternatives in their ability to satisfy defined criteria.

## 4. Significance and Use

4.1 Perform VA during the planning, design, and construction phases of a project.

4.2 The most effective application of value analysis is early in the design phase of a project. Changes or redirection in the design can be accommodated without extensive redesign at this point, thereby saving the owner/user/stakeholder's time and money.

4.3 During the earliest stages of design, refer to value analysis as value planning. Use the procedure to analyze predesign documents, for example, program documents and space planning documents. At the predesign stage, perform VA to define the project's functions, and to achieve consensus on the project's direction and approach by the project team, for example, the owner, the design professional, the user, and the construction manager. By participating in this early VA exercise, members of the project team communicate their needs to the other team members and identify those needs in the common language of functions. By expressing the project in these terms early in the design process, the project team minimizes miscommunication and redesign, which are costly in both labor expenditures and schedule delays.

4.4 Also perform value analysis during schematic design (up to 15 % design completion), design development (up to 45 % design completion), and construction documents (up to 100 % design completion). Conduct VA studies at several stages of design completion to define or confirm project functions, to verify technical and management approaches, to analyze selection of equipment and materials, and to assess the project's economics and technical feasibility. Perform VA studies concurrently with the user/owner's design review schedules to maintain the project schedule. Through the schematic design and design development stages, the VA team analyzes the drawings and specifications from each technical discipline. During the construction documents stage, the VA team analyzes the design drawings and specifications, as well as the details, and equipment selection, which are more clearly defined at this later stage.

4.5 A value analysis study performed at a 90 to 100 % completion stage, just prior to bidding, concentrates on economics and technical feasibility. Consider methods of construction, phasing of construction, and procurement. The goals at this stage of design are to minimize construction costs and the potential for claims; analyze management and administration; and review the design, equipment, and materials used.

4.6 During construction, analyze value analysis change proposals (VACP) of the contractor. VACPs reduce the cost or duration of construction or present alternative methods of construction, without reducing performance or acceptance. At this stage the alternatives presented to the owner/user/stakeholder are called value analysis change proposals. To encourage the contractor to propose worthwhile VACPs, the owner and the contractor share the resultant savings when permitted by contract.

4.7 The number and timing of VA studies varies for every project. The owner/user/stakeholder, the design professional, and the value analyst determine the best approach jointly. A complex or expensive facility, or a design that will be used repeatedly, warrants a minimum of two VA studies, performed at the predesign and design development stages.

## 5. VA Team

5.1 The Value Analysis Team Leader (VATL) plays a key role in the success of a VA study and is responsible for managing all aspects of the effort. A VA team leader needs training in value analysis and experience as a team member, leader, or facilitator on previous studies. Seek a person with strong leadership, management, and communications skills.

5.2 The size and composition of the VA team depends on the project being studied and the stage of design development.

5.3 If warranted, the VA team should consider a separate Value Analysis Team Facilitator (VATF). The role of the VATF is to assist the VATL by leading each workshop session in accordance with the overall VA job plan.

5.4 Select persons of diverse backgrounds having a range of expertise and experience that incorporates all the knowledge necessary to address the issues the VA team is charged to address.

5.5 Select technical disciplines for a VA team that are similar to the technical disciplines on the design team for the stage of completion being reviewed. Include professionals who are knowledgeable in the financing, cost, management, procurement, construction, and operation of similar buildings or systems.

5.6 The owner decides whether to create the VA team using members of the project team, that is, the owner/user/stakeholder, the planner, the design professional, and the construction manager, or using professionals who have not been involved in the design and have no preconceived ideas.

5.7 The owner/user/stakeholder and the VATL agree upon the team composition.

5.8 Determine the duration of each team member's participation based upon the design completion stage, the amount of information available to the VA team, and the interrelationship among the disciplines.

5.9 Decisions reached from the standpoint of one discipline frequently have a major impact on the approach the designer will take for another discipline. Thus, the multidisciplinary interaction is necessary. The collective knowledge and experience of the multidisciplinary team create the synergy that helps this procedure to be successful. The team is dynamic, marked by continuous productive activity which promotes positive change. Individual's personalities are important to the success of the VA team, as well. Positive attitudes, technical knowledge, education, and experience are important to the outcome of the study.

5.10 Make final the team composition and level of participation after receiving the project documents and knowing specifically what information is available for the Workshop Effort.

## 6. Procedure

6.1 A value analysis study has three sequential periods of activity—Pre-Workshop Preparation Effort, Workshop Effort, and Post-Workshop Effort. Within these activities, the VA team follows a formal plan, as shown in Fig. 1, and as described in the following:

6.1.1 *Pre-Workshop Preparation Effort.*

6.1.2 *Workshop Effort:*

6.1.2.1 Information phase.

6.1.2.2 Function identification and analysis phase.

6.1.2.3 Creative phase.

6.1.2.4 Evaluation phase.

6.1.2.5 Development phase.

6.1.2.6 Presentation phase.

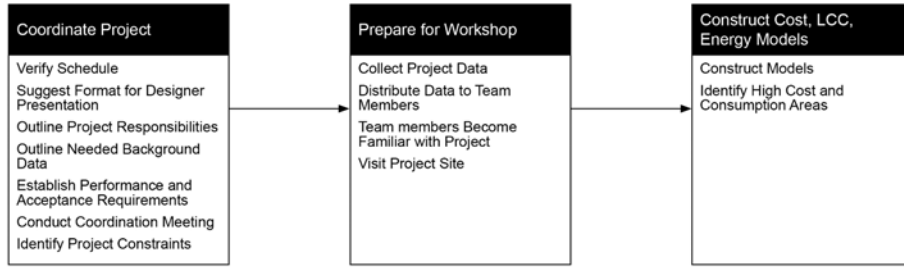
6.1.3 *Post-Workshop Effort:*

6.1.3.1 Implementation phase.

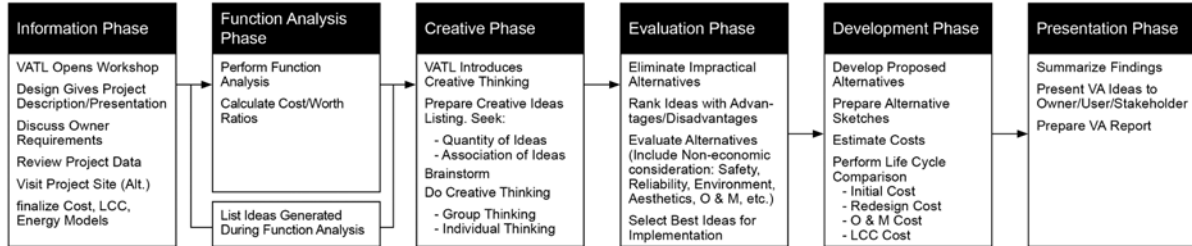
6.2 *Pre-Workshop Preparation Effort:*

6.2.1 The VA team prepares for the Workshop Effort to ensure that events are coordinated; that appropriate information is available for the VA team to review; and that the design professional and construction manager are prepared to present a description of the project on the first day of the workshop.

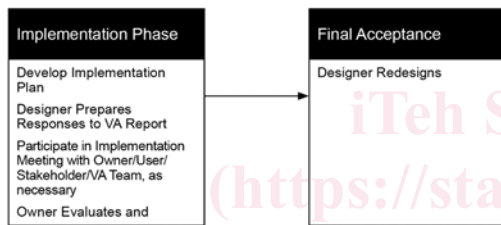
**Pre-Workshop Preparation Effort**



**Workshop Effort**



**Post-Workshop Effort**



**FIG. 1 Value Analysis Study Plan**

6.2.2 The design professional is an integral part of the value analysis process, whether the design professional participates throughout the process, or becomes involved at specific milestones. The VA team is only effective when it communicates with the design professional, the construction manager and the owner/user/stakeholder, and presents alternatives for their consideration.

6.2.3 Preparing for the Workshop Effort, the VATL coordinates the VA study schedule with the design professional and the owner to accommodate the project schedule.

6.2.4 The VATL, the owner, the design professional, and the construction manager, as appropriate, meet to discuss the scope of the workshop, the objectives of the workshop, and the constraints that have been imposed on the project by the user/owner/stakeholder or regulatory agencies.

6.2.5 The owner, the design professional, and the construction manager, as appropriate, establish performance and acceptance requirements for evaluating alternatives during the evaluation phase of the Workshop Effort. Select these criteria from items such as initial construction cost, life-cycle cost, aesthetics, ease of operation and maintenance, safety, and schedule adherence.

6.2.6 The owner, the VATL, the design professional, and the construction manager, as appropriate, determine the need for a site visit by one or more team members and establish the schedule for this tour. If the Workshop Effort is not going to

occur near the project site, it is appropriate to schedule this effort prior to the workshop effort.

6.2.7 The VATL collects the project study material from the design professional. Examples of information needed from the design professional include, but are not limited to:

- Owner's design standards
- Design criteria
- Project budget
- Design calculations
- Alternatives considered
- Technical memoranda, as appropriate
- Permit requirements
- Regulations governing construction
- Maintenance requirements
- Equipment data sheets
- Estimate of construction cost
- Quantity take-off
- Applicable building codes
- Architectural concepts
- Construction phasing
- Soil borings
- Operations requirements
- Project schedules
- Pre-purchase and accelerated purchase documents

6.2.8 Using the most current, preliminary estimate presented by the project team, the VATL develops the capital cost model, which organizes initial construction costs by element and trade to determine where high costs are expended (see Classification E1557). Display the estimated construction costs graphically on this cost model by system and subsystem. The