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Expanding Your VE Knowledge
The Value Discipline

EDITORIAL

Jack V. Michaels, Ph.D., P.E., CVS

The theme of this issue of *Value World* is expanding your VE knowledge. Let us begin with a little test. What does the word *discipline* in the title of this editorial connote to you?

Webster offers many definitions for the word, among which are “branch of knowledge or learning” and “training that develops self-control, character or orderliness or efficiency.” If you did not select both definitions as your understanding of *discipline*, you need to broaden your educational horizons.

As part of the process, I suggest you read two books by Norman R. Augustine, who retired recently as chair of Lockheed Martin Corp. Augustine offers invaluable guidance on both value and discipline in his books *Augustine’s Laws* and *Augustine’s Travels*.

In *Augustine’s Laws*, he states that most problems are self-imposed and usually can be traced to lack of discipline. The foremost attribute of successful programs is discipline: discipline to evolve and proclaim realistic cost goals, discipline to forego appealing but nonessential features, discipline to minimize engineering changes, discipline to do thorough failure analysis, discipline to abide by test protocols, and discipline to persever in the face of problems that will occur in even the best-managed programs.

The key message in *Augustine’s Laws* is: “Give people the responsibility, means, and authority to do the job you assign them; hold them accountable for their actions; and reward them commensurately with their performance.”

In *Augustine’s Travels*, he describes the type of person who gives value. I recommend the portrayal as further guidelines while you upgrade your value education.

Augustine has observed that value givers are professional, ethical, innovative, competent, motivated, and energetic people. Above all, they exhibit the quality of staying focused on the job at hand.

Augustine has observed over his years in business that too many people spend too much time worrying about “the next step,” about how they are going to “get ahead in life.” To Augustine, the people who give the best value are those who treat each and every job as if it were the last job they were ever going to have, and do it the best they know how.

Not only do these people do their jobs well, but by doing so, they help others do their jobs well. They do not divert their energy scheming how to make certain their efforts are noticed. All of us have so many hours a day to think and only so many calories of energy to burn. So we ought to devote little of that time and energy plotting how to get ahead. Augustine’s motto is: “Do your current job so well that everyone will notice you and want you to move up.”

Augustine sums this up with a poem he often shares with business colleagues:

*Every morning in Africa a gazelle wakes up.\r\nIt knows it must outrun the fastest lion or it will be killed.*

*Every morning in Africa a lion wakes up.\r\nIt knows it must outrun the slowest gazelle or it will starve.*

*It doesn’t matter whether you’re a lion or gazelle,\r\nWhen the sun comes up, you’d better be running.*

As people in the garment industry used to say, “Listen to the man; he knows what he’s talking about.” Aside from the breadth and depth of knowledge and experience Augustine displays in his books, he is the consummate storyteller, a modern-day Hans Christian Andersen.

The *Value World* editorial staff has assembled a number of informative value stories to help you broaden your educational horizons. Enjoy these articles as you increase your understanding of the value discipline, and keep running.

Good night and 30.
Quest for Value

Berge Tahmazian, P.E., CVS

ABSTRACT

This paper discusses the relation of value analysis to other management approaches and suggests an integrated approach for the best balance of value for customers as well as for business.

1.0 INTRODUCTION

In the last six years, I have attended many value society conferences, or read the proceedings of the speakers, in the United States and Europe. I was intrigued to hear topics at these conferences that, at first glance, seemed very remote or no relation at all to value analysis (VA). I was at ease relating team building, creativity, or design to cost with value analysis. I also expected subjects such as quality, total quality management, and quality function deployment to be mentioned, but was amazed to hear, at these conferences, subjects such as project management, concurrent engineering, process improvement, quality assurance, and even ISO-9000. I was also confused when, especially in Europe, methods such as benchmarking and reengineering were presented at value society conferences.

What is the relation of value analysis to all these disparate methods? Is it possible to integrate, or at least reconcile, value analysis with other approaches? Is value analysis a technique? A methodology? A philosophy? Where does it stand? Where does it fit? Where and when can it be used most efficiently? No clear answers were available to these pertinent questions. There seemed to be a need for definitive thought to integrate these different approaches within a comprehensive concept.

2.0 METHODOLOGY

My attempt to answer these questions brought me to search for the coherent elements in these different methods. My study consisted, through an extended bibliographical research (mainly in American and European value society proceedings) and my experience at Hydro-Quebec, of finding the most recognized definitions and descriptions of each approach, and sorting out the essential elements and grouping them by common or distinctive features. The use of an affinity diagram allowed me to better understand the possibilities of integration of the different approaches and also the specificity of each approach and its complementarity to others.

3.0 CHARACTERISTICS OF DIFFERENT MANAGEMENT APPROACHES

3.1 Value Analysis, Value Engineering, Value Management

Value analysis, as defined at Hydro-Quebec, is a systematic method to obtain the best ratio of satisfaction of a customer's needs and the cost of executing the product or service. It involves a rigorous approach and a multidisciplinary team (Bechard et al. 1996).

Since the first pioneering work of Lawrence D. Miles in the late forties, value analysis has evolved, with the changing focus of management, to become a comprehensive concept used all over the world.

Management focus shifted slowly from production and costs in the fifties toward national and international competitiveness in the sixties and seventies, and then toward quality in the eighties, and finally toward value in the nineties. Value analysis followed this trend (at least in some countries) and shifted from value analysis to value engineering to value management. This is illustrated in Table 1 from Michael Agopian (Agopian 1994).

The items in this table can be considered as the key elements of value analysis. The most important ones are satisfaction of customer’s needs/reduced costs, function analysis, job plan, multidisciplinary team, and creativity.

Value analysis (used as a generic word including value engineering [VE], value management [VM], design to cost [DTC], and design to life cycle cost [DTLCC]) covers a very large spectrum of applications depending on where, why, and how it is applied, as shown in Figure 1, translated from Philippe Pumir (Pumir 1992).

Going further and broader than value analysis as such, value management is defined by R.D. Richens as “a structured and disciplined approach that ensures the correct balance of performance, cost and delivery is in place to meet market requirements.” Value management increases value for the customer and the business. It welds the market, the customer, and the business (Richens 1994).

3.2 Total Quality Management

Total quality management (TQM) is mainly based on W. Edwards Deming’s philosophy of customer focus and his 14 management principles derived from this philosophy.

At Hydro-Quebec, quality management is defined as “a management approach aimed at totally meeting customer’s needs, at least cost, through greater empowerment of human resources and control of work processes.” This approach is illustrated in Hydro-Quebec’s quality management model presented in Figure 2, which shows the key elements of the model and their relation to the seven categories of the Malcolm Baldrige National Quality Award. The model highlights the key elements: four principles embodying the philosophy—customer focus (internal and external), respect for people, management by fact, and continuous
improvement and three management thrusts—policy management, work processes, and quality assurance—with a core of quality improvement and improvement teams.

For Hydro-Québec, "quality management is both a philosophy through its four principles and a rigorous management system based upon scientific analysis and improvement procedures promoting strong results" (Hydro-Québec 1991).

Total quality management is thus a long-term philosophy and prescribes a set of management principles, but is also flexible about techniques and tools to use. This flexibility constitutes its strength and its weakness at the same time. Techniques should be at the service of philosophy and principles. Prescriptive techniques can trap an approach in a closed, rigid system. On the other hand, TQM implementations have often failed because no structured techniques and tools were used to actualize it. We will discuss further how VA methodology can be complementary to TQM and help things happen.

### 3.3 Quality Function Deployment

Quality function deployment (QFD) was initially developed in Japan to encourage engineers in the automotive industry (Toyota) to consider quality early in the design process (Burton 1994).

QFD is based on the principle that products or services should be designed to meet customers' needs. With a set of basic tools (the house of quality, as illustrated on Figure 3, from Cohen 1995), a multidisciplinary team has to:

#### Figure 1

<table>
<thead>
<tr>
<th>Different VA approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Need</strong></td>
</tr>
<tr>
<td>VEC (VE customers)</td>
</tr>
<tr>
<td>CICF (Perform, spec)</td>
</tr>
<tr>
<td>LCC (Life cycle cost)</td>
</tr>
<tr>
<td>DTC (Design to cost)</td>
</tr>
</tbody>
</table>

Translated from Philippe Pumir
• Identify and prioritize customer's needs;
• Design or redesign a product or service to meet these needs;
• Determine the characteristics of the product that contribute to best satisfy these needs;
• Position the product or service in relation to the competition (Bechard 1996).

The key elements of QFD are customer needs, multifunctional team, product characteristics, competitive positioning, and house of quality.

We already see the strong similarities of value analysis to QFD and how QFD can help value analysis to clarify the needs of the customers and their satisfaction, and the position of the competition, in an even more structured way than value analysis alone. In the same way, value analysis can help QFD to better define the functions of a product or service that are important to the customers.

3.4 Project Management
Project management often is briefly defined as the management (planning, organizing, deciding, and controlling) of content, cost, and schedule by a project team.

The Project Management Institute defines it as "the application of knowledge, skills, tools, and techniques in order to meet or exceed stakeholder requirements from a project."

Project management is a process or set of integrated sub-processes intended to manage the project's scope, time, cost, quality, human resources, communication, risk, and procurement. Many sophisticated tools have been developed to deal with the hard side of project management and help it to shift from an art to more of a science.

The challenge of project management is becoming the management of projects. This is not merely a twist on words. The difference in their methodologies is real, as explained by Rudolph G. Boznak (Boznak 1996):

Project management is the direction and supervision of a project. It is a discipline, project-wide, and a tactical issue. Management of projects, on the other side, is the integration, coordination, communication, and simultaneous control of multiple projects. It is an operating environment, enterprise-wise, and a strategic issue. It requires a holistic approach.

The key elements of project management, including the concept of management of projects, are stakeholder, content, cost, schedule, team, and tactical or strategic issues.

3.5 Concurrent Engineering
Concurrent engineering (CE), sometimes also called simultaneous engineering, is a systematic approach aimed at integrating, from the beginning, all aspects of the life cycle of a product: market requirement, planning/conception, advanced development/product concept, design, prototype manufacturing/testing, preparation of main production, and production support.

This integration is done by decompartmentalizing (knocking

![Figure 2](Hydro-Québec's TQM Model)
Figure 3
The House of Quality

<table>
<thead>
<tr>
<th>A. Customer needs and benefits</th>
<th>D. Relationships (impact of technical response on customer needs and benefits)</th>
<th>B. Planning matrix (market research and strategic planning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Technical response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Technical correlations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Technical matrix</td>
<td>Technical response, technical benchmarks, technical targets</td>
<td></td>
</tr>
</tbody>
</table>

Originally from Lou Cohen (1995)

3.6 Reengineering
Business process reengineering, often called reengineering, was defined by Michael Hammer as “the fundamental rethinking and radical redesign of business processes to achieve improvements in critical, contemporary measures of performance, such as cost, quality, service and speed” (Hammer and Champy 1993).

Reengineering is thus a strategy for a radical transformation of an organization. It implies cross-functional teams and often starts from scratch. In spite of some impressive success stories, it has a great rate of failure. The key success factors in reengineering are (Tahmazian et al. 1996, 5):

- Leadership, vision, strategy and measurable objectives (top-down);
- Aligned system approach for organizational change;
- Customer focus;
- Cultural/structural change;
- Technology as enabler;
- Empowerment, engagement (bottom-up);
- Human dimension of change;
- Communication.

3.7 Benchmarking
Benchmarking is the search for industry best practices that lead to superior performance (Camp 1989). It is a rigorous study of differences. There are three distinctive types of benchmarking:

- Strategic benchmarking
- Process benchmarking
- Performance benchmarking

Performance benchmarking helps to aim and focus the reengineering effort. Benchmarking involves five distinct phases:

- Start-up
- Planification
- Research
- Analysis
- Adaptation

Benchmarking requires thorough preparation to avoid “industrial tourism.” One of its advantages is that it is cheaper, faster, and possibly easier.

4.0 ANALYSIS
The use of an affinity diagram allows one to gather all the key elements of these approaches in six major categories: customers' needs/satisfaction, multidisciplinary team, creativity, rigorous system approach, cultural/structural change, and scope. The focus of each approach relative to each category was then evaluated with a score of one to 10, a high number meaning a strong focus (see Table 2 by the author). This table was then validated by a focus group.

The exactness of this evaluation is perhaps debatable, but it helps us to highlight the strengths and the weaknesses of each approach as well as to identify its specificity and complementarity. For example, we deduce from this table that QFD focuses more than value analysis on customers’ needs and satisfaction, and that the other approaches—especially project management, concurrent engineering, reengineering, and benchmarking—may benefit greatly from using QFD or value analysis to help them to clarify customer requirements. We also see, by the high score obtained in the category “rigorous system approach,” that QFD is a very structured approach.

All these approaches favor teamwork (some of them insisting more on cross-functional or multidisciplinary teams) and usually train the participants to work as a team and reward participants for team results rather than individual results.

The pattern of scores obtained by TQM gives some hints about its special place. TQM is a very powerful philosophy with a broad scope, implying cultural change. It establishes an environment of continuous improvement but needs tools to realize it. In this sense, all the tools that fit with its philosophy and principles are complementary.

The strength of reengineering (and maybe its danger) is its creativity. Value analysis may be very helpful in analyzing the functions and evaluating, in detail, the solutions to balance the risks of drastic changes involved in reengineering. The same is true, to a lesser degree, for benchmarking.

The analysis of this table also shows that, for the first four categories—namely customers’ needs, team, creativity, and rigorous system approach—value analysis scores relatively high, which suggests that it can be useful in project management, concurrent engineering, reengineering, and benchmarking. On the other hand, the score of the last category shows that the scope of value analysis is narrower than some of the other approaches and needs to be thought over.
Table 2
Evaluation of the Focus of Each Approach

<table>
<thead>
<tr>
<th></th>
<th>VA, VE, VM</th>
<th>TQM</th>
<th>QFD</th>
<th>PM</th>
<th>CE</th>
<th>R*</th>
<th>B**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers’ needs/satisfaction</td>
<td>8</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Multidisciplinary team</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Creativity</td>
<td>8</td>
<td>-</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Rigorous system approach</td>
<td>9</td>
<td>-</td>
<td>10</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Cultural/structural change</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Scope</td>
<td>6</td>
<td>10</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

In this table, 10 = strongest focus; 1 = weakest focus. Ratings are relative (not weighted), and are not meant to be totaled for comparison of approaches.

*Reengineering
**Benchmarking

5.0 AN INTEGRATED APPROACH: THE QUEST FOR VALUE

A thorough analysis of the relatively high scores obtained by most of the approaches suggests a striking fact: The aim of each and every approach is the same—the quest for value, which inspired the title of this paper. Each method tries, in its own way, to offer the best value. The differences arise from the questions, What value? For whom? Why? When? How?

The first two questions—What value? and For whom?—are the most important ones. Figure 4, borrowed from Brian Mattinsley (Mattinsley 1994) gives different values addressed during the last decades.

So if the common denominator of all these approaches is added value, which may differ in kind, then it should be effective to reconcile these approaches to offer the best balance of values to the customer as well as to the business.

All these approaches may be used in conjunction with others to optimize the value proposition. Project management or concurrent engineering may use value analysis or QFD to focus more on customers’ needs; value analysis may be used in reengineering to define and evaluate the performance of the reengineered process. Performance benchmarking may help to define the objectives of reengineering.

In this pursuit of value, even drastically different approaches may be complementary and help to contribute to the same goal. In this sense, however radical the change involved by reengineering, a reconciliation may be possible with the concept of continuous improvement of TQM as illustrated in Figure 5 (Tahmazian et al. 1996, 7).

At critical periods, a diagnosis should recommend radical changes by using reengineering when incremental changes are considered not fast enough to attain the objectives and to stay in business. On the other hand, once reengineered, a business process should go through successive incremental improvement waves to stabilize. These strategic decisions should be taken at the higher levels of management.

In the same way, reengineering can be reconciled with benchmarking if we use them where they are most efficient, as illustrated in Figure 6 (Tahmazian et al. 1996, 11).

If the customers’ needs are met by the best practices in the industry, there is no need to take high risks by reengineering. It may be much easier to adapt and improve the best existing practices and gain from the lessons learned—often expensively—by others.
6.0 CONCLUSION

Value analysis is a powerful in-depth method in the analysis of value. Its force is function analysis, and it can be useful to other approaches. However, value analysis needs to broaden its scope to gain some breadth in order to become a more useful strategic management tool. Its recent evolution toward value management, seen as the quest for the best balance of value for the customers and for the business by using the most efficient tool, adds the needed breadth.

The quest for value is what links value analysis, total quality management, quality function deployment, project management, concurrent engineering, reengineering, benchmarking, and other related approaches. It still remains to do the necessary efforts to reconcile them and use them in conjunction within an integrated approach in the quest for value.

REFERENCES


Berge Tahmazian, P.E., CVS, is a project manager and quality adviser. In 1997 he launched a consulting firm, Beta, that specializes in value analysis and project management. Prior to that, Tahmazian worked for more than 25 years at Hydro-Québec, the national electric public utility of Québec (Canada), which counts more than 20,000 employees. He is a founding member of the Canadian Society of Value Analysis and assumed its first presidency for two years. Tahmazian is currently an active member of CSVA's board of directors.
Don't Abbreviate Value Engineering

A very frugal farmer decided to invest in a mule to help expand his small farming business. He was very pleased with the added production, but his VE training led him to find a way to reduce operating cost as a way to increase his profitability. To accomplish his goal, he gradually reduced the amount of feed he gave the mule each day. He noted that, although the mule lost weight and his ribs began to show, the mule was still able to plow his designated area.

A few weeks later, at a social gathering of neighboring farmers, one neighbor asked the farmer how the mule was doing. The farmer said, “Terrible. Just when I got him running economically, he ups and dies on me.”

This story has a parallel in today’s use of the value methodology. There is a subtle but growing movement to reduce the time allotted for conducting VE studies. The three-day VE workshop is gaining in popularity in some quarters, with an occasional two-and-a-half and two-day workshop being tried. If value practitioners follow the trend, will we reach the one-hour VE workshop before the “mule” dies?

There may be nothing wrong with the three-day VE workshop, provided the full job plan is followed. I have, on rare occasions, conducted three-day events under the following conditions:

• A one-day pre-event and planning meeting precedes the workshop.
• The subject of the study is a simple mechanical device.
• The executive review board meeting is scheduled after the workshop.
• More than half the participants have had prior VE-team experience.

Many cost-reduction, work-simplification, and other value-improving initiatives are being conducted under the VE banner. There is nothing wrong with cost reduction. I have seen some fine work in those areas, but it was not value engineering and should not be labeled as such. Some clients want complex organizational or process FAST models to conduct business systems reengineering studies or reduce process time. I have provided these services, but the client is told that the activity is not value engineering, it is using a VE technique for a special application.

One excuse commonly heard as justification for the abbreviated VE workshop is “My boss told me to cut value engineering from five days to three days.”

I find it interesting that none of the managers for cost-reduction initiatives I investigated were asked to cut their process time. To underscore this point, a well-known company’s proposal request for VE or work-simplification projects calls for three-day VE workshops and 10-day work-simplification studies.

Another abbreviated version of value engineering is ending the process after the speculation (brainstorming) phase. This has led to successfully completed project goals, but is it a VE activity under the definition and guidelines of value engineering? We do not consider a VE study complete until the team evaluates the brainstormed ideas, creates a proposal, and presents a business plan associated with the recommended improvement proposal.

SOME POINTS TO CONSIDER

A VE workshop need not be conducted in five (more or less) continuous days. In fact, a seven- to 14-day break after brainstorming will allow team members to test and resolve the assumptions made during brainstorming. This will result in better, more complete VE proposals when they return to finish the workshop event.

The 40-hour-workshop rule only applies to a certified value specialist (CVS) Module I workshop. Most VE workshops are tailored to the needs of the client, which may or may not comply with CVS tutorial requirements.

The VE process has many tools and techniques that are used to conduct a full VE event. These tools also work well as a stand-alone process or as part of another process. But using parts of value engineering does not make the assignment a VE study.

CONCLUSIONS

Many value engineers are multifaceted; that is, they are qualified in more than value engineering to improve cost and value. However, value practitioners are doing themselves a professional disservice by calling every cost-improving venture a VE study. This practice has led to client confusion (internal and external) as SAVE International and the Certification Board struggle to develop a professional identity for value engineering.

J. Jerry Kaufman, CVS, FSAVE, is president of J.J. Kaufman Associates, Inc. He has an engineering degree from the Academy of Aeronautics and Johns Hopkins University. His 25 years of progressive management positions with the Martin Co., Honeywell, and Cooper Industries span the industrial, energy, process, service, and aerospace industries. Kaufman has written three books as well as many papers and articles on value management. He is a past president of SAVE (now SAVE International) and past chair of the society’s Certification Board.
ABSTRACT

Charles Bytheway’s powerful graphic technique for logical function expansion is, at best, two dimensional: a how-why axis and, as modified more recently, a perpendicular when-when-when axis. This paper will propose a new tool—an expansion of traditional function analysis system technique (FAST), not only through completion of the second axis by the addition of a where direction (in the sense of preconditions), but also through the addition of a third axis dealing with human and other resources (who and what, respectively). Though conventional FAST practice occasionally shows resources in a matrix below the two-dimensional diagram, the approach proposed is felt to be more compact and rigorous, and a substantial enhancement to creativity and understanding. Examples of application of this approach will be shown along with recommendations for further research.

BACKGROUND

The Pivotal Importance of Function

Function identification and graphic depiction are distinctive of the value method. The essential quality of FAST is seen in its purposes:

- To represent team consensus regarding the matter under study
- To serve as a reference point for brainstorming during the creative phase
- To assist in logically relating functions and in identifying missing functions

In the absence of function identification and depiction, application of the remainder of the value-method elements results in what is typically described as cost cutting based on random idea generation—frequently to the great detriment of the matter under study. Function analysis permits a systematic understanding of basic and secondary functions and the interrelationships to be preserved.

Interesting Aspects of FAST History

Larry Miles’s form of function analysis was successfully used throughout the world for more than 15 years before FAST was developed. Though Bytheway’s 1965 FAST method established a how-why axis and a critical path, it did not include scope lines or when functions. In 1992, at the SAVE conference in Phoenix, Bytheway surprised a number of attendees by saying that he had never finished a FAST diagram. In a paper delivered at the conference, he states, “I use the process for developing the diagram as a creativity tool rather than a tool to organize functions. Oh, the diagram organizes functions all right, but the only reason I organize more functions is to stimulate more creativity and understanding. The diagram is just the outgrowth of this activity” (emphasis added).

In approximately 1967, Wane Ruggles of Value Analysis Inc. introduced scope lines and the placement of when functions below the critical-path functions on the how-why axis. When, in this case, meant functions that occur at the same time and/or are caused by a critical-path function.

In 1968, Richard J. Park of Chrysler Corp. added an eighth question to Bytheway’s original seven: When does this function happen? Or, this function happens at the same time as what other function? This question further strengthened the aspect of time in the FAST process. In a 1992 conversation between Park and longtime SAVE member Ted Fowler, Fowler reported that Park felt that FAST enhanced the function analysis process in that “it helps to tie the system together.”

It should be noted that Ruggles and Park emphasized that FAST diagrams are not flow diagrams.

At various times over the last 30 years, other modifications and enhancements have been added to the FAST method developed by Bytheway. These include:

- Notation of costs (on the diagram) attributable to each function.
- Creation of a when-when axis where functions above the how-why axis are independent functions and those below are tasks (lower levels of indenture).
- Creation of both and and or logic links, and equally important and less important distinctions between function position within the diagram.
- Creation of a responsibility and/or resource matrix below the diagram.

The Sometimes Overlooked Values of FAST

FAST is of value because it is a graphic depiction. The diagram facilitates abstract thinking divorced from any particular solution that may be under review.

FAST is of value because it is persistent. The diagram represents a very literal hands-on team consensus on the process or project under study. Typically, it is quite visible to, and accessible by, the team and becomes a visual reference point during creativity in a manner that is more compact and powerful than a written narrative.

FAST is of value because it clarifies levels of indenture. Particularly at the conceptual stage of project development, the hows and whys are broad and general. Diagrams of more...
developed projects, however, become relatively more specific in nature. A FAST diagram makes it quite difficult to confuse these levels of abstraction within the same critical path using the verb-noun discipline.

Current FAST Practice
Current practice seems to be primarily organized around construction, industry, and manufacturing, and, most recently, process (e.g., petrochemical or administrative) sectors. Certainly, among these applications there is substantial variation in the details of preparation. The SAVE International-promulgated Value Methodology Standard “Body of Knowledge” chapter currently lists classic, customer and user, and technical FAST as the primary approaches, but does not provide any detailed guidance. ASTM E 1699-95, by the American Society for Testing and Materials, likewise provides no detailed guidance on FAST preparation.

Opportunities of FAST
Keeping in mind Bytheway’s statement that “the only reason I organize more functions is to stimulate more creativity and understanding. The diagram is just the outgrowth of this activity,” it would appear that there may be room for further development of FAST techniques to enrich the diagram for particular applications. Indeed, the only justification for proliferation of approaches is to stimulate creativity and understanding.

NEW APPROACH
Aspects of a Problem—Directions and Dimensions
FAST currently identifies the how-why, or horizontal, axis. This first dimension may be thought of as the logic chain of methods and purposes.

In addition, FAST has identified a why direction (down and below the critical path) or, as is the case with some practitioners, a why-why axis—the distinction being higher (up) or lower (down) levels of indenture. This axis is perpendicular to the how-why axis. The distinction may be valid. However, for certain applications, down need not necessarily signify a task nor up an independent supporting function.

I propose to reconceive of this vertical axis as where (up) and when (down), where signifying preconditions and when signifying consequences (both positive and negative). Therefore, this redefined second dimension may be thought of as the logic chain of preconditions and consequences.

It is further proposed to introduce a third axis, perpendicular to the first two, and that this axis be designated as who (forward) and what (backward), who signifying people and what signifying other resources. This new third dimension may be thought of as an accounting of required people and resources.

At this point, the new approach is explicitly capable of dealing with all six of the traditional journalistic questions (five Ws and an H): who, what, when, where, why, and how. Some of the benefits of this new approach are:

- Incorporation of people and other resources more directly into the diagram.
- Incorporation forces these identifications into verb-noun function statements. This third axis also permits expansion of individual people and resource functions into both how-why and where-when directions. Matrix display is insufficient to convey this information.

Graphic Techniques
FAST, as essentially a two-dimensional diagram, is normally displayed on a two-dimensional surface. The introduction of a third dimension into the ground rules creates a particularly difficult challenge.

Some solution to this problem may be sought through isometric or axonometric projections with function boxes now indicated as function cubes. This assists with housekeeping but almost assures that the FAST diagram itself will be larger than its two-dimensional counterpart. Initial creation of, and changes to, the diagram also are not easy.

I propose to reconceive of this vertical axis as where (up) and when (down), where signifying preconditions and when signifying consequences (both positive and negative).

Another potential solution may be to depict only two dimensions at a time. This would lead to three two-dimensional diagrams depicting:

- How-why and when-where;
- When-where and who-what; and

The drawback to this approach is the necessity, because of potential overlapping functions, to cut sections along the second- and third-dimensional axes to remove this overlapping.

Though three-dimensional computer-aided design may solve the creation and update difficulties for both these approaches, the positive hands-on team aspects of index cards or Post-it self-stick notes are eliminated. (Ginger Adams, immediate past president of SAVE International and the author’s wife, has suggested, in the latter case, that using different-colored self-stick notes for each of the three dimensions may restore some of the hands-on qualities, however.)

Physical Models
It may well be that the solution to the problem is in the use of three-dimensional objects.

A naive model might be similar to a child’s game of three-dimensional tic-tac-toe—multiple clear plastic horizontal planes upon which to arrange function cubes capable of receiving a handwritten verb-noun function statement. The problem with this
approach is in devising a method of connecting functions, particularly vertically.

Yet another available option is a sophisticated ball-and-stick product marketed in the United States under the name Zometool. This sophisticated and well-made construction kit of parts can produce geodesic-dome structures and molecular models. However, the node elements (which would logically represent the functions in a three-dimensional FAST model) are rather small, making labeling difficult.

Applications of Three-Dimensional FAST

When is it appropriate to consider exploiting a three-dimensional approach to FAST diagramming? The following represent some broad categories of applicability.

- When a facilitator sees the need for further enhancements to creativity methods and of levels of study understanding. This, of course, depends upon the subjective judgment of the facilitator. Bytheway addressed this point of view as follows: “As soon as a function stimulates my creativity, I immediately stop the function analysis effort and ask the team members to brainstorm different ways of performing that particular function” (emphasis added). It should be noted that this suggests that the information creativity phases (including FAST activities), while ordered, are not to be interpreted as irreversible (i.e., the information phase is always subject to revisiting, and one may move freely from brainstorming to information to brainstorming as long as this activity enhances creativity and understanding). A three-dimensional approach, selectively applied, need therefore not burden the process of FAST diagramming in that it may not be necessary or appropriate to expand every function into where, who, or what aspects, except as it may open further creativity.

- In studies where resource functions (people, time, money) may require particular attention. The revised discipline suggested by a three-dimensional approach requires accounting for resource concerns first as functions (e.g., secure financing, hire staff) rather than just quantities (e.g., $1.6 million, 800 man-hours). As previously mentioned, matrix display does not deal with function statements; neither does it permit continuing expansion of resource functions in how-why or when-place aspects.

- In studies where there are likely to be a great number of assumptions as to how things are to be done or why they are to be done. These tend to be studies involving many sacred cows, cutting-edge technology, or repetitive design with site-specific modifications. The tendency is to unnecessarily narrow the scope lines of the study to a degree that trivializes even doing a FAST diagram. The where-when axis becomes particularly significant in these studies by uncovering assumptions related to prior requirements and consequences—particularly undesired or negative ones.

An Example of the Power of Three-Dimensional FAST

Consider the following example taken from an actual value study. At the time the study was done, a two-dimensional FAST diagram was prepared; this diagram is shown at the center of Figure 1.

In some cases, clarification of the project objectives is particularly revealing. In this example, the project involved facilities for transferring passengers from low-occupancy vehicles (LOVs, i.e., single-occupancy automobiles) to high-occupancy vehicles (HOVs, i.e., buses). This project was to be built at a suburban location adjacent to a major freeway connecting with city-center offices and shopping. The project components comprised a large parking lot and a (relatively) small covered, but unenclosed shelter for waiting passengers, and required access and egress drives and ramps for LOVs and HOVs.

Approximately 83% of the total project estimated dollars were allocated to the basic function, transfer passengers. Approximately 58% of this 83% (or approximately 48% of total project costs) was given over to the secondary function, accommodate LOVs (long- and short-term parking of cars). Approximately 35% of this 83% (or approximately 29% of total project costs) was given over to the secondary function, queue passengers. Based on the seemingly disproportionate percentage of project funds dedicated to a parking lot, the team examined more closely the justification for projected demand and found that only about half of the lot’s total capacity could be fully justified at this particular location. Indeed, the survey data suggested that another facility, farther from the downtown area, was the more...
likely beneficiary of the excess capacity planned for this project.

However, even the justified portion of the demand calculation depended on fairly optimistic projection of increasing usage—a mix of suburban population growth and, more importantly, increasing public willingness to shed the private automobile in favor of demonstrably faster and less-expensive public transit. With this in mind, the team again took note of the all-the-time function identified as attract public and, in the creativity phase, developed a series of ideas aimed at increasing the reality and the positive perception of security. In particular, the team suggested that the transit project incorporate selected commercial enterprises (e.g., dry cleaners, fast-food outlets, newsstands) at the site. This would not only generate revenue but provide the human activity on the site that was missing in the project proposed. This idea was not developed into a full proposal largely because of the absence of reliable cost data; nonetheless, it was contained in the final report as a partially developed proposal (PDP). At the presentation and implementation meeting, this PDP was rejected on the basis of having previously been found infeasible. Less than a year after the study, local papers reported that the transit authority had reconsidered the matter and decided to implement the idea on a pilot basis.

The bold portions of Figure 1 illustrate how a three-dimensional discipline might have been applied in this study in the following ways (without particular regard to resolving difficulties of graphic portrayal):

- The function accommodate LOVs presumes demand. The where aspect forces practitioners to consider that demand be demonstrated. Such a recognition might not otherwise have come to the attention of the team or might have taken considerably more time. The how aspect related to this function simply fills out the understanding of gathering this information.

- The function store LOVs, under the definitional discipline that interprets when as consequences, generates the recognition that a large parking facility is also much more difficult to observe and is, therefore, much more difficult to feel safe in (from theft, mugging, and the like). This negative consequence is directly related to security concerns, which are not disclosed otherwise.

- In like fashion, the expansion of the function provide security/shelter/info is enhanced by the redefined second and additional third dimension. Security issues are highlighted further.

- In the case of the function establish/enforce criteria the perhaps unanticipated negative consequence, increase staff (i.e., police or other enforcement agents), is more easily brought to light.

**AREAS FOR RESEARCH**

As has already been suggested, not a lot of improvement has been made to FAST techniques since 1964. This is particularly unfortunate in view of the increasing number of opportunities for value-method applications in process-problem areas. The following discussions are intended as a stimulus to such further research and growth.

**Learning From Other Techniques**

There is much to be learned from graphic techniques in other disciplines. It remains for practitioners to become familiar with these approaches, apply them, and compare their respective powers to enhance creativity and understanding.

Diagrammatic reasoning generally is a fairly well-defined cross-disciplinary field of study and certainly could encompass the FAST approach. In addition, other graphic approaches such as Mind Map exist for reasoning and problem solving.

A value-related technique known as TRIZ (pronounced trees), a Russian acronym for the theory of inventive problem solving, introduces a diagrammatic Substance-Field Model (tools acting through useful or harmful actions on objects, the combination of which is known as the field).

By way of furthering the power of FAST diagramming, a workshop simultaneously utilizing these techniques in teams might go a long way toward stimulating much-needed further development.

**Improved Graphic Representations**

Even within the framework of current FAST conventions (and especially within the boundaries of the enhancements proposed by this paper), further research is required into digital techniques to facilitate team creation, modification, and display of FAST diagrams. As the potential increases for virtual studies to be conducted by teams spread over great distances, this improved graphic capability is even more vital.

**CONCLUSION**

As a distinctive tool of the value method, FAST deserves additional research and development.

This paper has attempted to describe a new tool to enhance creativity and understanding through definitional modification and completion of its second dimension, as well as the addition of a third dimension.

It may be observed that FAST can exist and serve quite well with only the first dimension: how and why. This is very likely true. Given sufficient time for refinement, reduction of virtually any FAST diagram to this most simple and elegant form may be possible.

However, a FAST diagram is a team-created, working document that comes into being in real time and in the context of the overall job plan. At present, perhaps less attention should be paid to the diagram's completeness, adherence to one or another established form, or mode of graphic creation, and more attention should be paid to its power—its ability to effectively serve as a bridge between the information and creative phases.

**ENDNOTES**


Michael S. Adams, AIA, PP, CVS, is an architect and planner. His firm, Adams & Associates in Carrollton, Texas, provides value analysis, project management, dispute avoidance and resolution, and claims-investigation services. He holds bachelor of arts and bachelor of architecture degrees from Rice University and a master’s of architecture in health services planning and design from Columbia University. He has chaired the Web Site Committee and has served as director, standards and resources for SAVE International and director, Library Resource Center for the Miles Value Foundation. His value analysis papers have been published in the United States, Europe, and Japan.

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1. INTRODUCTION
VE methodology is known and accepted, and has an impressive history of improving value and quality. It has been applied to construction for more than 30 years. During this time, many owners have found the techniques of value engineering and life-cycle costing quite successful in optimizing value and improving the return on investment for a given project. This is accomplished through systematic application of VE techniques during design as a counterpoint critical appraisal of major decisions affecting the total costs of a facility.

Value engineering is a rigorous, systematic effort aimed at improving the value and optimizing the costs of a facility.

2. TODAY’S CHALLENGES
Most people would agree that long-term profitability is the main objective of their companies. Managing value and change is necessary to meet this difficult challenge.

3. OBJECTIVES OF VALUE ENGINEERING
There are three basic elements that provide a measure of value to the user. They are function, quality, and cost, and can be interpreted by the following relation:

\[
\text{Value} = \frac{\text{Function} + \text{Quality}}{\text{Cost}}
\]

Function = the specific work that a product must do
Quality = the owner or user’s needs, desires, and expectations
Cost = the life-cycle cost of the product

Therefore, we can say that:

Value = The most cost-effective way to reliably accomplish a function that will meet the requirements, needs, quality, and expectations of the user.
4. REASONS FOR UNNECESSARY COSTS
Many characteristics of unacceptable, poor value are traceable to the approach taken during the design and management process. One or more of the following reasons for unnecessary costs often create poor value:
1. Lack of information
2. Lack of ideas
3. Temporary circumstances
4. Honest (but wrong) beliefs
5. Habits and attitudes
6. Lack of communication and coordination

Every reason for poor value that is identified provides an opportunity for solution and an area for VE effort.

5. WHEN TO APPLY VALUE ENGINEERING
Under normal circumstances, value engineering should be performed as early as possible—before commitment of funds and approval of systems, services, or designs—to maximize return on investment. Savings potential is much greater the earlier value engineering is applied. Also, the later you apply VE, the greater the investment required to implement—and the resistance to change.

6. VE METHODOLOGY AND TECHNIQUES
The best way to overcome the factors of unnecessary costs is using the team approach; individual efforts are not as effective. The VE effort develops a cohesive team of self-motivated achievers committed to a common objective. A typical VE team consists of a mix of personnel, as illustrated in Figure 1.

The planned effort of VE consists of using the VE job plan. VE techniques create change on purpose, rather than letting change accidentally occur within an organization. The VE job plan is built around the scientific approach to problem solving. Figure 2 illustrates the VE methodology.

7. APPLICATION TO PROJECTS
There currently are full-time value engineers in all major U.S. government agencies under a mandatory federal statute. In addition, most major government suppliers and contractors have VE staffs. Outside the United States, some 20 countries have active VE practitioners. The leader is Japan, which has a higher proportion of value practitioners in the country than the United States. VE programs currently exist in Europe, South America, Asia, Australia, the Middle East, and India.

Typical Case Study—Social Center
This VE study, which lasted three weeks, was conducted after bids were received. The lowest bidder was $4 million. The study's objective was to reduce the cost of the project by at least 25% to meet the allocated budget, which was only $3 million. A VE study was conducted, which generated some 100 ideas; 25 were developed into proposals. These proposals were presented to the owners' building committee. The committee approved the bulk of the proposals and rebid the project. The new bids ranged from 24% to 38% less than the original bids.
8. CONCLUSIONS

Based on some 30 years of experience, here are several personal conclusions I recommend for further consideration.

As a rough guide to the potential of value engineering in a project, study costs of 0.3% to 0.5% of total project costs ($1 million to $5 million) and 0.1% to 0.3% of total project costs ($5 million to $50 million) should result in a good VE study. These funds should result in a minimum of some 5% to 10% savings in initial costs and 5% to 10% follow-on cost savings in annual maintenance and operations.

With these potentials, without sacrificing needed requirements, why not accept the challenge and do a VE study?

Alphonse J. Dell’Isola, P.E., CVS, holds a bachelor’s degree from the Massachusetts Institute of Technology. He is semiretired and has been working for the past five years on various projects in the United States and overseas. Prior to that, he was director of value management for a 500-person architectural/engineering firm in Washington, D.C., for 20 years. He has been the principal instructor in more than 200 training workshops, and his 1,000-plus VE studies have resulted in some $2 billion in savings. He is the author of six books on value engineering, life cycle costing, and project budgeting. His most recent book, Value Engineering: Practical Applications, was published in 1997.

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Expanding VA Knowledge in British Columbia’s Health-Care System—A Snapshot

Marcel Hebert

British Columbia is Canada’s Pacific Coast province, known worldwide for its rich natural resources, environmental heritage, and quality of life. It is home to 3.5 million people, with a population that is growing with a steady influx of newcomers from other parts of Canada and around the world. They are attracted by the province’s prosperous, competitive economy and its respect for multicultural diversity.

The impact of this growth on social services that are required to allow residents to enjoy a high quality of life is staggering. One of the main areas of growth involves health-care services, which are very costly. The province provides health-care services (hospitalization, physician fees, long-term care) at no cost to residents of the province. Total Ministry of Health expenditures were approximately $6.53 billion (about U.S. $4.76 billion) in 1994-1995 and are increasing each year. As part of providing these health services, health-care facilities required approximately $300 million (approximately U.S. $219 million) per year for capital replacement, maintenance, and growth.

In 1995, the provincial government established a requirement to complete a “value analysis” (VA) on major capital projects, with the largest expenditures occurring in education and health care. The government is trying to reduce the cost of constructing health-care facilities while maximizing the value received from capital expenditures. Measures in support of these goals include the present VA process undertaken during the design phase of all health-care projects that exceed $5 million (about U.S. $3.64 million).

Over the past several years, projects that helped reduce costs have proceeded through the VA process. However, the policy issued on applying value analysis was broad in nature and did not specify applying the concepts of first costs, life-cycle costs, or functions at an early stage. The VA process, coined “specification VAs,” is completed at the working-drawing stage. It is well-known that the highest value for the VA investment is achieved at the early stage of a project, so value analysis completed at the working-drawing stage was not the best value for a VA investment.

Specification VAs generally followed the process of retaining a cost consultant to lead the process and the use of a shadow team to review the design. The process involved two one-day workshops. The first day was designed to generate ideas, generally looking at first costs of the products specified in the design specification. The return on invested costs for the VA process was, on average, three dollars for every dollar spent. If the VA costs were $100,000, the savings generally were $300,000. In comparing the savings to the total project costs, the savings were in the 1% to 3% range. The returns were low because the process only looked at first costs.

The concepts of life-cycle costs (LCC) were generally not applied, nor was the use of the how and why of the function. Practitioners discovered that the same ideas—to use lower first-cost products—were coming up on each value analysis. It didn’t take long to come to the conclusion that changes would be required if the government wanted to get true value in applying the total VA concept. Basically, the highest worth of value analysis was not being achieved because all parts (first costs, LCC, and function) were not being applied.

It didn’t take long to come to the conclusion that changes would be required if the government wanted to get true value in applying the total VA concept.

The action steps taken to get value in applying value analysis were to develop a number of guidelines that outline the process as value analysis is applied at the various stages. The first guidelines developed were an outline of exactly what the design team should be looking at during the design process.

The main part of this guideline is specification data sheets. The sheets list, for example, one-by-four-foot fluorescent fixtures with electronic ballasts. A description of best use, first costs, life-cycle costs, and the main function, as well other similar products, are suggested. Specification data sheets include components in all fields—architectural, structural, mechanical, and electrical. With the use of specification data sheets, consultants don’t have to repeat the same work in obtaining the first costs and life-cycle costs for each component of the building.

The next guideline developed was a detailed outline of the VA process that would be undertaken as a project developed. Because a value analysis could be used at various stages, the four guidelines developed were program, schematic design, design development, and working drawings. The first value analysis on a project should be undertaken at the program stage (the program describes the type of service, present utilization, and future requirements, which translate into space requirements). This program value analysis uses general VA principles and clearly outlines how the process will be undertaken. For example, the use of a facilitator and expert.
world-class leaders in the program field, should help the project group look at the function, options, and outcomes of the program. The other three guidelines outline specific steps that should be looked at during the development of the design of the building.

The components of the health-care facility planning process and the timing of value analysis are shown in Figure 1. The planning process generally follows three stages: preplanning, planning, and construction. Preplanning involves the development of planning documents such as the strategic or directional plan, which is developed over time and updated every few years. It gives the facilities overall direction and goals, e.g., “Anytown hospital will be known as the Heart Center in B.C.” Next, the master program identifies all programs delivered, utilization, and future needs. The master plan follows this and outlines—in building-block terms—the physical requirements needed to deliver the program.

The final step, the functional plan, is a detailed program for a specific building or area from which a space plan can be extracted.

Once the preplanning is complete, the planning phase can begin. In the planning phase, the actual design consultants are retained. Finally, once the tender package is completed and signed by the facility, the construction stage can begin.

As of February 1998, the new VA guidelines are being finalized and will be presented in a one-day workshop to all health-care facilities and design consultants in the lower mainland of British Columbia (the education portion is as important as the VA process). The projected completion date is June 1998.

Marcel Hebert is a capital planner for the Greater Vancouver Regional Hospital District. Over the past 20 years he has been involved in the planning and development of capital health-care projects valued at more than $1 billion (approximately U.S. $729 million). He has taken the lead role in developing and educating health-care facilities in the total VA concept, and has published and presented several papers on the topic of capital planning.
Managing Profitable Changes Through A Supplier Value Program

Timothy Kuo, P.E., CVS

This article has been adapted from a paper Kuo presented at the Hong Kong Institute of Value Management Conference held in Hong Kong, November 12–13, 1997.

ABSTRACT

This paper explains how an enterprise can profit from managing changes through an effective supplier value program that offers an incentive to suppliers for reducing the cost of contracts. It describes how the federal government of the United States, especially the U.S. Department of Defense, manages a contractor Value Engineering Incentive (VEI) program and saved billions of dollars in taxpayer money by implementing value engineering change proposals (VECPs). This paper proposes a model of an effective supplier value program, based on the successes of the VEI program of the U.S. government.

INTRODUCTION

The objective of this paper is to encourage the governments and private-business enterprises of Pacific Rim countries to establish an effective supplier value program to improve their competitiveness and efficiencies. This paper was written based on 10 years' experience working on the VECP in the U.S. defense industry and 10 years' experience working on cost reduction and value engineering in the U.S. commercial (nongovernment) business.

INTENSE COMPETITION IN THE BUSINESS WORLD

The business world is very competitive. In order to survive, the enterprise must be a low-cost and high-quality producer. Value management can help the enterprise provide products and services that meet the high-quality and low-cost expectations of customers. It is a business survival tool. Value management has been used by business enterprises worldwide for 50 years, since its invention by Lawrence D. Miles at General Electric Corp. in the United States.

THE SUPPLIER’S ROLE IN COST REDUCTION

The application of value management must be spread down to the supplier level. You want your suppliers to use value management for reducing their costs so they can provide you with their products and services at the lowest possible cost. It is not good enough to just reduce in-house costs; you must also reduce the cost of outsourced items because your suppliers control a very high percentage of your product costs. More and more components and services are being outsourced, that is, supplied by the outside vendors instead of being made in-house. This trend is increasing due to pressures on cost, schedules, and specialization. For example, Chrysler Corp. has the lowest cost structure among the big three auto makers in the United States because it has the highest percentage of outsourced components. It is becoming very common for a business to have 80% to 90% of its products and services provided by outside sources and delivered in-house for final assembly, testing, etc. Management must pay attention to the cost of outsourced items to improve the company’s competitiveness in the marketplace. The suppliers are the gold mines of untapped savings. They are your business partners.

HOW TO OBTAIN SAVINGS FROM YOUR SUPPLIERS

The practice of asking your suppliers to arbitrarily reduce the price by 10% does not work in today’s environment. The supplier must be able to lower its cost of the items under contract by changing something so that the supplier can reduce the contract price without hurting its bottom line. You should encourage your suppliers to use value management to identify unnecessary costs and implement cost-reduction changes for continuous improvement. There are two types of cost-reduction changes. The first type does not affect the contract and therefore requires your approval to implement. This change may affect the fit, form, or function of the items under contract. To encourage your suppliers to submit this type of change to you so your company can reduce its costs, you should offer them monetary incentives. What kind of incentive program should a business establish? How can a business operate this program effectively? I have good news for you. You can benchmark the model of the U.S. government.

VALUE ENGINEERING INCENTIVE PROGRAM IN THE U.S. GOVERNMENT

The federal government of the United States has had this kind of profit-sharing incentive program in operation for more than 30 years. This is a good program for private business to benchmark. Let me describe how and why the U.S. government established...
value-incentive programs for its contractors. The federal government of the United States spends hundreds of billions in procurement every year and is one of the largest business enterprises in the world. It is always interested in ways to make the best use of tax dollars.

In 1953, the Navy Bureau of Ships became interested in learning the new cost-savings concept developed at General Electric and invited Miles to share the concept of value analysis. The Department of the Navy changed the name of value analysis to value engineering with permission from Miles and later established the first formal VE program within the U.S. government. In 1963, the Department of Defense formally established a departmentwide VE program that covers both in-house and contractor programs.

Management must pay attention to the cost of outsourced items to improve the company's competitiveness in the marketplace. The suppliers are the gold mines of untapped savings.

To encourage contractors to perform VE studies and submit cost-reduction proposals to the government, the Armed Services Procurement Regulation (ASPR) established requirements for the inclusion of a VE clause in defense contracts. It required that a VE provision be included in all contracts in excess of $100,000. The VE provision was designed to encourage contractors to develop and submit cost-reduction proposals—called value engineering change proposals, which involve changes in the contract specifications, purchase description, or statement of work—to the government. Such changes may include the elimination or modification of any non-value-added requirement regarding, for example, design, components, materials, manufacturing processes, tolerances, packing requirements, or testing procedures. If the government accepts the VECP, the VE provisions provide for the government and contractors to share the resulting cost savings in the proportion specified in the VEI provision.

The ASPR was later replaced by the Defense Acquisition Circular in 1980 and the Federal Acquisition Regulation (FAR) in 1984. The FAR Part 48 covers the policies and procedures for using and administering value engineering change proposals in contracts. The FAR Part 52 gives instructions for using VE provisions in clauses in contracts. The FAR Part 48 requires that government contracting officers insert Value Engineering Incentive Clause 52.248-1 in any supply or service contract with a value over $100,000. For the firm fixed-price contract the sharing ratio is 50%, with a sharing period of three years.

U.S. DEFENSE DEPARTMENT OFFERS 50% INCREASE IN VE INCENTIVE

To further encourage the contractors to submit VECPs, the Department of Defense issued a deviation to the VECP on April 10, 1997. This deviation revised the FAR language by changing the sharing ration from 50% to a range of 50% to 75%, and the sharing period from three years to a range of three to five years. This deviation expires in two years or when the FAR VE language is revised, whichever is sooner.

POTENTIAL TO INCREASE CONTRACTORS’ PROFIT MARGIN

The implementation of the VECP will not reduce the original profit in the contract. Instead, the VEI payment to contractors has a potential to increase their profit margins. This provides contractors with a very strong incentive to identify and remove unnecessary costs for the government. The Department of Defense established a VE program in 1963. Therefore, it produced the highest savings among the federal departments and agencies. Since 1983, the Department of Defense VE program has saved $21 billion from both in-house and outside contractors’ value engineering proposals.

U.S. GOVERNMENT VE REQUIREMENTS

The U.S. Office of Management and Budget (OMB) issued a final revision on Circular A-131, concerning a governmentwide VE policy, in June 1993. This revision added new requirements by requiring each agency to develop annual VE plans in both contractor and in-house programs and to report the cost savings to the OMB annually. The OMB reported the following VE savings from all federal departments and agencies as a result of Circular A-131:

- Fiscal year 1994: $1.2 billion (defense: $854 million, transportation: $14 million)
- Fiscal year 1995: $1.6 billion (defense: $734 million, transportation: $686 million)

The Department of Transportation caught up with the Department of Defense with its VE savings in 1995. The substantial increase in 1995 savings over 1994 probably resulted from the National Highway System Designation Act of 1995, which requires that a VE analysis be conducted on all projects on the National Highway System with an estimated total cost of $25 million or more.

On February 10, 1996, President Clinton signed the Defense Authorization Act—now known as Public Law 104-106—which contains a special section of procurement reform for the entire executive branch. This law requires each executive agency to establish and maintain cost-effective VE procedures and processes. The term value engineering means an analysis of the functions of a program, project, systems, product, item of equipment, building, facility, service, or supply of an executive agency, performed by qualified agency or contractor personnel and directed at improving performance, reliability, quality, safety, and life-cycle costs.

SUGGESTED MODEL FOR AN EFFECTIVE SUPPLIER VALUE PROGRAM

Based on the success stories from the VE program of the U.S. government, I would like to recommend that business enterprises
in the Pacific Rim countries set up a similar program. The following steps are recommended for an effective supplier value program:

1. Establish cost-savings goals and objectives.
2. Hire qualified VM personnel.
3. Provide high-level management support and adequate funding.
4. Publish a policy of cost-saving-sharing arrangements with suppliers.
5. Insert a cost-saving-sharing clause in major contracts or purchase orders.
6. Visit major suppliers to promote the use of value management and the submission of cost-saving proposals. Using the 80-20 Pareto Law, target the 20% of your suppliers that control the 80% of your outsourced costs for VM workshops at the suppliers' sites to generate cost-reduction proposals. The objective is to attack the highest cost drivers of your procured items.
7. Establish a multifunctional team that consists of key personnel from engineering, procurement, quality assurance, and value engineering to disposition the cost-saving proposals from suppliers.
8. Disposition and award cost-saving proposals from suppliers in a timely manner.
9. Record the cost savings.
10. Reinvest the savings in providing VM training for in-house and suppliers' employees.

A RECOMMENDATION TO GOVERNMENTS OF PACIFIC RIM COUNTRIES
An effective supplier value program is not limited to private business. Governments, small and large, can benefit from it too. The 10-point recommendation shown above is also applicable to governments. The VEI program in the U.S. government is a good model to copy. The VE Incentive Clause can be implemented by either an executive order or as a law.

A CALL TO TOP MANAGEMENT
The success of a supplier-value program requires the support and attention of the top management. Joe Lambert, president of SAVE International, has a famous quote: “Where management places emphasis, results will occur.” This is very true in the implementation of any value program. The application of value management is a planned, deliberate action. It will not produce a good result without the support of top management. The top managers of business enterprises and government must exercise their leadership to ensure the success of the value program. One way to ensure the success is to mandate the use of value engineering. There are two notable success stories in the United States: the Department of the Army's mandatory VE program and the VE legislation in the state of Virginia. Both programs have produced a significant cost saving to the taxpayers.

CONCLUSION
The benefits of a supplier value program to a business are:

- Reduce your cost.
- Increase your earnings.
- Improve your competitiveness.
- Increase market share by providing good value to your customers.
- Improve communication and cooperation from your suppliers.
- Improve team spirit with your suppliers.
- Incorporate new technology.
- Identify the potential in quality improvement.
- Establish long-term partnership with your suppliers.
- Improve your reputation as a cost-conscious producer.
The benefits to governments are:
- Better use of tax dollars.
- Better service to citizens.
- Waste reduction.
- Capability enhancement through new technology.
- Potential tax cut to taxpayers.

A supplier value program is a good investment for both government and private business. It should produce a good return on your investment. I highly recommend that this kind of program be established and integrated into the procurement system of the government and business enterprises in the Pacific Rim. This could be a part of your reengineering effort to survive in today’s fierce, competitive marketplace.

ENDNOTES

Timothy Kuo, P.E., CVS, is director, international affairs-Pacific Rim for SAVE International. He is a past president of the society's Dallas/Fort Worth Chapter and was named SAVE International Value Engineer of the Year in 1993. Kuo has more than 24 years' experience in value engineering and cost reduction, and has conducted numerous VE workshops in the United States. He possesses two master's degrees and a professional engineering license and is currently employed at Applied Materials in Austin, Texas.
Language of the Listener

Arthur E. Mudge, CVS, FSAVE

The value engineer’s responsibility is to have others accept and implement recommendations for innovative managed change—recommendations resulting from teamwork application of the systematic approach of the value methodology. Over the years, getting this acceptance has seemed to be one of the value engineer’s most difficult tasks, a task that has often ended in nonacceptance, frustration, and anger. In reality, this is a problem that is caused by value engineers, not by others.

Value engineering language tends to stress the necessary performance at a lower cost. This, however, is not necessarily the language of someone from engineering or manufacturing or purchasing, or—for that matter—from management.

Starting today, you can take the steps necessary to overcome this frustrating problem. The solution to this problem lies with you, not with those to whom you are trying to sell your ideas for innovative managed change.

First, you must understand that those to whom you are talking are, for the most part, not against such change. Second, you, in most instances, are failing to realistically communicate with them.

Realistic communications is the basis of the problem. The American Heritage Dictionary defines communication as “To have an interchange, as of ideas. ... To express oneself in such a way that one is readily and clearly understood.” In other words, value engineers must talk in a language that the listener hears and understands, a language that the listener wants to hear. Value engineers must recognize that this is not always our language. Yes, we are all speaking the language of our particular country, whether it be English, French, German, Japanese, etc.; however, it is the category of words used that makes the difference.

Value engineering language tends to stress the necessary performance at a lower cost. This, however, is not necessarily the language of someone from engineering or manufacturing or purchasing, or—for that matter—from management. Value engineers must recognize that each of these professions, just like the value methodology, has its own category of words, interests, and factors on which they measure performance and by which they are measured. Let’s take a little time to look and understand what some of these measurements are for each profession.

First, engineering language is “performance,” “product life,” and “meeting the customer’s specifications.” These three are also the points on which engineering’s performance is measured.

Second, manufacturing language is “build to the drawing,” “on-time delivery,” and “low scrap.” If manufacturing misses on any one of these three points, they get a poor rating.

Third, purchasing language is “meeting the specifications” and “on time delivery.” If purchasing goofs on any of these critical points, they can have a detrimental effect on manufacturing’s performance and therefore be put in a bad light.

Last, but not least, management’s language is “return on sales,” “return on investment,” “investment to sales,” “debt ratio,” and “return on equity,” each of which is measured as a percentage. These are the critical percentages by which management is measured.

It must be noted that none of the above are measured in elements of necessary performance and lower cost, in the language of the value engineer. Therefore, value engineers must take the time to learn to speak the language of listeners; if not, VE practitioners will continue to be faced with nonacceptance, frustration, and anger.

Arthur E. Mudge, CVS, FSAVE, senior associate of the consulting firm Value Associates, has served as vice president and manager of Joy Manufacturing Company for 24 years. His area of responsibility covers the development, organization, and operation of the Joy Value Activity throughout its 42 worldwide operations. Prior to joining Joy he was employed by R.C.A., Value Engineering, Inc., Raytheon, and General Electric Company. He has held positions in time study, wage rate, planning, equipment procurement, facilities planning, and value engineering and analysis.
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