

VALUE BASED TEAM DESIGN DECISION-MAKING

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BIOGRAPHY



Dr. Stephen J. Kirk is president of Kirk Associates, which specializes in value analysis services. He has over 25 years experience in applying value based design decision-making techniques to corporate offices, courthouses, research facilities, and hospitals. He is an instructor at the Harvard Graduate School of Design, professional education program. Dr. Kirk is a registered architect, a fellow of the AIA, a CVS, and received his doctorate at the University of Michigan where his research focused on ways to enhance the effectiveness of decision-making within small groups. He has recently served as president of SAVE International and is also a Fellow of SAVE. He is the author/co-author of six books related to value analysis.



Richard G. Turk has pioneered the use of value methods and Choosing by Advantages as a required part of the National Park Service planning and design program. Richard is a graduate of the University of Michigan. He is a registered architect with experience throughout the National Park Service. He was project architect/ project manager on several rehabilitation projects through out the country. He served as the planning team captain for the Comprehensive Design Plan for the White House. Richard has presented material on value analysis and sustainability to several national venues including the U.S. Green Building Council.



Richard W. Hobbs is an advisor to the professional design community providing vision and strategy for professional service firms and organizations. Following 22 years in private practice, ten years as AIA VP for Professional Practice and two years as AIA Resident Fellow, Marketplace Research, he is a change agent, helping groups and individuals capture new value in the redefinition/reinvention of the ARCHITECTURE profession. Hobbs received his Bachelor of Architecture in 1964 from the University of Washington and his Master of Science in Architecture in 1965 from Columbia University.

ABSTRACT

Architects and other design professionals are continuously challenged to satisfy client-expanding expectations within modest or even shrinking project budgets. Value based team design decision-making techniques such as "value analysis" (also called value engineering and value management) are meant to assist the architect and engineer in designing holistically within the context of "doing more for less." This is true whether the team (including the owner) is focused on enhancing building performance, achieving a strong design image, lower life cycle costs, increased user performance and comfort, or optimizing environmental sustainability.

This presentation will focus on three important design skills for architects:

- Design Integration (design decision-making)
- Communication (among the client and design disciplines)
- Facilitation (leading design workshops)

as they relate to making value based team design decisions that meet the needs of clients. According to Richard Hobbs, FAIA, Resident Fellow of the AIA, these are the skills most needed by practitioners for the next generation. Topics include: 1) value based team design decision-making concepts and principles, 2) project case study applications, 3) leading a value based team design workshop, 4) cost, quality, risk and life cycle cost modeling, 5) function/ worth analysis, 6) group creativity and team dynamics, 7) life cycle cost analysis, and 8) integrating value based team workshops within the design decision making process.

OWNER DEMANDS

Client Challenge to Architects

According to AIA Firm Surveys, from 1996 to 1999, "clients are increasingly challenging architects to provide greater leadership, accountability, and responsibility." Expectations are growing for Architects to understand the business needs of the owner and to do more with the limited resources available to the owner. Owners want to understand the design process to be followed by the architect and they also want to participate and will be actively engaged in decision-making. Owners expect and demand to be able to express their value expectations for the project and see that their priorities are met by the architect. This requires a more explicit decision-making process that all team members including the owner, user, other stakeholders, facility manager, design architects & engineers, and the constructor. A common language is needed to communicate thoughts and ideas. A more formal process for making decisions by the group is also needed. *This is not trying to design a facility by committee, as many have discovered, this is best left to the apt skills of the architect.* But, it is about getting input into the design process on a regular basis to better address complex issues such as sustainability, life cycle cost, operational effectiveness, flexibility, engineering performance to name a few in order to maintain accountability for all decisions reached.

In addition, owners insist that all "viable" alternatives have been considered and that the preferred alternative has been selected. Performing this activity in "real time" allows owner participation as well as proper analysis for rapid feedback of decisions reached.

VE Government Requirements

For government owners, more specific requirements for value-based decision-making are demanded through laws and regulations. For example Federal Law 104-106 specifically requires that a value engineering study be performed as a part of the design process. There are requirements set by government agencies for bringing in a value engineering team. For federal work, every project over \$2 million needs value analysis study. For highway work, it is any project over \$5 million. For New York City, it's the highest cost projects. And in Virginia, value engineering is required for all capital projects over \$5 million.

The Federal Facilities Council (FFC) is advocating that "to support sustainable development value engineering and life cycle cost analyses to evaluate a range of sustainable development options are used in the conceptual planning, design and construction phases of acquisition."¹ The FFC further advocates the owners "Focus attention at the front end during the conceptual planning and design phases where the ability to influence the ultimate cost of the project is the greatest."² This translates to the application of value methods earlier in the planning and design process.

ARCHITECTS NEED FOR CHANGE

Defining Value and Return on Investment

Definitions of words and how they evolve over time has always fascinated Richard Hobbs especially architecture terms. For instance, "design-build, which used to connote a method to reduce costs at the expense of the design and even the client's strategy, now is recognized as an integrated design/construction process that respects the concerns of the client, architect, and contractor. Likewise, "value engineering," which used to define a process to save money in the short term (client and building performance be damned), now means using analysis to achieve maximum building performance over its entire life cycle resulting in increased return on investment for the owner. Architects need to be aware of how our adjusted perception-and resulting technology---contributes to the reinvention of the architectural profession.

Traditional Design versus New Value Based Approach

The traditional approach to the design process begins with the architect's assets, core competencies, and a desire to create a product that matches (hopefully!) the client's priorities. The new value based decision-making approach takes on the reverse: defining the client's priorities, then acquiring or improving the skill sets, talent, and knowledge needed to create products that meet the clients needs. This more formalized decision-making approach allows a more holistic understanding of the project by all stakeholders.

¹ Sustainable Federal Facilities; A Guide to Integrated Value Engineering, Life Cycle Costing, and sustainable Development. Federal Facilities Council Technical Report No. 142. National Academy Press, Washington, D.C., 2001, Executive Summary, page 3.

² Adding Value to the Facility Acquisition Process: Best Practices for Reviewing Facility Designs. Ralph S. Spillinger with the Federal Facilities Council Standing Committee on Organizational Performance and Metrics. Federal Facilities Council Technical Report No. 139. National Academy Press, Washington, D.C. 2001.

The new approach consists of using a multi-disciplined team including participants from the owner, user, facility manager and constructor. Some are new to the project to maintain independence and assure all viable ideas are explored. If all stakeholders are not represented then role-playing those missing are encouraged. The owner is involved from the beginning to assist in defining their value expectations for the project and in setting priorities. Real time decisions are reached using value based methods in a team "workshop" setting. Many of these workshops have now evolved into "value based design Charrettes" to more fully explore a variety of ideas. Paramount to the success is the skills of the architect to facilitate these team-oriented sessions. Tools used by the facilitator to help communicate to the team include: function analysis, quality modeling, group creativity/ innovation techniques, life cycle costing, design/cost simulation modeling, and choosing by advantages.

Architects Respond

Based on AIA Firm Surveys, from 1996 to 1999, the number of firms offering expanded services increased significantly. Architectural firms have responded to client challenges to provide greater leadership, accountability, and responsibility by expanding service offerings and the value proposition in different ways. For instance, large firms dominated the landscape and found economic stability by expanding their scope of services. Value based services such as value analysis, life cycle costing, post occupancy evaluation are examples of expansion. Small firms, on the other hand, sought stability through specialization, offering value-based services a la carte or in concert with other firms. The consulting firm of Kirk Associates, for example, offers value management and facility economics services directly to owners or through the bundled services offered by larger architectural firms and construction management firms.

Comparing the three latest surveys, expanded services, such as value analysis, have increased in profitability to architects. In 1990, expanded services represented 22 percent of total revenue; in 1999, it was 39 percent. From 1990 to 1999, the demand for basic services increased by 86 percent; the demand for expanded services increased by 313 percent.

Taking an increasingly owner-centric approach to services has freed architects somewhat from the tyranny of construction financial cycles by decreasing their reliance on basic design services as their sole bread and butter. From 1996 to 1999, basic design services declined as a source of revenue from almost 80 percent to just over 60 percent. It is fair to say that this approach to services provision is both planned (strategic), as firm principals set growth strategies and fulfill them, and by chance (opportunistic), as firm principals perceive unfulfilled client needs and expand to meet them. Expansion of services has also led to progressively diverse staffing, as different skills are needed in architecture firms. Those trained in value analysis such as certified value specialists (CVS) are being sought by architectural firms.

VALUE BASED TEAM DESIGN DECISION-MAKING PROCESS

The Decision-Making Process (value methodology)

Too many people equate value engineering to making things cheap. Done correctly, it is about value over the lifetime of the system, facility, community, or whatever, being analyzed.

Value engineering is not simply about money, it is, as the name suggests, about value, which includes important intangibles such as patient care, in the case of a hospital; operational effectiveness in the case of corporate offices; and creation of “destination,” in the case of retail and entertainment centers. If value engineering aims only to save money in the short term—in construction—then it is a misnomer.”

The power of value based team decision-making is in the methodology. The six-step problem-solving process focuses on increasing value in the all-powerful triad of cost, quality, and performance. The six steps of decision-making are:

- Information gathering and benchmarking, for example creating cost and quality models
- Function analysis, which is the exercise of stating the project purpose in a verb/noun form
- Creativity phase, which does not stop with the first workable idea
- Evaluation of ideas generated using life cycle cost analysis and using benefit cost comparisons
- Development of those ideas into a workable preferred alternative
- Making recommendations to the decision-makers identified through the orientation meetings.

This is a methodology that is beyond the more traditional design approach. And it will benefit any field of consultation, including architects, every kind of engineer, and business managers. Moreover, it is a service that can be provided even when another architect is doing the design and documentation phases. The value specialist works closely with the design architect to develop a variety of options from which to choose. This role works best with repeat clients, where the trust and rapport are already established. An option for providing these services to a first-time client is to come into a project as part of the design or construction management team.

New Tools & Techniques

There also is the important consideration of specialization. It is vital to know the client’s business at least as well as his or her primary competitors. Obviously, the tools and techniques differ among client types, however "function analysis" is used on every project using two word "verb-noun" phrases allow the team to communicate the purposes to be achieved if the project is to be a success for the owner. Function analysis, considered by many to be the heart of value based decision-making, helps the team discover how and why each function is related to the goals of the project.

Holistic Design Team Involvement

A holistic approach to design is achieved by involving all the stakeholders. This consists of using a multi-disciplined team including participants from the owner, user, facility manager and constructor, in addition to the design team of architect and engineers. The owner is involved from the beginning to assist in defining their value expectations for the project and in setting priorities.

Workshop Setting for Real Time Decision Making

Real time decisions are reached using value based methods in a team "workshop" setting. Many of these workshops have now evolved into "value based design Charrettes" to more fully explore a variety of ideas. Paramount to the success is the skills of the architect to facilitate decisionmaking in these team-oriented sessions. Tools used by the facilitator to help communicate to the team include:

function analysis, quality modeling, group creativity/ innovation techniques, life cycle costing, design/cost simulation modeling, and choosing by advantages.

Apply VE Early in Design Process

In its history, value engineering was once applied late in the design process, when all the construction documents were finished. The information was known however it was too late to make design changes if new ideas were identified which would improve project performance or lower life cycle costs. Now value analysis has moved closer to the crucial formative stage of business development decisions. At its best, value analysis is a process of coordinating and integrating interdisciplinary teams.

In the process of recommending ideas, the importance of starting early is a matter of how changes become more expensive as project development progresses. A great idea for adding value to a project is not so great when it requires the whole team to back up and start over again on some of the basic assumptions. So some great ideas never get used. Because the overarching mindset of the value analysis process is the integration of the whole for the benefit of the project life cycle, regardless of where the value management team came into the project. Naturally, a large part of the value specialist's skill set is team building acumen and understanding of group dynamics in the facilitation of the team.

Value Specialists to Augment the Design Team

Owners find it to their advantage to bring certified value specialists on board early to work with the architect team to make sure a full range of solution options are explored for the client's consideration and ultimate decision. Because of the skills a value specialist brings to the team such as facilitation, communication and decision-making methods and techniques, architects find this to their advantage. Value specialists are also brought on board by the architect themselves to provide team leadership. Construction managers also utilize value specialists to assist in value based team decision-making.

Cost of A Value Study

The cost of a study can range from as little as the fee for the team facilitator or include the cost of an entire value study team working over several days. A five-day value analysis workshop involving 12 people for a hospital project at schematic design recently cost an owner \$75,000. This is the high-end range for the cost of a single review of a complex project. Two weeks before this workshop a one-day orientation meeting was held to discuss objectives for the value study. It began with a discussion of the goals of the project. Later a site and existing building tour occurred. The value five-day workshop followed the methodology described earlier. The value management team continues to work as a group to keep ideas moving and coordinated. A value analysis report is issued at the conclusion of the study to document decisions reached.

Goals of a Value Study

You have to look for the big-picture issues to retain focus in such a short value review session. This might include issues such as sustainability, more effective visitor interpretation, visitor inspiration, operational enhancements, greater building flexibility or increased engineering systems performance.

If life cycle cost is of concern, the task is to figure out where most of the money in an operation comes from and goes. And you have to determine where the thoughtless waste of money in day-to-day procedures occurs. With a hospital facility, 5 percent of the overall cost may be capital costs for construction and 95 percent will be the ongoing operating cost. In corporate facilities, the breakdown is about 30 percent capital cost and 70 percent operating cost.

When evaluating operations, the team must constantly challenge the existing operating procedures with insight into what the next generation of operating procedures are likely to be. Because of the short time and immense complexity, this is a particularly difficult mindset to achieve and task to tackle.

With value management, you may set a strategy to spend the same amount of money and still increase productivity, or you can set a higher range of first-cost expenses to gain major increases in productivity. Either way, the first-cost is more than offset by the gains in productivity over the life of the facility.

Value Study Teams

Team experts for value based studies vary from project to project. Therefore a value specialist requires a large network of experts to move from one project to the next. It is also important to find experts who work well on teams.

CASE STUDY APPLICATIONS IN DESIGN

Value studies are best applied in the early stages of design. This usually occurs at normal owner review points such as the end of schematic design and design development. Value studies may be performed on new construction as well renovation projects. Two case studies are used to illustrate application of the process and tools used within the decision-making framework.

The first is a new science center for the Great Smoky Mountains National Park. It is 14,660 GSF in order to meet the functions of curation, work areas, offices of research, education, labs, and support. The construction cost is over \$3.9 million. A value study team reviewed the project in the concept stage prior to project funding to assure the owner that all viable alternatives had been explored.

The second project was a renovation and addition to a forensic laboratory for the National Fish & Wildlife Service. Functions include receiving evidence, housing the evidence, labs for analysis, and documentation of forensic results for testimony. The project has 23,000 GSF of renovated space and 38,000 GSF of addition. The construction cost is over \$14.5 million. A value study team reviewed the project in the schematic design stage to assure the owner that best value had been achieved. Value objectives included enhanced sustainability, optimized life cycle cost, best project phasing, minimized project risks, and improved project quality.

Both value analysis studies included members from the owner, user, facility management and the design architect and engineers. The constructor was role-played by members of the study team. The process followed was as described earlier. The workshop duration for the science center was 3 days

while the forensic lab was 5 days. Independent new team members were added to each value study team for fresh ideas.

The value based team study for the science center resulted in proposals that improved the building layout, adjusted the site master plan and utilities, modified architectural and mechanical systems for improved sustainability, and listed a number of other recommendations for the owner and architect consideration. Project cost savings opportunities of \$500,000 (13%) were also identified. Over 80% of the team's recommendations were ultimately incorporated in the design.

The value study for the forensic lab resulted in proposals that improved the project phasing; site & building layout; structural, architectural, mechanical and electrical systems; sustainability; and project management for the owner and architect consideration. Project cost savings opportunities of \$1,700,000 (12%) were also identified. Over 85% of the team's recommendations were ultimately incorporated in the design.

OPPORTUNITIES FOR APPLICATION

Strategic Value Planning

New developments in value analysis has lead to the term "strategic value planning," which means using strategic thinking during project planning so that the client gains maximum value. In fact, it appears that many clients view this as the most important of all services. Clients see the tremendous impact of setting proper design criteria, preparing a quality model, and defining client and community quality and performance expectations.

Value Enhanced Master Planning

Using value based decision-making for site master planning at NASA's Goddard Space Flight Center resulted in better defined requirements over the next 25 years. The value study team developed scenarios of "possible futures" then evaluated the space and other technical requirements for each possibility. The master planners then used the data to develop a plan that would accommodate the projections, yet have the flexibility to adapt to each possible scenario.

General Management Planning

Using Choosing by Advantages (CBA), a tool to quantify non-monetary advantages, the National Park Service uses the value method to balance benefits and costs during General Management decision-making. The value methods allow planning teams to understand the relative advantages of alternatives and make judgments about their value when selecting a preferred planning alternative. After evaluating initial planning alternatives, the value study team uses the knowledge gained to craft a final preferred alternative, which may include valuable components of several of the alternatives. In one case approximately \$100 million was avoided through the process of value planning in the General Management Plan for a national park.

Criteria & Standards, Prototype Layouts

For General Motors, the use of value based decision-making tools such as life cycle costing and value analysis helped update existing criteria & standards. This resulted in the change of some former systems such as built-up roofing to 80-mill PVC roofing, for example. Even some prototype manufacturing layouts were evaluated and new building layouts developed.

Programming/ Project Definition

The use of VE tools such as function logic diagrams and quality models assist in the programming phase of new projects. The FAST diagrams help the owner see the big picture of project requirements. The quality model helps the owner define expectations and set priorities for the architect.

Value Based Design Charrettes

The Army Corps of Engineers is using value-based design Charrettes to define new project requirements, explore alternative solutions and establish project budgets. They have used this approach on a variety of projects over the past 5 years with great success. The National Park Service is encouraging that all pre-design and design Charrettes be value-based, document the rational and reasons for specific design choices.

VE in Design-Build

Value management is particularly a good idea in design/build projects because it helps the client establish the parameters before the design/builder comes on board. The National Park Service is beginning the use of value methods for evaluating the cost and benefit impacts of setting specific performance specifications of standards.

Brad Buchanan, ALA, of Buchanan Yonushewski Group, a design/build firm in Denver speaks of the "timing of value." The biggest return on an investment of time happens early in design-development phase, Buchanan says. It increases in a smooth curve up from the concept phase. This added value doesn't have to be seen as a cost savings that lowers the project budget, Buchanan tells us. Rather, it can be viewed by the client as an opportunity to keep the original budget, add value, and create a better product.

Creativity and flexibility are the keys to adding value to the design/build process, according to Buchanan. Changes occur on every building project--all the time--and each creates a giant ripple effect, even though it may not be immediately felt. The tendency is to hammer each change to fit the earlier decision, rather than be open to new implications. If you can be open, as Buchanan says, "you can take the project from expected to extraordinary. You need to lean into the project and be a cheerleader for the possibilities."

Contractor Value Incentive Clauses

These construction contract clauses have been used in construction for over 20 years by government organizations such as GSA, Corps of Engineers and the Navy Engineering Command. These clauses

permit the construction contractor to perform a value-based study and submit recommendations to the government for change. If the owner approves the value change, the owner and contractor share in the savings achieved.

Post Occupancy Evaluation

More recently, owners have used post occupancy evaluations to assess recently completed projects to obtain lessons learned before proceeding to the planning and design of new similar projects. This value-based process examines both performance and cost issues to properly assess their value in later projects. Some discoveries have led to modifications in existing owner and architect criteria and standards.

NEW APPROACH BENEFITS

The value based team approach to decision-making offers benefits to both the owner and the architect. Using the leverage of the architect during the planning and design stage, the owner gains significant improvements to the project performance, quality and life cycle cost with minimal investment in the new value based decision-making process.

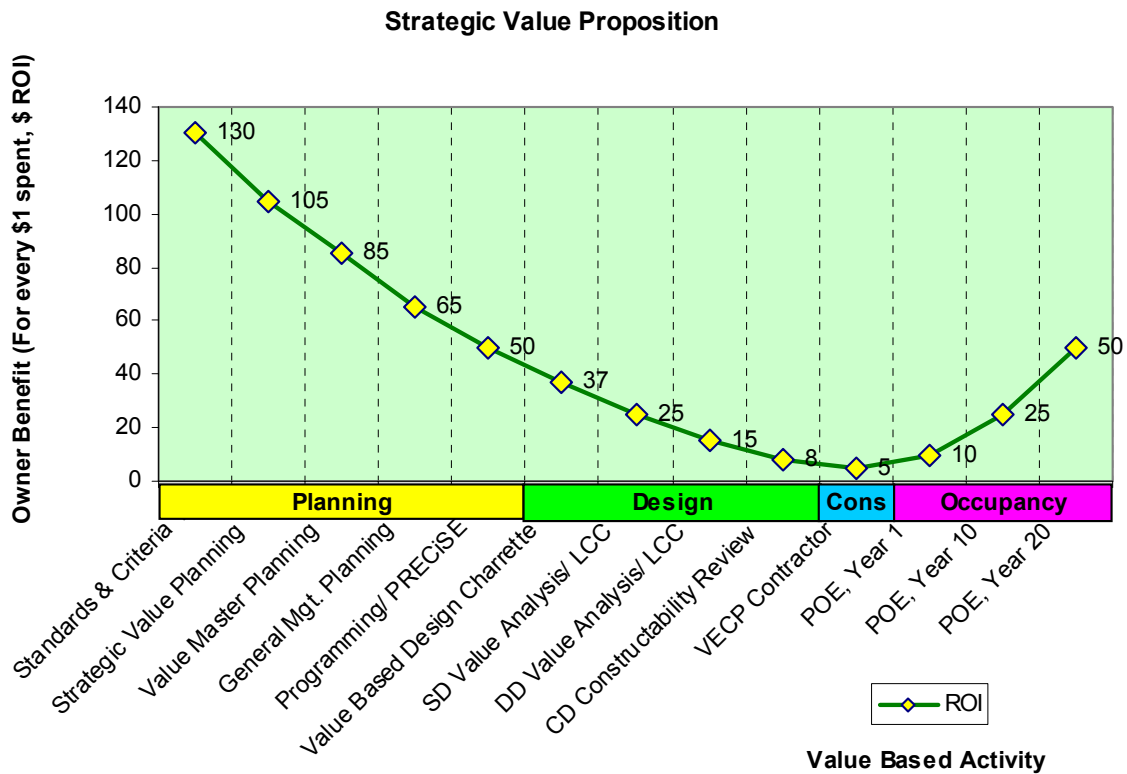
Owner Benefits

Kirk's findings show that owners recognize that there is a definite return on investment for strategic value planning services by the architect. Kirk estimates that every dollar spent in the planning phase saves \$100 in the implementation phase. Every dollar spent in the programming phase after the strategy phase saves \$50 in the implementation phase. These dollars can be reallocated into the project; meaning the architect is providing a true value-added service. The graphic below shows strategic planning fee dollars spent in various phases of the design process and their corresponding savings in implementation costs. (Notice that post-occupancy evaluations can offer value-added savings as well. Kirk considers construction services as the implementation phase.)

Kirk's research indicates that clients see--and are will to pay for--value-added services through all phases of the project. In fact, clients are willing pay a greater fee for more value-based services because they are used to paying other (non-architect) consultants for these services, Kirk says.

Architect Benefits

This field carries enormous potential for architects looking to expand into new areas of profitable consultation. There are 200 certified value specialists (CVS) in the U.S. today. Of those, only half, say 100, are in construction fields. Maybe 20 of them are architects. Many architectural firms have found that including value based decision-making services in their design proposal increases their chance to be selected by the owner. Offering these services also increases chances for continued involvement with the owner.



SUMMARY

In summary, owners expect and are demanding more from their architect and design team, all decisions must evaluate benefits and cost. The architect cannot make decisions for the owner, but he/she can ensure informed decision-making. The architect can meet these new demands through expanded service offerings and by increasing the skills of the firm to include those with skills in team facilitation, use of function analysis to improve group communication, and new advanced tools in decision-making such as life cycle costing, choosing by advantages, and other benefit cost decision making processes. Certified value specialists (CVS) are currently trained in these skills to assist architects in meeting owner needs. Architects should consider joining SAVE international to learn the skills necessary to perform value based team decision-making services for owners.

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