

THE USE OF DESIGN CHARETTES TO ENHANCE THE PRACTICE OF VALUE ENGINEERING



John B. Sankey

Mr Sankey is a resident of Merriam, Kansas; and works as an Architect/Value Engineer for the Corps of Engineers in Kansas City, Missouri. He hold degrees in both engineering and architecture. Before employment with the Corps, he spent 20 years as both a licensed engineer and licensed architect with a variety of design and construction firms. Mr Sankey has been instrumental in adapting innovative ways of applying Value Engineering (VE) to new situations.

ABSTRACT

This paper explains how Design Charettes can be used by VE Practitioners to (1) expand their business opportunities, and (2) increase customer satisfaction. It explains how the discovery that a Design Charette (a commonly accepted Architectural design tool used by architects) can be used to advantage in the practice of VE.

of the puzzle, making possible the impossible. The Design Charette provided a concept design and cost estimate from which to begin a VE Study. Using a charette, the VE practitioner can respond to customer needs "before design".

THE DESIGN CHARETTE

To understand this paper, the reader must first understand the Design Charette.

WHAT IS A DESIGN CHARETTE?

A Design Charette (Charette for short) is a compressed design process. The Charette accelerates the act of concept design, reducing the time required.

THE OBJECTIVE OF A CHARETTE

The objective is to quickly (within 4 or 5 days) arrive at a good, workable customer approved, "concept" design, that is within scope and within budget.

THE OUTPUT FROM A CHARETTE

The output resulting from the Charette is a "concept" design. This is a "big picture" design that includes an overall floor plan, a site plan, four principal elevations, major materials and systems selection, a cost estimate, a narrative structural concept, a narrative mechanical concept, a narrative electrical concept, and a narrative civil engineering concept. The design is complete in concept, but not complete in detail, and certainly not a finished design. Although the design is not a finished design, it is a "good workable" design, that can be taken, essentially unchanged to final completion.

The Charette Design leaves a myriad of detailing and design development left to be accomplished. If

INTRODUCTION

How the discovery was made

Before becoming a VE practitioner, my primary profession was that of Architect. It was in architecture that I was introduced to Charettes. When I moved from the practice of architecture into VE, it was assumed that there would be little use for architectural skills. To my surprise, it was on a VE study that I found myself accidentally involved in using the toll of Charette as part of a VE study.

A customer wanted to use a VE Study on a project with a short schedule. No design or cost estimate existed. The Project Manager wanted to do a VE study "up front" as a means of "jump starting" the project. Not knowing much about the details of VE, the Project Manager failed to realize that a "traditional" VE Study "before" design was a little premature. The "traditional" VE study "before" design would be impossible. The traditional VE Study depends upon a design as a study object, and a cost estimate (based on the design) as a benchmark from which to measure savings. It was discovered that the Design Charette provided the missing piece

the Charette is properly done, the detailing and development will require no changing of the overall concept (site plan, floor plans, elevations, systems selections) from that put forth in the Charette.

THE KEY TO THE CHARETTE

The key to the Charette is that it forces the early reconciliation of three things by the user customer. The three things are: wants, needs, and budget. In Charette there is immediate feedback to the user of the physical and economical impact of user wants and needs upon the design and budget.

DESIGN CHARETTE - The Steps

To further understanding of the Charette, the steps taken in a typical Charette are outlined below. A typical Charette can be broken down into three main parts, a pre-workshop part, the Charette workshop, and a post workshop part.

PART 1: PRE-WORKSHOP

TEAM FORMING

Before the Charette Workshop, a Design Charette Team is formed. This consists of the Project Design Team, Customer Representatives, Project Management, and a Team Leader.

The Project Design Team includes the lead designer (usually the project architect), a second architect, an interior designer (or a third architect), a structural engineer, a mechanical engineer, a site planner or civil engineer and a cost engineer.

The Customer Representatives includes facility owner representatives, facility user representatives, facility tenant representatives, and facility operator representatives.

The Project Management members includes the Program Manager, the Design Project Manager (or managers), and the Technical Manager (or managers).

The Charette Team Leader is a person or persons, knowledgeable in the Charette Process who facilitates (leads) the Team through the Charette. In my office the Charette Team Leader is a Value Engineer.

PART 2: CHARETTE WORKSHOP

The Charette Workshop is the heart of the Charette. During the Workshop the Charette Team spends five days cloistered together doing intensive design. During the Charette Workshop the following takes place:

INFORMATION GATHERING.

The Design Charette Team listens to the project stakeholders (user tenants, user operators, facilities managers, facilities owners, program managers, project managers) as they describe the project.

ARCHITECTURAL PROGRAMMING (a part of information gathering).

During information gathering - architectural programming takes place. An architectural program is design information put into a matrix format that documents all major project needs in terms of physical needs of the facility.

To make an architectural program; user needs an major project needs are transformed into physical needs of the facility. This is a key step in the writing of the architectural program. Physical Facilities Needs includes such things as size, name, and shape of building spaces (rooms); relational needs of one space to another, number and size of building floors; structural, mechanical, electrical, and communication needs etc. The bottom line of the architectural program describes the facility in terms of both net and total gross square footage.

COST ESTIMATE.

Once an architectural program has been developed, a preliminary cost estimate can be made. The cost estimate is based on square footage costs adjusted for the specific facility under study, rule of thumb cost for building systems, cost for expected contingencies, escalation of cost over time, and cost adjustment for project difficulty and project size. The cost estimate is a quick ballpark estimate. The cost estimate thus developed is compared to the project budget. Usually, at this stage, the cost estimate exceeds the budget.

RECONCILIATION OF PROJECT AND BUDGET

The objective here is to bring the project and the budget into agreement, i.e. get the cost of the project to fall within the budget. The earliest reconciliation is the most efficient. The longer that project expectations are allowed to exceed available funds, the more expensive and traumatic is the inevitable judgement day. It forces a reality check at the earliest possible point in the process. Reconciliation can be made by either (1) reducing the estimated project cost, or by (2) increasing the project budget. Normally, the preferred method is to find ways to reduce the project cost. This is done, not by reducing the estimate, but by redefining the project that defines the architectural program, which in turn reduces the estimate. There are two ways to redefine the project. (1) redefine the project scope or (2) redefining the translation of project needs into physical facilities. (See Figure 1).

Reconciliation is an iterative process that continues until project cost is safely within project budget. The process is thus: redefine the project by getting the user to change user needs, that in turn will change facility needs, which changes the architectural program, which changes the estimate of project cost. The new project cost is then again compared with project budget (see Figure 2).

At the conclusion of the reconciliation, there will exist a new architectural program and a new cost estimate. The architectural will have been approved by the customer and the cost estimate will have been validated as being within the budget. The reconciliation is one of the keys to the Charette.

REDEFINING PROJECT SCOPE

As mentioned, one means of redefining the project is to reduce project scope. This means that user expectation as to scope must be lowered to conform to the reality of funds available.

Redefining the scope of the project usually means the separation of wants from needs. This is especially true in large organizations (corporations or government) where the tenants and operators are remote from the seat of financial accountability. The Charette process forces the conscious separation of wants from needs, with the subsequent relinquishment of wants and the protection of needs.

REDEFINING THE TRANSLATION OF PROJECT NEEDS.

A second means for reducing the estimate of project cost is to redefine the translation of project needs into physical components of the facility. Redefining the translation of project needs into physical needs of the facility means finding an alternative method of meeting facility needs. This does not involve changing the boundaries of the project (project scope), but involves changing the way one satisfies project needs within that boundary. This would be a VE study within the Charette. (see Figure 1).

An example of redefining the translation of project needs into physical components is: a proposal for an innovative structural system or mechanical system that would reduce project cost while still performing the function. Another example of a redefinition of translation could be the introduction of an innovative means of facilities operation that would reduce capital cost.

DESIGN

Once the architectural project cost is reconciled with the project budget, concept design can begin. Concept design proceeds until a concept floor plan, a concept site plan and four principle concept elevations are produced. Besides the drawings just mentioned, the concept design also includes a narrative concept of the structural system, a narrative concept of the mechanical system; the electrical system; the communication system, and a narrative concept of the utilities infrastructure system. The design developed rapidly at this point because the designers have been an integral part of the Charette process from the beginning.

DESIGN CRITIQUE AND FEEDBACK

As soon as design concepts begin to take form on paper, a show-and-tell session is initiated with the client representatives. This can take place looking over the designers shoulder on the board, or gathered around a past-up of sketches on the wall. dialog between designers and client take place. Changes are incorporated based on this dialogue. The cost estimator is continually adjusting the running cost estimate in response to the dialogue. If cost is escalating, then time-out is called. A new reconciliation session is held in which the architectural program is again adjusted to bring the project back within budget. The running cost

estimate is recalculated to verify the new program as being within budget. Once this happens design continues until, as mentioned, the concept design is achieved that is both client approved and within budget.

PRESENTATION

The concept design is presented to the stakeholders. The stakeholders have the opportunity to make minor adjustments to the design, as long as the adjustments do not contradict decisions made previously during the Charette Workshop. The stakeholders need to be reminded that existing design decisions were the result of stakeholder guidance during information gathering.

PART 3: POST WORKSHOP

FORMAL REPORT

Based on the comments from the presentation, the final concept design is later drawn up, documented, and put in the form of a formal Design Charette Report.

THE CHARETTE AS PART OF VE

Now that the reader understands the meaning of the word Charette, the discussion can now turn to the prime topic of this paper; how can one use the Design Charette to expand business opportunity for the VE office. As will be shown, the Charette fits nicely into the VE environment.

Once the Design Charette is complete, the project is at a point where a "traditional" VE Study can be conducted, if desired, i.e. there exists a design and a cost estimate. The design and cost estimate are the primary ingredients necessary for a "traditional" VE Study. This would be a "traditional" VE Study following the Charette. [see FIGURE 3].

If at this point there is to be a VE Study, the process would be standard fare for any VE Practitioner. The initial step is to begin the VE Job Plan; information gathering (including functional analysis), speculation (including brainstorming), analysis, development, and presentation. The outcome from the VE Study is an improved version of the Charette design. Savings from the VE Study can be used to reintroduce selected wants and needs that were given up during the Charette. While the

design from the Charette was a good workable design, the design from the VE Study will be a better design, giving the customer increased value. (See Figure 4,).

THE VE TEAM. The VE Team can be the same team as the Design Charette Team or the VE Team can be an entirely different team. Many VE practitioners, when conducting a traditional VE Study, chose not to include the Design Team in the VE Team. There are two valid reasons for this; (1) the Design Team has too much pride of ownership, and therefore has trouble being objective in critical analysis of the design, (2) the Design Team has been too close to the project for too long, and has trouble making the mental leap necessary to come up with new creative alternatives (can't see the forest for the trees).

The above stated reasons for not using the Design Team as part of the VE Team do not appear to apply in the case of a design resulting from a Charette. The short time span spent on the Charette generated Design, plus the pragmatic, structured approach to the Charette Design tends towards a no frills, objective, generic design. A good workable design. Designers have not had enough time to form emotional attachment to their own design refinements. In addition, the short, structured time frame of the Charette has forced the designers to remain "big picture" oriented, tending towards keeping the forest in perspective.

That the Charette Design Team can be successfully used in the VE Study, offers several advantages. The advantages are: (1) continuity between Design Charette and VE Study, (2) efficiency of effort when the same persons serve both as designers and VE participants, (3) automatic buy-in on the part of the design team. The Design Team must ultimately buy-in to the VE Study if the results of the VE Study are to have any chance of being implemented.

THE ADVANTAGES OF REUSING THE DESIGN

Adding the Design Charette into the VE equation greatly expands the target of VE activity. Without the Design Charette, the VE practitioner can only conduct "traditional" VE Studies on those projects that have both an existing design, and an existing cost estimate. This means that there are only certain times, and certain projects, appropriate to introducing VE. These times normally do not include the early stages of a project, before design and cost estimates

are made. This is exactly the time when the potential for positive VE impact is the greatest. With the addition of the Charette, the window widens to include these early stages. With the Charette, a new project can become a candidate for VE after one week of a Charette Workshop. Experience has shown that the greatest potential for VE effect is achieved during the earliest stages of the project. The Charette plays into this principal excellently. Virtually all new projects now become candidates for "traditional" VE Studies.

The Charette offers five advantages

1. The Charette expands the window of VE opportunity. VE Studies (services) can now be suggested at early points in the project, even before a solid design or cost estimate exists. This increases the opportunity for VE service and the potential for VE success.
2. The Charette jump-starts the project, to quickly get off the mark.
3. The Charette can be offered to a client who cannot make up his mind about the project. The Charette helps the client make decisions by providing timely and relevant information, and forcing an early reconciliation of project to budget.
4. Even if the Charette is to be used without a corresponding VE Study, the Charette is a way of laying a groundwork of trust that will lead to later VE Studies.
5. The Charette fits nicely in front of the "traditional" VE Study. The output from the Charette just happens to be what is required as input for the "traditional" VE Study. The VE Study and the Charette compliment one another. This offers the client the opportunity to not only get a project off to a rapid start with a generic type design (one week Charette), but in addition, provides a means of (in one additional week) advancing the project to a higher level design (increasing customer value).

WHAT KNOWLEDGE DOES IT TAKE?

What knowledge does it take to integrate the Charette into a VE Practice? Given that the Charette offers advantages to the VE Practice, how difficult is it for the VE Practitioner to add the Charette to the list of skills already acquired.

Conveniently for the VE practitioner, the skills,

tools and talents that are used in leading a Charette, are almost the same skills, tools, and talents that are used in leading a VE Study. In addition, the Steps of a Charette are very similar to the Phases of a Traditional VE Study. All the VE practitioner needs to pick up, is knowledge of a Charette, how a Charette works, and how to write an architectural program. This is easily done in a couple of days. Once the knowledge of the Charette is acquired, the VE practitioner is ready to function as "leader of the Charette".

To illustrate this point, consider the following comparison of the SKILLS, TOOLS, TALENTS, and PHASES used in leading VE Studies with the SKILLS, TOOLS, TALENTS and STEPS used in leading a Charette. See Tables below.

TALENTS NECESSARY TO LEAD VE STUDIES	TALENTS NECESSARY TO LEAD DESIGN CHARETTES
Good Speaking Skills Can Think on ones feet Good Politician Get along well with people Good organizational skills Logical Thinker Can use Overhead Projector Can use Flip Charts Leadership Ability	Good Speaking Skills Can Think on ones feet Good Politician Get along well with people Good organizational skills Logical Thinker Can use Overhead Projector Can use Flip Charts Leadership Ability

PHASES OF A VE STUDY	STEPS OF A DESIGN CHARETTE
Info Gathering (VE) ----- Function Anal (VE) F.A.S.T. Diagrams Estimate of Pro Cost ----- ----- ----- ----- ----- Speculation on Functions Analysis of Ideas Development of Proposals Presentation of Proposals Critique of Proposals ----- VE Study Report Implementation	Info Gathering (Design) Proj Wants & Needs (W/N) Function Anal (Design) ----- ----- Initial Architectural Prog Estimate of Project Cost Reconcile Proj with Budget Separate (W/N) Cut W/N or add Budget Modify Translation Final Architectural Program Speculation on Design Options Analysis of Design Options Development of Design Options Presentation of Design Critique of Design Final Refinements Design Charette Report Implementation

SKILLS USED IN LEADING VE STUDIES	SKILLS USED IN LEADING DESIGN CHARETTES
Team Building Group Dynamics Group Psychology Knowledge of VE Process ----- ----- ----- Written Communication Spoken Communication	Team Building Group Dynamics Group Psychology ----- ----- Knowledge of Facilities Design Process Knowledge of Charette Process Written Communication Spoken Communication

TOOLS USED IN LEADING VE STUDIES	TOOLS USED IN LEADING DESIGN CHARETTES
F.A.S.T. Diagrams Function Analysis (VE) Active Verb Measurable Noun ----- ----- ----- ----- Brainstorming (structured process) Team Building Group Dynamics Flip Charts Markers & Boards Paste Visuals on Wall	----- Function Analysis (designer) Bld circulation logic space relationships Architectural Programming Concept Cards Bubble Diagrams Proximity Matrix Design Creativity (unstructured process) ----- Team Building Group Dynamics Flip Charts Markers & Boards Paste Visuals on Wall

CONCLUSIONS

In summary, a Charette is a compressed, accelerated, project design process, that forces timely stakeholder decision points, leading to an approved, validated, in budget, concept design, in a short time (usually one week). A VE Study can be used inside the Charette to aid in the reconciliation process (a VE Study "as part of" the Charette).

In addition, if a better design is desired, a "traditional" VE Study can be linked to the end of the Charette (a "traditional" VE Study "following" the Charette). The output from a Charette is conveniently just what is needed as input to a "traditional" VE Study.

Anyone who has led VE Studies, can, with minimal training, become successful as a Charette leader. This allows the VE practitioner the option of offering a more complete service.

There is one disadvantage to the addition of the Charette to the practice of VE. If used, it will require the customer to make an investment of more time and money. The usual five day Study Workshop will no longer be sufficient if a Charette is also to be used.

Aside from the disadvantage of time and funding, there are seven advantages offered through the addition of Charette to the list of VE services.

- 1 The Charette expands the window of VE opportunity.
- 2 The Charette aids in being able to take advantage of VE Studies earlier in the project, thus taking advantage of increased possibilities for savings.
- 3 The Charette can be offered to a client customer who cannot make up his mind about the project.
- 4 The Charette will jump-start the project, using the clients input, to get the project going.
- 5 The Charette can be a way of laying a groundwork of trust that will lead to later VE work.
- 6 The Charette fits nicely in front of a "traditional" VE Study. The output from the Charette conveniently fits the input requirements of the VE Study. The VE Study takes the design produced by the one week Design Charette and escalates it

to a higher level of quality/value in one additional week.

- 7 The Charette can be offered to the customer as a separate service, without VE. This again expands the opportunity of the VE office to serve the customer.

NOTES

Note 1: "TRADITIONAL" VE STUDIES

The word "traditional" is used here to denote a VE Study as commonly defined by SAVE in the MOD I Workshop. This is a VE Study where an existing design and cost estimate are made the subject of study, using functional analysis and structured creativity. The result of the Study is a list of VE Proposals that involve design alternatives that increase project value, normally claiming savings, while not altering the basic function of the design. There are things some call VE Studies (non traditional) that do not require an existing design and cost estimate, and do not lead to quantitative savings. One example of a non traditional study is a "process study" (the study of organizational processes) using the VE Job Plan.

Note 2: The Team is heavy in architecture and interior design. The product developed during a Charette is a "concept" design. The greatest burden during the development of a concept design falls on the architects and interior designers. The Charette Team is seeded with extra architects (and interior designers) to provide the horsepower needed to develop a concept design in five days.

Note 3: There is no electrical engineer mentioned. Unless the project has a significant amount of electrical engineering issues, an electrical engineer is usually not needed on the Team.

Note 4: As in a VE Study, the Cost Engineer is an extremely important person. A Charette should not be considered without a good cost engineer on the Team. A reliable running estimate is the key to the reconciliation process.

Note 5: Because project cost tends to creep up as project design progresses, it is prudent at this stage to shoot for an estimated project cost that is comfortably below the project budget. This provides a cushion for cost creep during design.

FIGURES

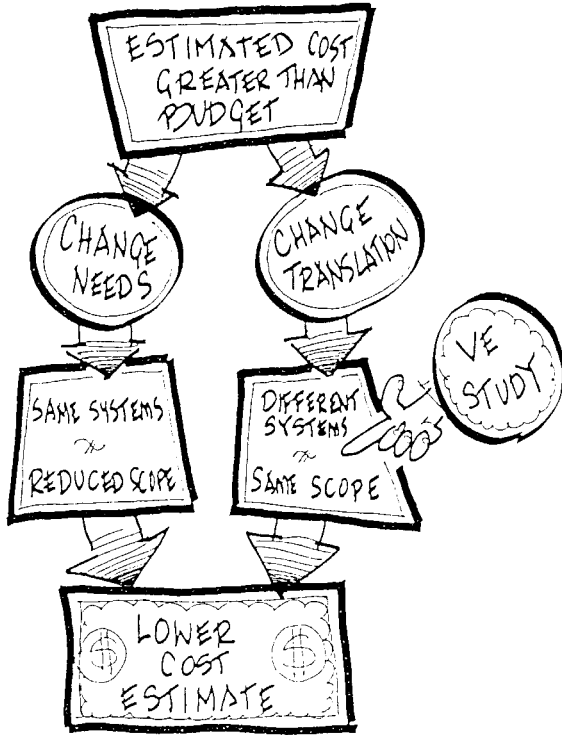


FIGURE 1

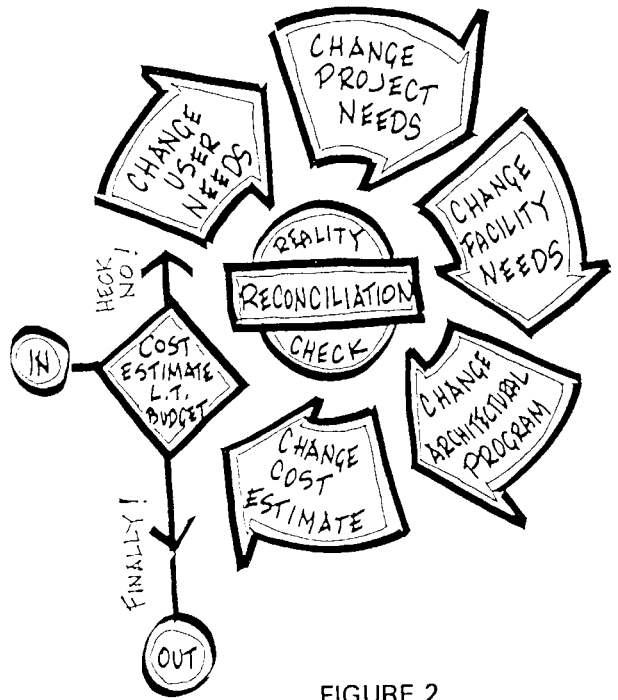


FIGURE 2

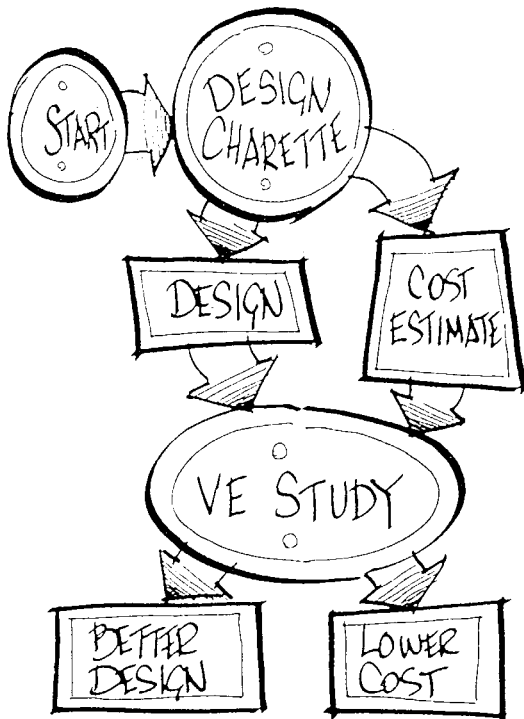


FIGURE 3

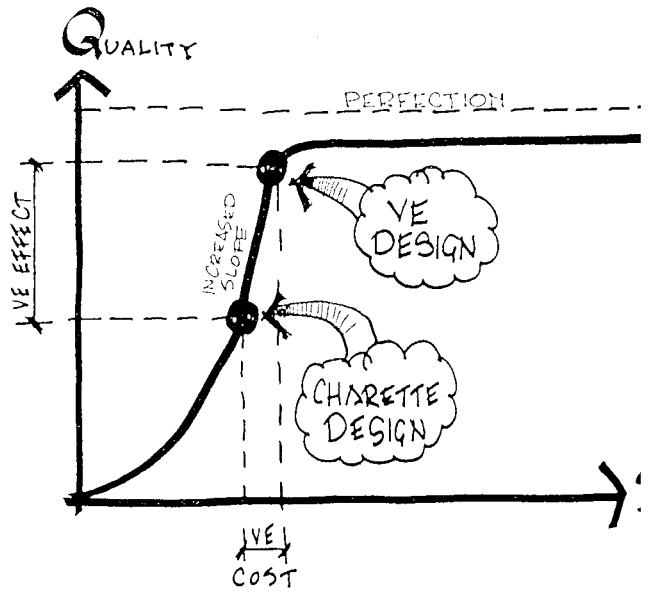


FIGURE 4