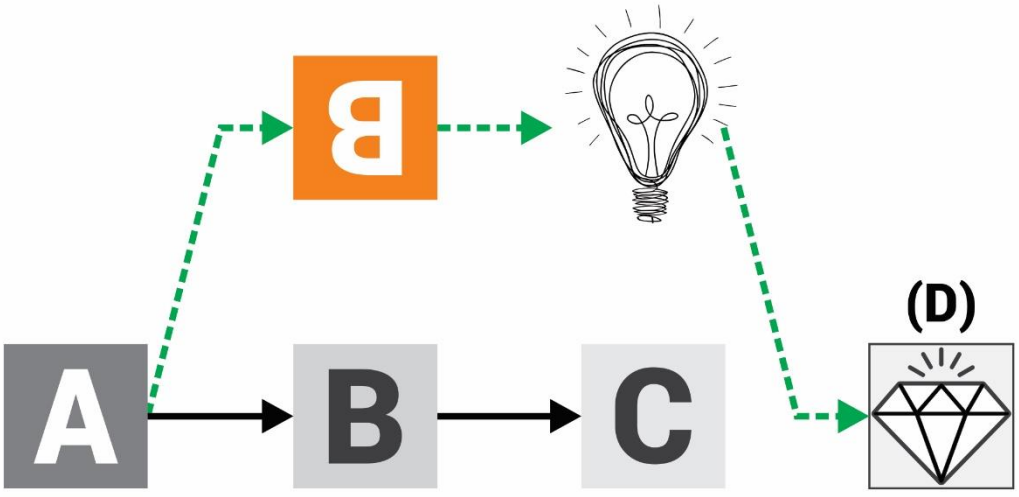
FRANK VICIDOMINA

A-B-Ds OF ADVANCED VALUE ENGINEERING



First Edition, December 2018

A-B-Ds of Advanced Value Engineering

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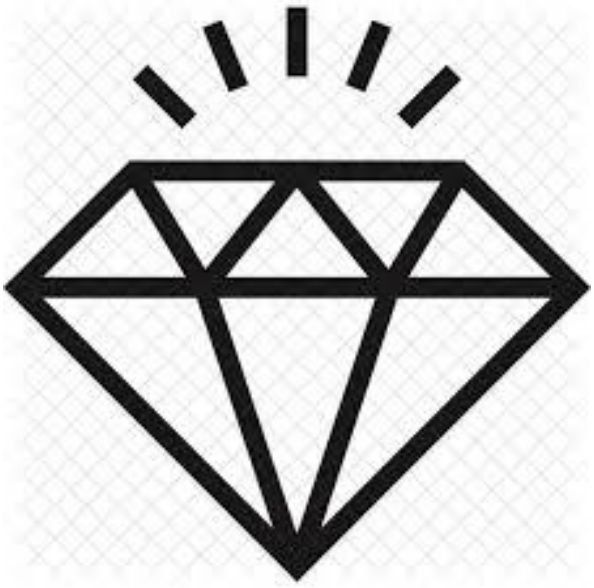
Acknowledgements

To the good Lord above for which we all owe everything……..

To my wife, family and friends for which I also owe everything ……..

To the many VE professionals that have worked with or for me, thank you for you tolerance as I know that I was a real pain (at times)……..

Introduction



CHAPTER 1

INTRODUCTION

"You should write a book when you retire," they all said. "Ok, sure", I sez. So here 'tis….

Working as a Value Program Manager for a large federal agency I do indeed have numerous outrageous stories (of both VE success and failure). While these stories probably do have a high degree of entertainment 'value' looking back on my career I realized that I have experienced a most unique professional journey and perhaps there may be better value in sharing knowledge I've acquired along the way.

As an agency VE manager for over 20-years I represented the owner (client), became certified as a VE facilitator (practitioner) and served as a study team member for both my projects and others (VE team member). As such, I've experienced VE from all angles and offer a perspective few others have. I have managed, supervised and/or worked for over 40 different VE facilitators and completed over 250 workshops/reports.

I can honestly say that just about all of the VE facilitators I've worked with are most qualified professionals and successful. All are unique in how they execute a study; no one (including this author) runs a perfect workshop, however. Everyone has relative strengths and weaknesses. I've seen a wide range of VE facilitation methods and styles and have ~~stolen~~ learned many things that I want to share in this book/course.

The VE practitioner's goal should be to best take care of the CUSTOMER via finding 'D' – the 'diamond in the rough' better solution. I am a firm believer, via experiencing numerous positive VE workshops, that this can be accomplished by optimal execution of the VE Job Plan. To that end my objective is to help improve your facilitation skills via sharing my experience and observations (and opinions) in this document as well as in a course setting with your input.

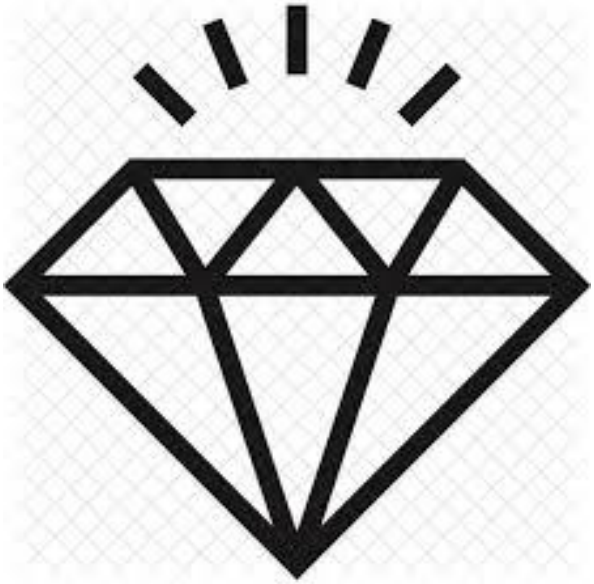
This book presents the subject matter training course but is also good as an independent, stand-alone learning document. Its content addresses functionality and issues associated with the Pre-Workshop, six-phase VE Job Plan and Post-Workshop activities as well as various select 'odds and ends'.

If you're looking for the latest gee-wiz technologies, etc., you're not going to find such in this document (some new techniques, etc. will be presented as part of the course, however). Focus here is on reiterating what VE should be, identifying issues and offering advice on how to improve preparing for, conducting and documenting VE workshops. The book/course is aimed at the experienced VE practitioner but may also be helpful for those new to the profession.

Thank you and I hope you will be more than satisfied with your time and money investment.

- *Frank Vicidomina*

Pre-Workshop



CHAPTER 2

PRE-WORKSHOP

SUMMARY LIST OF GOALS, OBJECTIVES AND FUNCTIONS:

- **Prepare for study**
- **Assemble team**
- **Develop agenda/schedule**
- **Select venue/room**
- **Collect project information**
- **Prepare workshop presentations**
- **Start report**

(Other goals, objectives and functions?)

SUMMARY LIST OF ISSUES:

- Late funding/purchase order
- Client wants you to facilitate project team members as VE Team
- Desired team members either unavailable or too expensive
- Client wishes to have one or two-day workshop when four is appropriate
- Arranging field trip (or no field trip)
- Lack of project information
- No project cost estimate (OMG! OMG! OMG! ….)
- Late funding/purchase order
- New client; unknown venue, logistics, cooperation etc.
- Client requests VE workshop too late in design/planning process
- Client rep non-responsive
- Client rep not familiar with VE
- Client rep just interested in 'checking the VE box'
- Client rep a control freak (may be quite involved with VE process)
- Late funding/purchase order

(Other issues?)

(Discussion of Goals, Objectives and Functions)

Note: As per the following chapters, most of the above items are addressed below. Some are left out as they appear to be straightforward. If taking this course, please feel free to pick any of the 'left-outs' for class discussion.

Prepare for Study. It's hard to come up any other primary goal for this phase. This is a necessary and important activity that requires attention and thoroughness if you want to have a successful workshop. Major elements of workshop preparation are presented and discussed as follows:

Assemble Team. This is obviously very important and can certainly make or break your VE study. In a perfect world, you are always budgeted enough to obtain as many highly qualified people that you want and that your preferred team members are available for your workshop. Of course, this doesn't happen all the time. So, you may have to make staffing trade-offs within budget.

My take is to get one or more key people from outside of the client's agency staff that can technically address project/process features and can produce VE recommendations. One should discuss the project/process with the client to determine technical needs. Remember, you need to have good 'VE' people and not just technically strong individuals. They must be able to get out of the box of traditional design and procedures and be able to write good VE proposals. A full VE team should be between 5 to 10 people and may include a non-technical VE assistant to take notes and process information as necessary. Not a bad idea to have someone on the team that can facilitate in your absence if you have to leave via emergency or hit the lottery some evening during the workshop.

Should the client's design/planning/process team members be VE team members? Old school of thought is absolutely not! They will bias the thought process and inhibit change. They should only be involved in the information and out-brief phases of the workshop. This philosophy does has some merit particularly when VE studies used to be performed very late in the design process. VE should be done, however, early in the project delivery process as a development tool and not as a review element. Given proper VE application early in the project delivery process, project team members should definitely be included in the VE team and the client be encouraged to arrange such. Do recognize, however, that your outside experts must be strong (and diplomatic) enough as to not be discouraged by the client's project staff opinions and standard practices. The VE workshop setting should promote the exchange of ideas and methods used by the client's agency and by your outside experts as opposed to a 'my way is better than yours' contest.

The customer should also be strongly encouraged to invite representatives of the end user(s) to be on the VE team or at least be involved in the workshop. While actual project/process users may not be 'technical experts', they know their project/system better than anyone you bring

in. And, most importantly, they are the primary customer of your customer. Their input throughout the VE study should be solicited and valued.

Develop Agenda / Schedule. Almost every VE facilitator prepares a workshop agenda schedule. Many do not, however, refer back to the schedule once the workshop commences. Recommend reminding the team of where they are schedule wise and acknowledging being on-track and/or encouraging better time utilization at least once a day.

The workshop agenda does not (and should not) be particularly long or complicated. Remember that you likely have several VE 'nubies' involved and much of the VE detail terminologies won't mean squat to them anyway. Purpose of the agenda/schedule is to keep the process on time and not define details.

Select Venue / Room. You may or may not have control over the time and place of your workshop. Often the venue will be selected by your client and may likely be their office conference room. Sometimes you will be asked to provide a conference room – usually at your hotel. You should ask your client about the possibility of conducting the workshop on-site in a room provided by the end user or sponsor. This can help motivate and involve the end user and they will at least be appreciative of the offer even if it the workshop is not held at their place. Downside would be travel logistics to the project site, etc. Regardless of location, you should help assure that the venue is comfortable for the participants, has proper utility and is accessible for those that may have to commute to the study (parking, building entry, etc.) Providing, or easy access to, coffee and doughnuts etc., also goes a long way.

Collect Project Information. Hopefully your client will provide adequate project/process information. Don't ask for everything available because you might just get copious amount of data that you won't need and could waste your client's time in assembling. Figure out what's important and try to limit your information request to pertinent items.

You want to receive information more than a week before the start of the work so it can adequately reviewed by yourself and VE team members (please forward to them no later than one week before the study). It may be helpful to receive information piecemeal as your client gathers each part and not wait for a single transfer. You also may need access to a staging website where files can be accessed in lieu of e-mail delivery as often files are larger than e-mail allowable size.

Prepare Workshop Presentations. Kicking off your workshop should either be via an intro by your customer (and/or their customer(s)) and you. As such, you should prepare an opening presentation that should include:

. Why are we doing this and why now? (Audience needs to know why they're there).

. What is VE? (Likely much of the audience not experienced in VE); keep this fairly short – doesn't need to be an entire intro to VE course.

. Workshop Agenda (Good to hand out paper copy of this and refer back to it at least once a day).

. Venue logistics (Restroom, snacks, anything else); likely workshop had outside participants/guests; I actually did a workshop in a building where it required two access cards to get to the restroom and three to get back to the conference room….. Good to work that stuff out early on.

In addition to your opening VE introduction, ALWAYS BE PREPARED TO PRESENT INITIAL PROJECT/PROCESS INFOPRMATION YOURSELF; you can't fully rely on or control what your client (client's client) will do or don't do at the beginning of the study. A project manager may not show up; he/she may not bring the right presentation file, etc. IT HAPPENS! Proper response is not to stop things before you even get started. You should have project/process presentation (or equivalent information) files loaded up ahead of time. You can present them to the team/audience – just don't pretend you're the project/process user or expert. Let the audience help you through it.

Start Report Document. When time permits it's not a bad idea to start preparing your workshop report document. This requires that you review and become familiar with project information and perhaps identify possible discrepancies and/or inconsistencies with the data provided that can be addressed early in your workshop.

(Discussion of Issues)

Note: Several listed issues are covered in the above discussion and are not repeated here. The same may occur in the following chapters.

Client wants you to facilitate project team members as VE Team. Suppose your client insists on using the actual project/process team as your VE team. Would first suggest trying to discourage using people associated with the project/process or in the same local organization to serve as the primary VE team since it's certainly hard to get outside the box when they work inside same. You may offer a compromise of sneaking in a couple of outside experts. If your client still insists on having an incestuous VE study you have to decide whether or not to decline the work or not. Remember, the end project will ultimately be a reflection on you.

Client wishes to have one or two-day workshop when four is appropriate. Perhaps your client wants a short duration workshop of let's say two days and you know 3 or 4 days are

needed to conduct a thorough VE study. As with the above, first suggest trying to get additional time and present why this is so important. If not successful you have to decide what has to be time-reduced in order to have a successful, albeit abridged workshop. Things you may consider (do you):

. Nix the field trip (if applicable)?

. Truncate Function Analysis (addressed further in **Chapter 4**)

. Not develop VE alternative costs?

. Defer the out-brief presentation to a later date?

Again, you must ultimately decide if can have a successful workshop given limited schedule and whether or not you decline the work.

Arranging a field trip (or no field trip). A field trip to the project site or process location should be conducted if at all possible. Not just for the obvious of obtaining first-hand information but other valuable things happen as well. First, just the experience of a site visit is a great team building exercise. Also, you often meet and talk to the end users or sponsors on-site. They usually provide pertinent information and perspective that you would not get from just conference room presentations. On-site observations can also stimulate creative ideas.

If a field trip is impractical, etc., you may try maps and satellite imagery to the best extent possible (Google Earth, etc.)

Lack of project information. Is a significant lack of project/process information a show-stopper? My answer is that 'It depends'…..

If there is absolutely no project information, then, of course strongly suggest to your client that the workshop be postponed until such that that there is something to look at. If information does exist and it just hasn't been provided within a week of the workshop, then pushing the client to provide it may be the plan.

Let's suppose that you have a well experienced VE team on tap for your workshop. I offer that if just a conceptual design can be established you may still be good to go and have a productive workshop. Based on a proposed project/process concept experienced staff can develop a presumptive design based on the client's agencies past as well as universal practices. Parametric cost estimates can be applied to further define the project/process. The VE Job Plan can then be applied to the presumptive design and potential performance improvements and/or cost saving measures can be identified. This process is quite similar to VE application in design-build projects where the VE workshop is performed on the Request for Proposals prior to solicitation. VE results can often recommend adjustments to the RFP that help ensure desired performance as well as provide better opportunity for cost efficiency.

No project cost estimate (OMG! OMG! OMG! ….) Is no available project/process cost estimate a VE show-stopper? More than a few VE practitioners say yes, VE is a no-go without one. I strongly disagree with this philosophy/practice and offer the following reasoning.

Consider that VE is most effective when performed ***early*** in project/process development and/or design. If you are truly applying VE early in the process doesn't it make sense that a detailed project cost estimate has ***no***t been produced yet? Can't have it both ways.

I certainly realize that having a proposed project/process cost estimate greatly helps with executing a VE workshop but it is certainly not necessary. Per discussion above an experienced VE team will have little problem in defining project definition and parametric costs with or without an available cost estimate. Cost models can be developed from such VE team estimates and VE focus can be applied.

Also consider that the cost comparison of VE proposals to existing design features should illustrate the ***relative*** difference between each. As such, just as long as an apples-to-apples cost basis is used (actual client provided unit cost or VE team developed parametric cost) the analysis should be valid.

Client requests VE workshop too late in design/planning process . So, your client wants you to do a VE study very late in the project design. Well, you certainly should have that beloved cost estimate… ;) Ok, you know no matter how good a VE you do it's too late to change the project so is there ANY value in going through with the workshop? In my strong opinion, maybe…..

Consider whether or not your client (his customer(s)) will develop similar projects/processes in the future. If so, your team may certainly produce recommendations for potential use in later endeavors. As such, you may want to carry out the workshop and prepare the report document with that in mind. Conversely, if this is a one-time unique project, they've totally missed the boat and you might want to consider turning down the work.

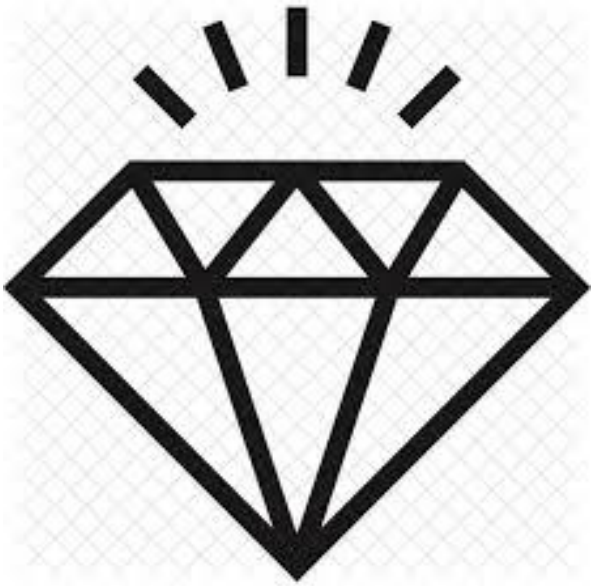
Client rep non-responsive . Your client sets you up with the bare minimum to perform a workshop and is then basically out to lunch and unresponsive. This is certainly not a good situation but perhaps not the end of the world. Again, if you have a senior team you still should be in good shape as they may be able to be productive with such minimal assistance.

Do, however, ***diplomatically*** try to directly contact designers, end users and other key project/process development staff to participate in the workshop or at least provide additional informative input.

Client rep a control freak (may be quite involved with VE process) . Perhaps your client is overly involved and is a bit of a control freak (Ok, me guilty….;)). Try to roll with it. Be flexible. Maybe try a 'good cop / bad cop' routine with some of your team members in dealing with your

client. Try to make sure, however, that their over-involvement does not influence your VE team to the extent that ideas are discouraged and/or bad assumptions are accepted when they may feel otherwise. Try to emphasize to your client that you, collectively, want to satisfy his client(s) and keep the workshop focus as such.

Information



CHAPTER 3

INFORMATION PHASE

SUMMARY LIST OF GOALS, OBJECTIVES AND FUNCTIONS:

- **Obtain knowledge**
- **Assimilate (be-friend) project team**
- **Educate team about VE**
- **Prepare/deliver (short) VE presentation**
- **Present project (by project manager(s))**
- **Conduct field trip**
- **Determine performance standards**
- **Identify/list project risks/issues**
- **Listen to end users**
- **Research project**
- **Organize information**
- **Develop cost model**

(Other goals, objectives and functions?)

SUMMARY LIST OF ISSUES:

- **Very little available project information**
- **Project Manager not cooperative**
- **No cost estimate (OMG! OMG! OMG! OMG! OMG!) …..**
- **Project team doesn't show up**
- **Key VE Team staff doesn't show up**
- **Design or plan isn't comprehensive/complete, etc.**
- **Unmotivated and/or disruptive project team**
- **Sponsor or end user at odds with primary client**
- **Discover fatal flaw(s) in current design/plan**
- **Too much workshop discussion time spent on one or more non-priority project/process features**
- **Logistics – bad room, IT, phone-in……**

(Other issues?)

(Discussion of Goals, Objectives and Functions)

Obtain Knowledge. My choice for the basic goal of this phase.

Assimilate (Be-friend) Project Team. An important 'when' function associated with the above is to start to get the project/process team on-board with the workshop. You want everyone in the room to be an active participant in the workshop as well as to 'buy-in' to VE. So from the get-go you want to proceed in such a manner as to invite all involved to be part of your team for the week. Always lead off by introducing the room emphasizing that they are important to the task at hand. Try to be interactive with your audience from the start.

Educate Team about VE. It is likely that several attendees have very little experience with VE so it is important that you present the basics of VE and the Job Plan. Even if everyone says they know VE, assume otherwise and allocate at least a short time to re-hash the basics. You can lose people's interest right off the bat if you proceed without their having any (or the right) idea of what a VE workshop is.

Prepare / Deliver (Short) VE Presentation . As an initial task of your workshop you should conduct a short intro to VE presentation. This should include connection to how VE is being applied to the target process/project. This should include presenting the week's agenda and when each phase of the VE Job Plan will occur. Good to briefly identify what your product (VE report) will contain and how they will contribute to it.

Emphasis on short, like 15 – 20 minutes, tops. Counseled a rookie recently and he had about an hour's worth of intro presentation planned for his workshop. Nope.

Present Project (by Project Manager(s)). Certainly, a basic element of the Information Phase is the project/process representative (project and/or technical manager(s)) presentation of the current project/process status. You should ensure that he/they know this in advance and are prepared to do so. Suggest that you obtain their presentation materials (usually e-files) ahead of time and download to your computer.

THERE ARE SEVERAL KEY ITEMS THAT I BELIEVE YOU SHOULD TAKE AWAY FROM THIS BOOK/COURSE. THE FOLLOWING IS ONE OF THEM:

Be fully prepared to lead the project/process status presentation yourself. The PM or tech manager(s) may not show up (on time or otherwise) or not be prepared to present project/process information. This is certainly not the optimum way to start your workshop but the alternatives of having a room sit there idle for a long duration or cancelling the workshop should not be acceptable.

This emphasizes the importance of having project/process information ahead of time. Also, realize that there should be people in the room familiar with the project so you can certainly rely on their input as you go through the material. If there are no project people, then you must decide to proceed or not without any project team assistance. If you have a good VE Team you still should be ok, albeit not in the best circumstance. If presenting on your own don't pretend to be the project/process expert. Leave open questions open if there are no answers in the room. Figure things out later as the workshop progresses.

Conduct Field Trip. When possible, always encourage your client to arrange a field trip to the project site. There is no substitute for the added perspective of looking at the project in person versus just viewing plans. Also, there are usually end users giving the site tour and their input during this time is probably the most valuable information you'll get in the study. Also consider that the field trip is an excellent team-building activity and creativity stimulant. And always, be safety conscious, adhere to all rules, etc.; keep an eye on your team members (children) when out at a site (Had a guy climb a water tower to take a pictures…… Plant manager had a stroke when he saw him up there.)

Determine Performance Standards. Something many facilitators do not directly do is to identify and list project/process performance standards. This is different (but is overlapping) to functionality and/or risks and issues. Performance standards (also referred to as attributes) basically answer the question. "If we suggest a change, it would improve the project/process because it … (item), (item), (item)…."

It's always a given that improve cost-effectiveness is a goal; others could include "reduces (a certain) risk", "reduces implementation/completion time", "accomplishes (specific task) in an improved manner", "improves customer acceptance", "reduces construction complexity", "reduces down-time", etc. These are important factors that the team should always be aware of and ultimately rate proposed ideas by. Best if you identify project/process standards (or attributes) on the first day of the workshop when the client and end users can participate.

Identify / List Project Risks / Issues. Over the years I've noticed that most, if not all facilitators perform a specific workshop task to identify project/process risks and issues. It's important. So much so, I believe that this should be an added phase to the official VE Job Plan say either between Information and Function or Function and Creativity.

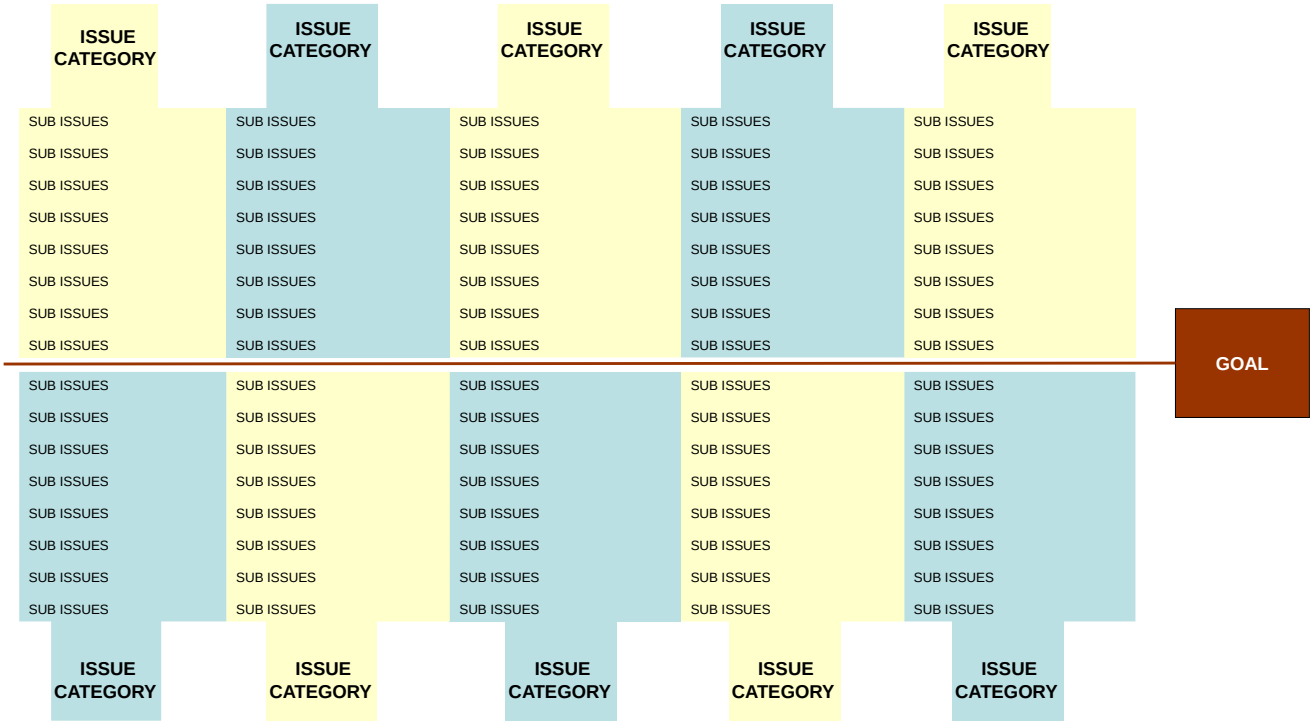
As I've been informed, there is a technical difference between a 'risk' and an 'issue'. The former is the combined probability and consequence of an adverse occurrence where the latter the adverse occurrence has already happened or exists. For an example, a risk would be "Construction will be difficult if river stages exceed the 1% probability level of X feet." A similar issue would be "Construction will be difficult during the spring when the river elevation will (highly certain) be above X feet."

To be honest, I've gotten away with identifying both together with the realization later on that any VE recommendations consider probability/consequence versus existing situation when ultimately determining its viability. There are some situations, however, where it's appropriate (by item and/or by client request) to specifically assess risk and formally integrate in the VE study.

Chances are that your client has their mechanism/process of risk analysis. Best to use it if you can. Whether or not you utilize your clients approach or your own, make sure that what you do is accurate and appropriate for the project/process. Keep it simple. I've seen overly complex VE risk assessments that ultimately ended up as a waste of valuable workshop time.

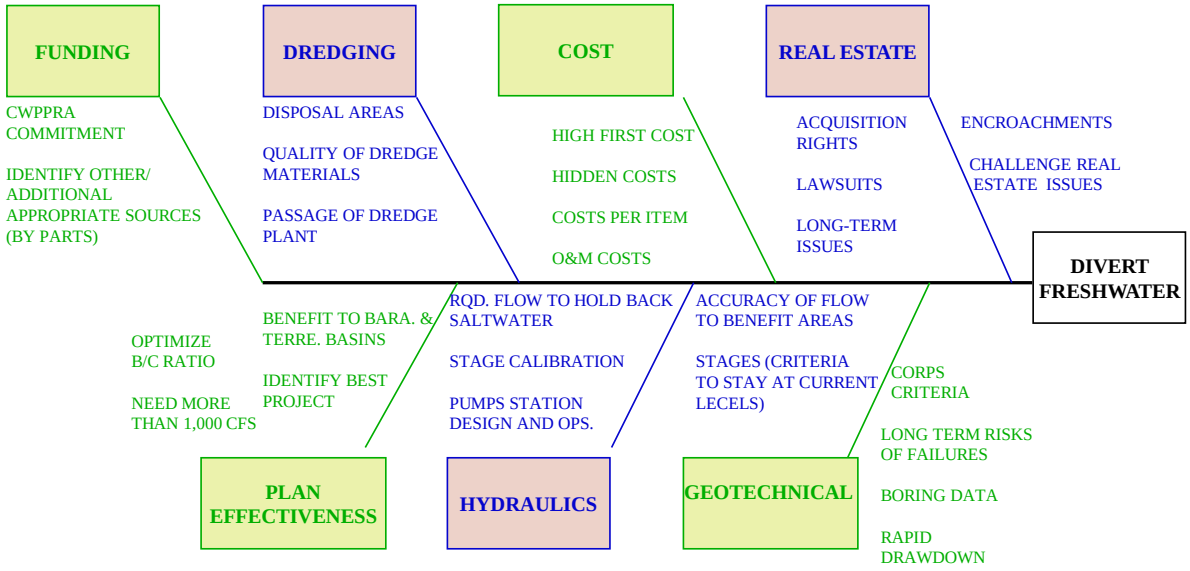
As with the above, you want your client/end users to contribute to identifying project risks and issues so again, best if accomplished on the first day of your workshop when attendance is likely at its maximum.

When there are numerous risks and issues to address, I have on occasion morphed a 'Cause and Effect Fishbone Diagram' to organize and group thinks. Below is a template and an actual project utilization to consider. Could be helpful in identifying common issues associated with multiple project/process features.



Template for 'Fishbone' Diagram to Organize Issues

"FISHBONE" DIAGRAM FOR BAYOU LAFOURCHE DIVERSION



Listen to End Users. As discussed in the above chapter highly encourage your client to invite/ include project/process end users in the workshop. Make it a point to solicit their input. You may even include a specific agenda line item designating a time slot for this.

Research Project. Regardless of being prepared for the above mentioned possibility that you must present the project/process to the workshop audience, it is more than a good thing that you, as the workshop facilitator be as familiar with the project as possible. Again, don't pretend to be the room expert but having a good working knowledge of the project/process goes a long way in the quality of your facilitation and executing the VE Job Plan.

Organize Information. In addition to having the ability to smoothly present VE and project/process information on Day 1, you, as the facilitator, should also be prepared to go back and find items as needed as the week progresses. Side notes, file titles, etc. should be

considered to help designate where specific types of information are located. Saves valuable time and helps maintain an uninterrupted flow of the workshop.

Develop Cost Model. If at all possible, a cost model (resource allocation, etc.) should be developed for the project/process. Strongly recommend doing this before the workshop. Although having the workshop team put together a model is an excellent team building exercise, it can be cumbersome and time consuming. Suggest presenting a draft to team for discussion/adjustment.

This is important. A cost/resource model identifies big ticket features that deserve a higher degree of VE focus. As such, it is when developed early in the workshop.

Don't have a cost estimate – so skip the model; no, not necessarily. You still should try to assess where the big dollar features are in a project/process. If you have a technically experienced VE Team you still should be able to ferret out items of high VE potential.

(Discussion of Issues)

Very little available project information. (See same item in previous chapter).

Project Manager not cooperative. In addition to the above discussed situation where you may have to present project information yourself, non-cooperation of your PM may go further and affect your entire workshop. PM non-cooperation can vary by magnitude and cause and is certainly problematic. Hard nut to crack but my best advice is to try to communicate a couple of things to the client/PM: one, VE is one of those things where the more effort you put in the better the results and, since usually the client is doing VE because his agency/company requires it, diplomatically remind the PM that they're paying anyway, you have a good team and are at his disposal for the better part of the week. Offer to help address his current project issues at a minimum.

No cost estimate (OMG! OMG! OMG! OMG! OMG!) ….. (See discussion above and in the previous chapter).

Project team doesn't show up. It happens; not a good situation. Try to assure that you have a strong primary VE Team that can address the project/process without client assistance if need be. Also, emphatically encourage the client to get project staff in the workshop, even for a short time.

Key VE Team staff doesn't show up. This is certainly an ugly one – and it happens. People get sick, family emergencies, etc. First off, try to have a little bit of technical overlap on your team (easier said than done). Try asking the client if they can spare staff to take that person's place. Additionally, consider calling/emailing the missing person or others if and when something comes up during the workshop that the remaining team may need advice.

Design or plan isn't comprehensive/complete, etc. Worth repeating from above that VE is most effective the earlier it's done in project/process development. As such, you may not have comprehensive plans for the proposed project/process when you do the workshop. Answer again is that you should have a VE Team with enough experience to develop a conceptual design based on the clients past projects or other standards and work from there. Remember, VE is primarily about addressing project/process functions and not just the proposed project/project features themselves.

Unmotivated and/or disruptive project team. A common attitude of project/process staff is that of dismissing the fact that you can tell them something they already haven't considered; they know what they're doing and don't need your help. In addition to the suggested items to handle a non-cooperative PM, may I suggest offering to the project staff that VE is also an exchange of information and that we (the primary VE Team) would like to see how you are designing this project/process so we can share with our peeps. Maybe we can offer things that you might want to consider in future projects given different situations. Sometimes this works…. Sometimes not ;)

If and when you have a particularly disruptive individual try to get that person on the side during a break and let them know that "When you do this…… It makes it hard for me to do what I need to do. So can you help me out here?" Got this technique from an instructor's course and have successfully used it a couple of times. May not get the individual fully on-board but still may be effective in reducing the disruptions.

Sponsor or end user at odds with primary client. Not a common occurrence but if you run across it, be careful….. don't want to alienate one of the other (or perhaps both). Look at this as a great VE opportunity – because it truly is. Looking at new, 'out-of-the-box' issue solutions may be just what the doctor ordered for in this situation. A perfect fit for VE application. Give you an example, flood control project along a stream – client wanted the sponsor to acquire privately owned real estate to build an earthen levee; sponsor wanted client to stay within existing right-of-way and build a much more expensive structural floodwall. They were at odds, project stalled no resolution in sight. VE study proposed excavating a diversion channel on publically owned land that was further evaluated and determined to reduce flood stages low enough such that a levee or wall was no longer needed. Less costly than levee or wall….Good stuff!

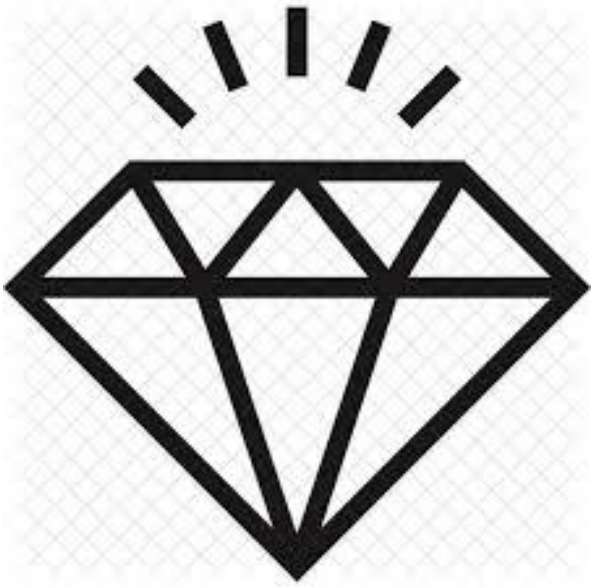
Discover fatal flaw(s) in current design/plan. Every now and then you will run across a project/process plan that is a disaster and will simply not be successful. Reasons include, but not limited to, way too expensive, not constructible, won't perform as intended, cost estimate totally bogus, warehouse positioned backwards on site (actual case one-week before bid), facility will blow up if built per plan (true story; true 'fatal' flaw), etc. No problem, VE to the rescue, right? Well, yes but a suggestion here….

Important that your client's design team save face. Present your recommendations accordingly. Give then an 'out'. Doesn't do you any good to bad mouth someone, even if deservedly so. A matter of professionalism that your client will appreciate. Simple example: better to say, "The previous cost estimate turned out to be too low.", instead of, "The cost estimator blew the previous estimate." (actual edit I made to one of my VE contractor's draft reports)

Too much workshop discussion time spent on one or more non-priority project/process features. Manage workshop time. Don't allow prolonged discussion for a minor project/process feature. Once the time is wasted, very hard to gain it back. I've encountered this issue many times.

Logistics – bad room, IT, phone-in, etc. Your client has set you up in a conference room that just doesn't cut it. Best advice is that it's worth a delay to try to get in a satisfactory room either at the client's location or somewhere else if possible. This may mean getting a conference room at your hotel, etc. Discomfort for several days can definitely adversely affect workshop performance. Also make sure before the workshop that any phone-in, on-line connection, etc., to those participating remotely works. Big distraction dealing with com-failures, especially at the onset of the workshop when everyone is ready to get started and then watch you flounder with tech stuff.

Function Analysis



CHAPTER 4

FUNCTION ANALYSIS PHASE

SUMMARY LIST OF GOALS, OBJECTIVES AND FUNCTIONS:

- **Identify opportunity**
- **Create understanding**
- **Expand knowledge**
- **Change viewpoint**
- **Identify verb-noun elements**
- **Identify functions**
- **Classify functions**
- **Organize functions**
- **Develop F.A.S.T. diagram**
- **Determine function resource requirements**
- **Allocate activity resources**
- **Stimulate Communication**
- **Promote participation**

(Other goals, objectives and functions?)

SUMMARY LIST OF ISSUES:

- **Diagraming can be a time-consuming activity**
- **People not familiar with process may not participate**
- **Starting up a diagram often cumbersome**
- **May be hard for some people to use verb-noun format**
- **May be 'shortchanged' by some facilitators**
- **May be drafted before workshop**
- **Including project/process activities in the F.A.S.T. diagram**
- **Secondary functions often underplayed, even ignored; CAN BE IMPORTANT PLAYERS!**
- **Loss of focus on client's needs versus FA execution**
- **Accurate cost allocation to individual functions can be difficult**
- **Physical use of 'sticky' notes can be problematic**
- **May have IT issues when done/converted to electronic format**

(Other issues?)

(Discussion of Goals, Objectives and Functions)

(Philosophy). Function Analysis (FA) remains a most critical element of the VE Job Plan. However, it's execution should not be a stand-alone achievement of your study. FA should primarily reflect your client's needs for project/process performance and not be a 'masterpiece' in and of itself.

Up until recently SAVE FA guidance required fairly strict adherence to FA execution (proper identification of functions and logic diagraming). Given the importance of FA it was stressed that a high level of attention to such detail was warranted. SAVE's new philosophy on FA allows significant latitude in adhering to the process details with far more emphasis on client focus. This change reduces time and energy spent meeting FA 'rules' and loosens up the process to better include the client's needs. As such there is no longer a primary need to identify functions with 'acceptable' verb-noun definition nor is it necessary to develop a totally complete or logically perfect FAST diagram. Implementation of this change has resulted in more efficient and meaningful FA execution. Please consider this when addressing the below.

Identify Opportunity / Create Understanding / Expand Knowledge / Change Viewpoint.

At the core of VE is the practice of focusing on project/process intent and purpose versus what the project/process consists of. With such focus on, "What does the client need from this product/process?'', potential improvement beyond the boundaries of the product/process itself become possible. Expanding functional knowledge and obtaining a true understanding of the client's performance requirements is necessary to open the doors of opportunity and can often change an initial viewpoint of the project/process, not only of the VE Team proper, but sometimes that of the client as well.

Identify Verb-Noun Elements / Identify Functions / Classify Functions. VE facilitators have their various means of identifying project/process functions; whatever works best for you – stay with it. Do know, that now we have far greater flexibility in how we execute FA (we are now free to use verbs like 'provide' and 'obtain'…and include adjectives and adverbs as needed… Woo hoo!). It is important to emphasize that the function of FA is to best capture the client's performance requirements as opposed to creating a masterpiece of a F.A.S.T. diagram. So, forget the rules of the past and communicate with your client in plain speak to identifying key functional elements of his project/process. This should now go fast and easy without much pause on getting the proper verb-noun perfectly for any given function. Always pose and repeat the key questions, "Why are we doing this?"; "What do we want this element to do? (What MUST it do?)"; "What does it take to and what happens when we do this?", etc.

While function identification should be client focused and liberally executed, it is still important to know what are the higher/lower order needs as well as what are primary and secondary

functions. This is how we better understand the project/process and obtain focal points of potential change opportunities.

Organize Functions / Develop F.A.S.T. Diagram. With new emphasis on defining customer needs versus FA perfection, organization of functions should be done with minimal stress and grief. Determination of the projects/process highest order and primary functions should be done by the team with client participation if at all possible. Basic How-Why-When-As a Consequence of layout of your functions should be done without hang-up. Again, FA perfection is not your goal here. Consider whether you need to complete an entire comprehensive F.A.S.T. diagram or can elements related to major function groups be done as stand-alone items. Keeping the client's needs in focus should continue in this part of the FA process.

Determine Function Resource Requirements / Allocate Activity Resources. An important aspect of FA is to identify functional requirements that are resource intensive. Identifying these functions provides a level of priority goals to the VE workshop. The 'Pareto Principal – 80%/20%' can be applied once resource allocation is done. Use of an activity/function/resource matrix is a good, albeit potentially time-consuming method of distributing project/process resources to your functions. I offer a bit of a shortcut via inclusion of project/process activities in your F.A.S.T. diagram per discussion in the below related issue. If no cost data are available, team determination of numeric resource or just high/low designation can be applied (see below subject item issue).

Stimulate Communication / Promote Participation. Ok, here is another primary take-away from this book/course…… A fundamental highest order and important 'When' function to the FA Highest Order functions is promoting team interaction and associated universals participation. FA should be done as a team. It is at this point of the VE process that team dynamics should be developed and established. If you don't have a working team by the end of FA, you're in trouble as the following phases work best via a team approach.

Identifying and mapping out project/process functionality is important. Having your teamwork as a team even more so. Don't just take Frankie's word on this….. True story here:

> *At a SAVE International Conference, I guess in the early 2000's, at the end of a presentation session, I assume on FA, a number of practitioners were still arguing some technical point. The discussion carried on as they became oblivious to room agenda that was ready for the next session. In walks non-other than the then 80 something year old Mr. (Dr.?) Charles Bytheway. Yup, oh by-the-way the man that invented FA (sorry, couldn't help myself). The room suddenly became deafly silent as the subject technical warriors summoned Mr. Bytheway to the front. Each side immediately presented their argument to the technical issue at hand and then they paused for the wizard's verdict. His priceless response went something like this: '…. All this FA mumbo-jumbo really doesn't matter…. Don't waste your time on stuff like this…… What you want to do in FA is get your team*

working as a team so you can have a meaningful creativity session.' …. Really busted their 'bubbles'….. Most cool!

Team members may get ahead of themselves and want to include functions of alternative ideas. FA should assess the project as currently planned/designed. As such, these functions should be saved for the Creativity phase in order not to convolute things. However, be careful not to discourage participation by telling a team member to defer their input.

(Discussion of Issues)

Diagramming can be a time consuming activity. FA can burn up a lot of time. Be careful and be ready to move things along as needed. Also, keep FA in perspective – you can develop a very complex FA diagram, etc. that ultimately may be impressive but not really serve its purpose. Many in the VE industry believe that one cannot do too much FA in a VE study. Nope, the other phases are important too and should be given adequate attention given the time constraints of most workshops. Keep the customer needs as a focus – not the 'magnificentness' of your FA/F.A.S.T. diagram.

People not familiar with the process may not participate. FA may be new to some of your team members. As such, they may want to sit it out or just be an observer. Do what you can to get everyone to participate even if you must conduct a short FA training session at the onset.

Starting up a diagram is often cumbersome. I've seen more than a few facilitators stumble in getting a diagram started. Have a plan as to how you generally construct a FA diagram. I have my own tactic of starting from both the highest order function(s) left to right AND from the project/process activities from right to left (I know, using activities on a F.A.S.T. is taboo – see related issue comment below).

May be hard for people to use verb-noun format. FA 'newbies' may not get the hang of the verb-noun thing; also, FA diagramming is counter-intuitive to a regular activity execution chart as FA often lays-out backwards to such. Be patient and realize that FA may be foreign to new VE team members.

May be 'shortchanged' by some facilitators. Even though SAVE emphasizes the critical importance of proper FA in a VE study, I have been amazed at the number of facilitators that perform incomplete FA in their workshops. Given that most of my studies that I have been in

the client's seat have been construction projects, the most FA deficiency I've experienced is with resourcing functions (this most certainly can't happen in a process study without significant negative impact). Other frequent omissions include partial completion of the F.A.S.T. diagram (completed after the workshop) and lack of a complete list of functions ignoring major activity items, and, listing few (if any) secondary 'When?' or 'As a consequence of' functions. Don't substitute the current new 'liberties' of FA with completeness.

May be done before the workshop. May get in a bit of hot water with the SAVE folks for even mentioning this but it comes up more than a few times given limited workshop duration. When there is limited workshop time you may want to prepare a DRAFT FA diagram prior to the workshop and have the team amend it. I certainly don't recommend this if you have adequate time to do FA from scratch but sometimes you have to cut time out of the study somewhere. Deferring the Presentation Phase is a good first choice time saver; beyond that FA would be your only real second choice to abridge if necessary. Lack of team building aside, you may not be sacrificing too much if the project/process has a simple scope and/or is repetitive with prior/recent VE application. Again, not recommending this, but can be done if need be.

Including project/process activities in the F.A.S.T. diagram. Please note that the following is the author's opinion. Standard practice discourages the inclusion of project/process activities in a F.A.S.T. diagram as it may interfere with focus on project/process functionality. I, on the other hand, have had much benefit in including activities in my F.A.S.T. diagrams and will simply list such via the following bullet points:

- Formulating a F.A.S.T. diagram is aided by building it from both sides of the scope lines.
- Those not familiar with F.A.S.T. diagrams can often understand it via connection with project/process activities.
- Every function should be ultimately tied to a project/process activity; if it isn't, a project/process deficiency is identified; this often occurs with, 'When?", and 'As a result of', functions.
- Alternately, if a project/process activity ties to a common function, the activity may be all, or in part, redundant and would denote the potential for reduction.
- Resourcing functions can be illustrated via identifying high resource activities with the functions they tie into.

I believe that including activities in the F.A.S.T. diagram offers more benefit over the potential of polluting the teams focus on project/process functionality.

Secondary functions often underplayed or ignored. Remember that secondary and/or 'When' or 'As a Consequence of' functions can be important factors in a project/process and may warrant VE focus. Effort should be made to identify these items and include them in FA and have them placed in your F.A.S.T. diagram.

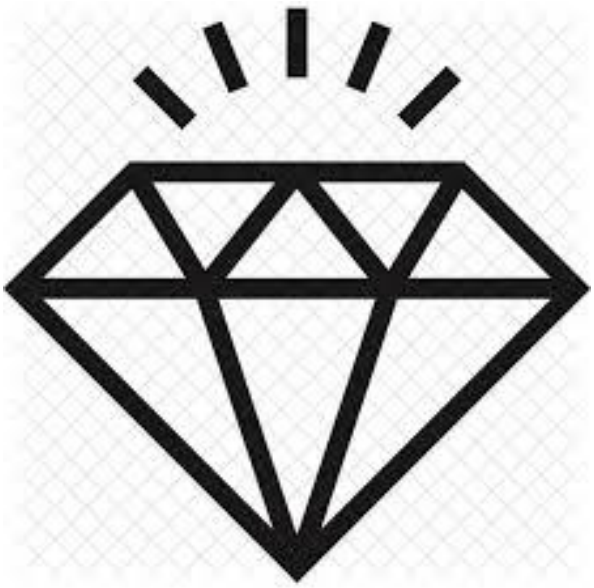
Loss of focus on client's needs versus FA execution. To restate, new FA emphasis is away from FA and F.A.S.T. diagram perfection to better identification of customer functional needs. As such, it is important to keep the FA session focused on your client and not on best verb-noun definition or layout of your diagram.

Accurate cost allocation to individual functions can be difficult. As noted above you may not have cost data for your workshop subject so how does one allocate resources to functions? In some situations, it may be critical to use parametric cost values, etc. Cost experienced team members that may best use historic or best judgement would need to be relied upon. But consider whether or not 'numbers' are really necessary. It still may be obvious as to what activities and derivative functions are high-cost, labor etc. High resource functions can still be identified even without numeric resource information.

Physical use of 'sticky notes' can be problematic. Most everyone uses sticky notes on the wall as a means of developing a FA diagram. Not easy to do electronically on the screen from scratch. Make sure your venue can accommodate sticky note use (space and surface, etc.) And, … get the big ones…. Easier to use/see.

May have IT issues when done in and/or converted to electronic format. Whatever electronic program you like to use to illustrate/document your FA diagram, note that none are particularly easy although you may find one better relative to another. Good trick is to take a picture of your sticky notes on the wall (or even leave them up if you can). Maybe work overnight to clean up the diagram for later use.

Creativity



CHAPTER 5

CREATIVITY PHASE

SUMMARY LIST OF GOALS, OBJECTIVES AND FUNCTION:

- **Generate ideas**
- **Identify new concepts**
- **Stimulate thought**
- **Allow free-thinking and participation**
- **Maintain flow of ideas**
- **Reference F.A.S.T. diagram and issues list**
- **Challenge team**
- **Promote illogical ideas**
- **Keep team focused**

(Other goals, objectives and functions?)

SUMMARY LIST OF ISSUES:

- **Non-participatory team**
- **Non-participatory individual(s)**
- **Lack of ideas**
- **Team loses focus**
- **Team bogs down with discussion of idea or related issues**
- **Facilitator allows extended discussion of an idea or related issues**
- **Flow of ideas slows or stops**
- **Facilitator neglects reference to F.A.S.T. and/or issues**
- **Portion(s) of project may be overlooked**
- **Complex project may require doing independent creativity sessions**
- **Logistics of listing ideas (flipchart and/or e-list)**
- **Lack of attention to project issues and/or secondary functions**
- **No focus on by-passing vs solving issues**

(Other issues?)

(Discussion of Goals, Objectives and Functions)

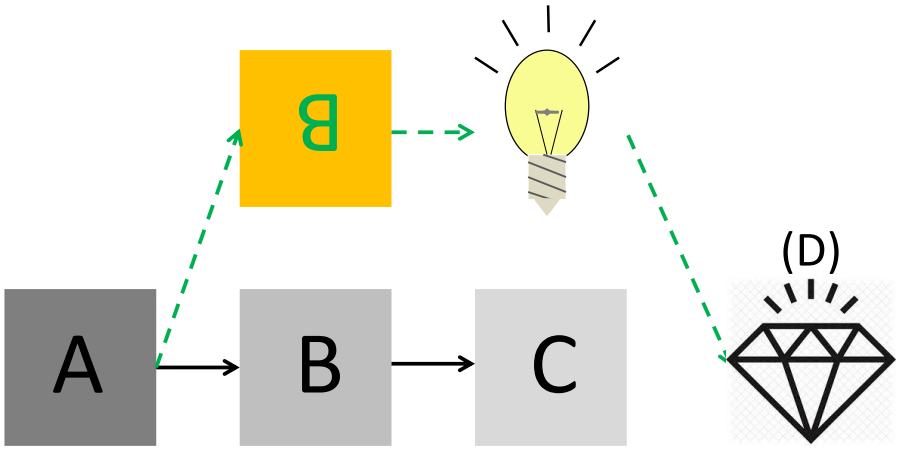
Generate Ideas. I may have this backwards, but I've heard most state that the primary goal of the Creativity Phase is to generate as many ideas as possible. I'm gonna go with the next function as paramount:

Identify New Concepts. Ok, here is another primary take-away from this course/book. The reason we do VE is to put forth new ideas for the client. If the client is looking for a review session to cut cost he really doesn't need VE for that. We want to provide that 'diamond in the rough' for the client. Something new; out-of-the box; innovative. Even if the concept can't be applied to the specific project/process under study, it may be utilized in the future.

While the VE establishment claims that Function Analysis is the key activity of VE, I offer that this phase is truly where the rubber meets the road. Don't get me wrong, FA and a good Information Phase is imperative to setting the stage for meaningful and productive brainstorming but the bottom line is that new ideas and concepts must be identified here.

So how do you get a bunch of conservative engineer types to get out-of-the-box and be creative? Well, you must use some form of 'structured' (in-the-box) methodology. Ironic….. The process I'm found of is called 'Lateral Thinking'. While not a copyrighted concept, I do have to give much credit to Dr. Edward DeBono who wrote a nice book on the subject say 40 or so years back (still a good read). This concept is illustrated on the cover and repeated in the figure below and can be briefly explained as follows:

'Logical' solution thinking follows a 'logical' step-by-step process; reasonable solution 'A' leads us to a more reasonable solution 'B' that we further develop to our best, logical solution 'C'. Lateral Thinking takes a different approach as non-logical, non-reasonable, even goofy solutions (upside down 'B') are allowed AND ENOCURAGED to be brought forth in the brainstorming session. Intent is that such illogical ideas may trigger a thought (light bulb) and/or complete concept (diamond) that is both new and perhaps applicable as a solution. This 'laterally' by-passes logical thought and helps the VE Team think of something new and maybe find that diamond level solution for the client. This method helps support the downstream functions of this phase as further discussed below.



Concept of ‘Lateral Thinking’

Stimulate Thought. A good brainstorming session must include conditions that stimulate the participants to think. How do you get your team, both as individuals and as a group to be actively engaged in this process? Well, hopefully team building has occurred in your workshop activities leading up to this phase. You must also create an environment that encourages participation as well as controlling the process to maintain such. Consider the points discussed below.

Allow Free-Thinking and Participation. With respect to the above concept of Lateral Thinking it is imperative that there is open, free-thinking as well as full team participation in your brainstorming session. You want to encourage a free flow of all ideas, good or bad, limit or eliminate discussion, no criticism, etc. To get things started you might consider putting the first few ideas on the board (include an obvious stupid idea to give an example and comfort of stating such).

Ok, this almost qualifies as another main point of the book but not so since not many facilitators do this but….. If you have a large and complex project/process you may have to sub-divide it and focus brainstorming accordingly. Some facilitators will do this anyway and limit creativity to only individual aspects (or functions) of the project as a standard way of conducting the session. Can't think of a worse creativity buzz kill than telling your team to get out of the box but the first box we're going to limit thought to is Item or Function X. I encourage you to allow wide-open ideas initially and re-focus later as discussed further. Often, a team member is busting a gut holding in their ideas just waiting for the start of the brainstorming session only to be told to hold the ideas unless it applies to the first 'box'. Buzz kill major……

Maintain Flow of Ideas. It is important that the facilitator to keep the 'popcorn' of ideas moving. Do not allow criticism and keep discussion to a minimum as necessary just to clarify an idea, etc. You will get bogged down at some point but do your best to keep things alive and moving as long as possible. Remember, you want goofy ideas as well as good ones and there should be no limit of the former.

Reference F.A.S.T. Diagram and Issues List. Ok, once the 'popcorn' slows it's time to go to the boxes…… Be sure to reference each scope function and make sure that the team has ideas on each. Also, and equally important, go to your list of issues and see if you have ideas on resolving or by-passing them. Regarding the latter, look at things holistically and see if issues can be avoided vs solved. That is to say if project/process Feature X has a number of tough issues, can we functionally accomplish what X does by doing something else and thus negate such issues. The above mentioned augmented 'fishbone' diagram can assist in identifying project features that have numerous issues and/or common issues that affect multiple features. Hey, note this as another one of my important course takeaways …..

Challenge Team. Set goals for your team to generate 'X' number of ideas or the like. Push them. Again, looking for the upside-down B's that may generate the light bulb.

Promote Illogical Ideas. Stated above several times as to why this is a good thing. Sure, can get out of hand and so you do have to control this to a degree as well, but need the 'illogical' items to help identify possible new practical concepts.

Keep Team Focused. Not exactly the opposite of the above but keep the team engaged on what the VE study needs to do. That is, try to identify new and innovative solutions to the designated project/process functions and issues. As the facilitator you must also keep the team and perhaps individuals fully engaged in the brainstorming session to maximize chances of success.

(Discussion of Issues)

Non-participatory team. Yikes….. It happens. So what do you do if the team ain't playin brainstorming? Answer is whatever it takes…. Try putting up the first few ideas yourself and see if that gets you anywhere. Also, I like asking the team the question per any specific project/process feature, "What can we do to accomplish (the function) instead of building/using (the specific feature)?" Or address a specific issue, "How can we fix or avoid (the issue)?" Keep things light and a bit of humor helps too. If all else fails, threaten not to pay them ;)

Non-participatory individual(s). You want everyone involved in brainstorming. So what if you have an individual (or several) on the sidelines? I like calling them out like a school class thing but in a positive sense like, "Mr. Jones, you seemed to mention some potential good ideas regarding (whatever) before when were discussing things. What do you want to put on the board?"

Lack of ideas. Sometimes the team just doesn't produce that many ideas. At such point you'll have to pause and go back and discuss high-cost features and/or important issues and see if you can stimulate additional ideas. Or, call them a bunch of losers and see if they'll respond… ;)

Team loses focus. Not saying that the team loses focus of the project but gets out of the groove so to speak of your desired free-wheeling brainstorming session. Some of the main causes are discussed in the next several items.

Team bogs down with discussion of idea or related issues. Often there will be lengthy discussion of an idea during brainstorming. While such may be important to the selection and ultimate development of the concept you must control time spent during this time and offer that you will discuss the idea further in the next phase. This is a very common occurrence so be vigilant and expect this to occur.

Facilitator allows extended discussion of an idea or related issues. Not quite the same as above as many a time I've actually seen the facilitator lead to extended discussion of an item and bogs down the brainstorming session (me guilty too). Be aware of this.

Flow of ideas slows or stops. You always will reach this point in a brainstorming session. If you feel enough free-wheeling has occurred them simply move on to addressing individual functions and issues as discussed above, If, however, open ideas have not been sufficiently plentiful you may want to urge the team to produce more and kinda integrate some specific functions or issues that need to be addressed and try to get back in the popcorn mode.

Facilitator neglects reference to F.A.S.T. and/or issues. Make sure that you, or your facilitator hire, does indeed reference functions and issues. I've had more than a few facilitators blow this off thinking that they have enough ideas to develop or something. This keeps the VE Process 'integral' within itself and should always be performed.

Portion(s) of project may be overlooked. As an overlap to the above, you should make sure that all significant project/process features and activities have been covered in the brainstorming session. Another good reason to actually list all pertinent project/process activities on the F.A.S.T. diagram.

Complex project may require doing independent creativity sessions. You may have a very large and/or complex project/process where you just have to divide and conquer. Suggest creating as big chunks as possible as I believe you want to avoid being creative within a given box.

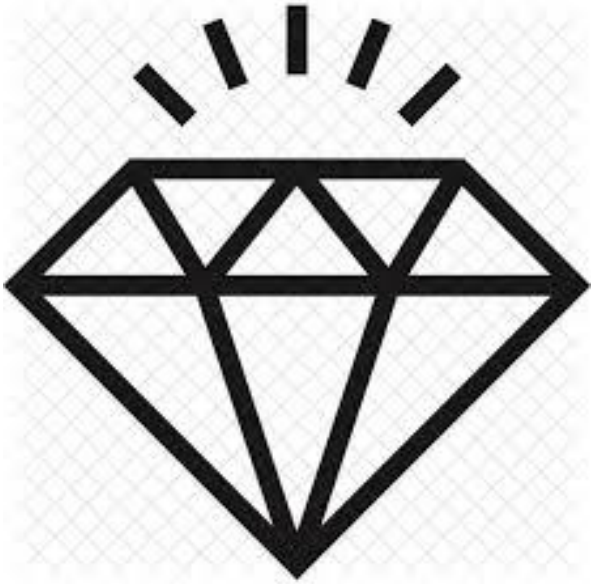
Logistics of listing ideas (flipchart and/or e-list). Back in olden days when this computer thing was an apparent passing fad, facilitators wrote ideas on flipcharts and taped each sheet to the wall or perhaps just flipped them over. Now days most list ideas on a spreadsheet and project such on the meeting room screen. Some facilitators still use flipchart paper taped to the wall as they like having the team see all the ideas all of the time which may further stimulate

creativity. Either way (or others work) but be sure you know what you're doing and the logistics of either are not cumbersome. Another big creativity buzz kill when the flow stops because the facilitator is wrestling with flip chart sheets or can't run his computer spreadsheet properly.

Lack of attention to project issues and/or secondary functions. Discussed above but also do not overlook secondary project/process functions as they may also carry importance and/or cost.

No focus on by-passing vs solving issues. (See above function item 'Reference F.A.S.T. Diagram and Issues List')

Evaluation



CHAPTER 6

EVALUATION PHASE

SUMMARY LIST OF GOALS, OBJECTIVES AND FUNCTIONS:

- **Screen ideas**
- **Determine pass/fail**
- **Discuss pros and cons**
- **Combine and re-identify ideas**
- **Rank alternatives**
- **Determine best-to-worst**
- **Identify rating factors/performance attributes**
- **Develop rating mechanism**

(Other goals, objectives and functions?)

SUMMARY LIST OF ISSUES:

- **Evaluating a large number of ideas can take a long time**
- **Facilitator allows too much discussion time for ideas of lesser importance**
- **Alternate ideas may be discarded if VE Team thinks they already have the best option identified**
- **Team can't reach a consensus on the disposition of an idea**
- **Dots**
- **Involvement (or non-involvement) of project/process team; may want to dismiss everything or may not provide any feedback**
- **Project team stating, "We're already doing that", when you know otherwise**
- **Non-establishment (or non-use) of rating factors or performance attributes**
- **Too few good ideas to develop**
- **Sponsor or end user has differing opinion of an idea vs your client and the project/process team**
- **Idea may require more investigation to determine disposition (not necessarily ultimate determination)**
- **Ranking method may be flawed or cumbersome**
- **Bogus attempt to quantify qualitative rating factors**

- **Re-quantifying quantitative rating factors**

- **Proper integration of risk analysis**

(Other issues?)

(Discussion of goals, objectives and functions)

Screen Ideas. Pretty straightforward purpose of this phase is to screen brainstormed ideas and rate and rank to the extent required by your client. Again, depending on your directive, this process can range from determining a simple pass/fail for each idea to performing a comprehensive analysis that results in recommending a single alternative.

Determine Pass/Fail. A basic requirement of this phase is simply to determine whether or not an idea is worthy if further evaluation and development. This should, however, go beyond just a checkmark or 'X' as discussed below. A basic initial designation of 'Recommended', 'Eliminated' or 'Already Being Done' is a good start. Some facilitators insist that a reason for rejection should be documented. While this may be warranted in some situations I'm not sure the report reader goes that far as to review and think about rejected ideas. They usually care about what's being proposed vs not. Again, that isn't to say that discussion of rejection reasoning is not important per below.

Discuss Pros and Cons. While some ideas are clearly good or bad and will get a fast checkmark or 'X' many ideas often require discussion of their merits and issues before their disposition is determined. NOTE THAT THIS IS AN IMPORTANT PART OF THE VE PROCESS AS SUCH DISCUSSION CAN RESULT IN A POSITIVE ADJUSTMENT OF THE IDEA OR TRIGGER A NEW FAVORABLE CONCEPT.

Combine and Re-Identify Ideas. As stated above it is important to try to revise ideas or keep good parts of the idea and identify additional potential favorable options. As with all VE Job Plan phases the Creativity Phase continues through Evaluation and to the end if the study.

Rank Alternatives. The client may require that the VE Team rate and rank comprehensive alternatives. There are significant elements to consider in best accomplishing this as indicated below.

Determine Best-to-Worst. The above requires relative rating of alternatives and again needs special attention per below.

Identify Rating Factors/Performance Attributes. Regardless of whether or not the VE Team is required to rate/rank alternative proposals, it is important that an evaluation factors be established. These factors, or performance attributes, set a guideline to help determine why a

particular idea may produce a favorable change. Cost should not be included as a performance attribute as it is what such improvement (or reduction of function) is measured against. Cost is also a defined quantifiable element (cost is cost).

IT IS IMPORTANT THAT RATING FACTORS / PERFORMANCE ATTRIBUTES REFLECT YOUR CLIENT AND END-USER DEFINITION. AS SUCH, STRONGLY RECOMMEND IDENTIFYING THESE EARLY IN THE VE WORKSHOP, PARTICULARY WHEN THE CLIENT AND END-USERS ARE PRESENT. Establishing performance is a hybrid of function identification and helps set the mind-set for the VE Team early in the study.

Develop Rating Mechanism. If your client has a standard for rating alternatives you should use it. Care in adjusting their process should be applied to address any apparent deficiencies. If you use your own rating system please ensure the following:

- It's legitimate
- It's simple and understandable
- It can be tested against itself (more on that below in 'Issues')

Ok, the 'standard' rating mechanism that is usually included in most basic VE courses is the weighted point system. Here, all rated alternative attributes, usually even including cost, are assigned relative points and expanded (multiplied) by weighted relative values as assigned to rating factors. All 'qualitative' factors now become 'quantitative'. Total points are tallied and the winner is ……

Is this method legitimate? Yes, but only if it is done correctly (I have yet to see a facilitator accomplish this).

Is it simple and understandable? Yes, but can get convoluted if not presented as such.

Can it be tested against itself? Yes; but again, I rarely see facilitators proof their comparison matrix.

So, in my not so humble opinion, this method sucks; it can be EASILY challenged and manipulated (see issues below). I've seen numerous alternate quantitative systems where proponents openly de-bunk the above standard weighted points process. They all claim that their system is the only one that is accurate and the rest are bogus. My conclusion is that they are all correct; they are all incorrect as well.

ANOTHER IMPORTANT TAKE-AWAY …. Frankie highly recommends rating alternatives via keeping quantitative elements strictly as they are and rate qualitative elements in a non-numeric fashion (keep rating qualitative as well). This is an "apples and oranges" approach but so be it. In my opinion one gets honest and defensible results albeit partly subjective. For example, a comparative rating including both quantitative and qualitative elements may go something like this:

- Alternative A cost will cost $1,000,000, produce 1,110 widgets per day and is expected to have a high degree of reliability and relative ease to repair if and when outages occur.

- Alternative B will cost $900,000, produce 1,200 widgets per day but will have a relatively higher chance of outages and may require more complex and expensive repairs.

Even though Alt. B results in a higher production rate per unit, we believe the relative reliability and ease of repair of Alt. A makes it the better plan (I believe adding that Alt. A scored ‘250’ and Alt. B scored ‘235’ only takes away from the legitimacy of the analysis).

See an example of a cost-separate rating matrix below.

Empire Flood Gate Alternative Analysis

No.	Description	Cost	Performance Measures				
			FCR	D	CI	M	NO
1	Build new floodgate to allow a straight line channel from existing lock	$109 million	Excellent	Fair	Good	Excellent	Excellent
2	Build new floodgate just north of existing floodgate	$90 million	Excellent	Excellent	Good	Excellent	Excellent
3	Leave gate as-is and construct pump station to handle excess flow over existing gate when closed	$96 million	Fair	Excellent	Fair	Poor	Excellent
5	Build new floodgate at the southwest corner of the hurricane protection levee just west of the existing floodgate	$94 million	Excellent	Good	Excellent	Excellent	Excellent

PERFORMANCE MEASURE LEGEND:

FCR – Flood Control Reliability

D – Meet Deadline

CI – Construction Impacts

M – Maintainability

CE – Cost Effectiveness

NO – Navigational Operations

(Discussion of Issues)

Evaluating a large number of ideas can take a long time. A good problem, but nonetheless a problem, is having a vast number of creative ideas to evaluate. As stated above the VE process demands that all be vetted with intent to identify even more potential project solutions. Recommendation here is to keep the team focused and don't let discussions wander too far away from each individual idea/concept being evaluated.

Facilitator allows too much discussion time for ideas of lesser importance. Whether you have a large number of ideas or not, the facilitator should keep team discussions focused on each individual idea. Aside from wasting time letting team members ramble on, the VE Team as a whole could lose some interest if the evaluation session becomes too unruly. Limiting discussion to that pertinent to the idea or broader range of a concept should be adhered to.

Alternate ideas may be discarded if VE Team thinks they already have the best option identified. Never be too sure that a single idea is an outright winner. Many an occasion further analysis by the VE and/or project/process team reveal flaws not initially discovered. As such, avoid allowing the VE Team to discount good but apparent not the best ideas on the board. An alternate concept may ultimately end up as the best way forward. Better to keep items in the mix and let the project/process team select later vs eliminating a good, but not the apparent best option.

Team can't reach a consensus on the disposition of an idea. There are ideas where a team consensus on viability can't be reached. Suggest referencing performance attributes (rating factors) for direction as to whether or not an idea truly improves value. Achieving project functions and/or solving issues should also be checked. If still not decisive, my philosophy is to keep the idea alive and let your client reject it later.

Dots. There are more than a few facilitators that utilize the 'dot' method of idea evaluation. Basically, VE Team members are given a fixed number of stick-on dots and they place them on ideas (vote) they believe are viable (obviously logistics via electronic idealist version goes a little differently). It is pre-determined that ideas with a set number of votes will get vetted and the others eliminated from further consideration or are minimally discussed. Facilitators that utilize this method claim success but my experience has been quite the contrary.

My main issues with 'dots' is the reduction of full vetting of ideas with subsequent reduction of producing new ideas from such discussion. I firmly believe the VE Job Plan is not being fully adhered to. Also, giving the team a limited number of dots (votes), low and behold there is a fixed maximum of alternatives that ultimately get developed. As a client/owner I always felt

cheated by this as I preferred to have all possible viable alternatives identified and fully documented. So, if you're a dot kind of guy, God bless you, but don't come to my place with em.

Involvement (or non-involvement) of project/process team; may want to dismiss everything or may not provide any feedback. Your client and his team vanish by the time you're evaluating ideas. Or, worse yet, representatives are present and they don't like anything on the board, even apparent good ideas. Addressing the latter, try to diplomatically keep good ideas in for development. Give rationale such as 'we believe it's still may be a good way to go… perhaps for a future project'. Keep in mind that there are often other 'higher-ups' that will see things differently and like the VE proposals. For the former, make an effort to get your client and his key staff back in the room for a short review (sanity check) of the VE Team's screened idea list. This can go a long way by eliminating ideas that shouldn't be there and by considering comments they give regarding the good ones.

Project team stating, "We're already doing that", when you know otherwise. If you have your short out brief per above (or during your formal presentation meeting) you may often hear from a project/process team member that "We're already doing that." But you know that isn't the case and he/she is just covering their behinds. So your response should be:

a) Ok, we'll eliminate this recommendation from the report.
b) You're so full of s---; here's the document to prove it. We're putting it in the report.
c) Good; we think it's a real good thing to do so we'll endorse it via our recommendation.

For me, b) is the way to go, however, best you stick with c). Don't even consider a).

(Same quiz in **Presentation - Chapter 8**) ;)

Non-establishment (or non-use) of rating factors or performance attributes. I've witnessed more than a few facilitators not using any formal basis for evaluating ideas. No performance attributes were identified and functions from the F.A.S.T. diagram are ignored. Remember, there is good reason why all phases of the VE Job Plan tie into one another. It's an important consideration to maximize the effectiveness of your workshop.

Too few good ideas to develop. Your VE Team has only identified a scant few ideas to develop. Yikes! Ok to back up a bit and brainstorm a little more. Make sure you go through your F.A.S. T. diagram and see if there are more ideas to accomplish each function. Also, go back to your list of project issues (you have one, right?) and see if there are any more ideas to help solve any of those. Should you still end up with very few developable ideas, remember, just one good VE recommendation may justify the workshop – so just make it a good one!

Sponsor or end user has differing opinion of an idea vs your client and the project/process team. Been here several times and can be a very difficult situation. First, use your own judgment as to whether or not an idea should or should not be developed on its own merit. If you're in agreement with your client, best to let him work it out with the sponsor(s) or end user(s) on whether or not it goes in your report. If you're on the other side of the street vs your client then may I suggest that you remind him/her that there is limited harm in including it in the workshop report as it is only a recommendation and not a directive or decision action. Then, you probably want to do what your client tells you to do.

Idea may require more investigation to determine disposition (not necessarily ultimate determination). It's not uncommon to not be able to definitively determine the merits of an idea without additional research and design development. My philosophy is to present the idea with full disclosure that it is conceptual and further development is needed. Don't try to assume favorable elements of the idea if you just simply don't know either way. Present the open question(s) in the presentation of the idea/concept.

Ranking method may be flawed or cumbersome. As discussed above, any given rating/ranking methodology is often flawed and can also be time consuming and/or cumbersome. In using a weighted points system the biggest issue I've encountered is that the facilitator does not proof the consistently or logic of the weighting assignment. For example, a given rating factor 'A' is 100% more important than factor 'B' which is 50% more important than factor 'C'. So, the facilitator should check in applying values to alternatives that such is the case and when factor 'A' is compared to factor 'C' that factor 'A' does indeed carry 150% more value than factor 'C'. Two additional pet-peeves I've seen quite often are discussed below. Again, for my money leave quantifiable elements as they are and rate qualitative items in a qualitative fashion (excellent, good, fair, etc.) and do a comprehensive evaluation accordingly.

Bogus attempt to quantify qualitative rating factors. If, and only if, you have solid data to determine measurable relative differences for any given qualitative variable in your project, assigning a numerical value to such, strictly via VE Team opinion is not legitimate. Who died and made your VE team opinion measurement experts? Such a practice comes off as almost completely arbitrary and is easily challengeable. If, however, one does have solid opinion measurement data, then applying weighted points in a scientific manner is certainly legitimate. For example, I attended a good conference presentation by a Japanese company that did complete household kitchen installations. They performed a comprehensive customer survey gathering opinions regarding relative preferences such as, but not limited to, counter space vs appliance size; appliance size vs cabinet space; cabinet space vs floor space, etc. So when the company performed a VE study to improve kitchen designs alternative ideas were evaluated via scientifically established weighted variables.

Re-quantifying quantitative rating factors. My favorite observed rating abomination……. Many weighted points rating systems recognize cost as the most important factor. As such they weight cost at the highest premium of all factors. So, when one rates relative cost and then multiplies such by a large weight number stuff like the following often occurs:

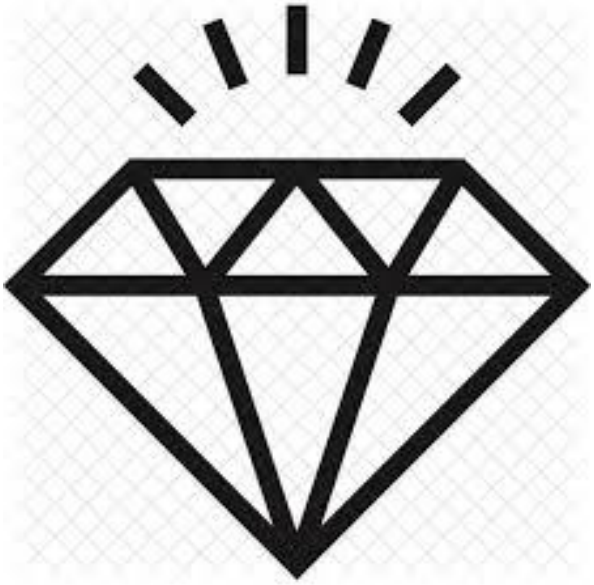
- Alternative A cost $1,000,000
- Alternative B cost $900,000

  Alt. B scores 10 out of 10 and Alt. A scores 5 out of 10 (Why? Because the team believes that being $100,000 more expensive is a big deal or perhaps it ranked 5th out of 10 competing options….). Then applying the 50% (50 point) importance value to each, Alt. B scores 500 and Alt. A scores 250.

So, an alternative that's only 10% less expensive than another scores 250 points or 25% better on a total evaluation scale of 1,000 possible points. Completely bogus….. Cost is cost and along with other quantifiable factors, should not be weighted relative to each other.

Proper integration of risk analysis. Last but certainly not least is the evaluation of relative risks per an individual idea. Risk may, or may not be measurable or accurately measurable. So, care should be applied as such. The facilitator should determine if risk can be accurately quantified or not and then decide if it should be rated numerically or qualitatively. I've experienced several very unsuccessful attempts to quantify relative risks of VE alternatives so suggest you adhere to my above recommended rating system criteria of legitimacy, simplicity/understandability and validity.

Development



CHAPTER 7

DEVELOPMENT PHASE

SUMMARY LIST OF GOALS, OBJECTIVES AND FUNCTIONS:

- **Demonstrate/communicate alternative concepts**
- **Describe alternatives**
- **Illustrate alternatives**
- **Include drawings and/or pictures**
- **Include manufacturer's information**
- **Compare alternatives to current plan/design**
- **Identify advantages/disadvantages**
- **Address rating standards**
- **Develop relative costs**
- **Calculate quantities**
- **Determine unit costs**
- **Evaluate life-cycle costs**
- **Summarize recommendations**

(Other goals, objectives, and functions?)

SUMMARY LIST OF ISSUES:

- Limited information to fully develop alternatives
- Fixed format (one size does not fit all); over-formatted, standardized forms
- Disadvantages may not be fully identified
- Advantages and disadvantages not consistent in other recommendations
- Rating factors often ignored at this point
- Often summary conclusions lacking
- Often need further investigation to reach conclusions (open issues)
- Recommendations not written in a way best for anticipated readers
- Not enough time to develop complex and/or numerous alternatives (not developing alternatives)
- Inconsistencies
- Cost estimates usually order of magnitude
- Cost comparisons may not be 'apples-to-apples'
- Life-cycle costs may not be accurately assessed and/or calculated

(Other issues?)

(Discussion of Goals, Objectives and Functions)

Demonstrate/communicate alternative concepts. The bottom line in development is to demonstrate the viability of a proposed change and communicate that concept to the reader (your, their client(s)). Note that there is some overlap here with the previous Job Plan element of Evaluation. Relative costs and performance comparisons can be in either phase but I've chosen to include such here. A few general considerations are that you should try to stay within the boundary of the specific item you're changing and that you should clearly classify facts, opinions, pros and cons and especially, unknown or undeterminable factors as limited by the scope and nature of the VE workshop. Also, remember who the customers are and prepare documentation so it makes sense to them.

Describe alternatives. Here's another main course take-away…. simple. Please use a verb for all recommendation titles. Some examples: "Use, Consider, Install, Add, Remove, Change (not a favorite), Integrate, Replace, etc…. Remember, you're suggesting that the client change something; this is an action, even if is just 'to consider' such action. Once you've gotten past the title, a brief description of your proposed change should be stated clearly and thoroughly enough such that the client can understand your recommendation. Short and sweet rules.

Illustrate alternatives. If possible/practical, illustration of your recommendation goes a long way (picture worth a thousand words thing, you know).

Include drawings and/or pictures. Technical drawings or actual photos of your recommendation should be included if possible. Again, volume is not recommended, just enough to help present your concept. Make sure that your drawings/photos are of adequate quality; if not, best not to use them. I've had some luck with using conceptual 'cartoon type' self-made drawings that present a recommendation in a 'conceptual' fashion. For example, I might show a proposed new pumping system change via boxes and circles in lieu of trying to amend a CADD file. Such semi-schematic type illustrations can be quite appropriate as you are presenting a conceptual change. Good to be consistent with other recommendations, e.g., if you use engineering drawings try to use that method for all and vice-versa. Another good thing to do is to use a common base map or plan /section drawing for as many recommendation write-ups as you can. This can be an issue when you have multiple team members writing up items.

Include manufacturer's information. If possible, include cut sheets, etc. from supplier(s) if applicable to the recommendation. If voluminous, put it in an appendix. If a public project be careful to make sure you keep the concept open to other competitors. Can be a good thing to invite supplier reps to your workshop (see discussion item in **Odds and Ends** below).

Compare alternatives to current plan/design. A fundamental element of presenting a recommendation is of course to compare it to the current plan or design. In cases where your workshop precedes a defined plan/design comparison to a standard, common or expected 'presumptive' practice can and should be included.

Identify advantages/disadvantages. Again, a fundamental item in presenting a plan/design change (see related issues discussed below).

Address rating standards - Rating factors that you've established for alternative evaluation should not be forgotten and should be referenced in the presentation of your recommendations. In some cases it may be prudent (and/or desired by the client) to formally list each factor and how the change idea rates per each attribute.

Develop relative costs. When applicable, a relative cost comparison of the proposed concept versus existing should be included. It is important, however, that such cost development be pertinent, honest, as accurate as possible and clearly presented (see cost issues discussion below).

Calculate quantities. In order to assess costs existing and proposed change quantifiable items must be calculated. Even when project/process information is limited, as much care as possible should be given to quantity estimates. Assumptions should be clearly stated and some discussion on effects of variance in your assumptions should be considered.

Determine unit costs. If unit costs are available from the project/process information at hand, best choice is to use such for alternative comparative purposes even if you believe such prices are not fully accurate. However, in cases where you firmly believe client data are erroneous and/or badly out of date, etc. it's certainly better to use your accurate costs and document why there is a difference. In cases where a cost estimate has not yet been prepared for the project/process, you must research and select unit prices from various sources. Keep in mind that for *comparative purposes* the accuracy of unit prices may not be critical as common factors may be applicable to *both* the existing and proposed change. Refinement of costs may not, therefore, be pertinent in establishing the relative economics of either option. However, when different elements compete with one another in such a comparison better care in unit price accuracy is warranted.

Evaluate life-cycle costs. Future costs can often be a factor in determining the relative economics of a proposed change. It is therefore imperative that life-cycle costs be accurate assessed. I have encountered many significant deficiencies on how various VE facilitators calculate and apply life-cycle costs (see discussion in issues below).

Summarize recommendations. It is important that a recommendation is concluded in some form of summary paragraph. Such should discuss pertinent 'highlights' of all factors addressed in the development write-up. Pros and cons should be weighed and a definitive conclusive 'bottom-line' should be included that recommends that your client makes the proposed change. It can be helpful in the discussion to cite previous and/or other project/processes that have successfully utilized the recommendation.

(Discussion of Issues)

Limited information to fully develop alternatives. There are times when you have a good conceptual idea but not a lot of information to fully develop it. That's ok. No need to fake it - just go with what you have and fully acknowledge that you have limited data and further effort will be needed for your client to make a decision on implementation.

Fixed format (one size does not fit all); over-formatted, standardized forms. Many facilitators lock in to a standard format for proposals that they are comfortable with. Whether such format completely covers any and all possible aspects of any given recommendation, it may not be suitable for the type of recommendations given various project/process types and situations. There are times where your standard format won't fit the general type of recommendations you have for a particular study. When you try to jam info in such a format it greatly takes away from the report document and overall perception of your recommendations.

I've encountered more than a few of what I call 'meat and potatoes' alternative format templates – you know, Title, Current Design and Drawings, Proposed Design and Drawings, Advantages, Disadvantages, Discussion/Justification, Cost, Calculations. This certainly fits well when you change a design component and all of these aspects apply. But what if you are in the planning phase of a project/process? This format doesn't work as well as a free paragraph with added data as needed. Be flexible.

Of course, if your client wants a set format to their standards, that's what you use unless you can convince them otherwise.

Another issue I've encountered more than a few times is that a formatted proposal form may be so rigid and/or complex that someone using it for the first time has problems conforming. This can be a common occurrence in a VE study where study team technical experts are using your

format for the first time. I HAVE HAD MANY COMPLAINTS FROM SUCH PEOPLE CLAIMING THAT TIME SPENT ON FORMAT CONFORMATION TAKES AWAY FROM EFFORT ON ACTUAL WRITING. I'd rather have my technical experts writing on what I've hired them for vs playing with form issues.

Disadvantages may not be fully identified. Often a writer oversells a concept by not fully considering its disadvantages. Give your idea a fair shot all the way around. Not including disadvantages gives the appearance of a snow job and takes away from the recommendation.

Advantages and disadvantages not consistent in other recommendations. Wish I had a dollar for every time I've reviewed a draft report and found something listed as an advantage for one concept and as a disadvantage for another. Happens a lot so check write-ups closely.

Rating factors often ignored at this point. As noted above, rating factors established for alternative evaluation should be included to some degree in the documentation of each recommendation. It's not uncommon to see such rating factors totally ignored. Use them.

Often summary conclusions lacking. Again, as indicated above a presentation of a recommendation should have a definitive summary statement citing why such a change should be implemented (or considered). This summary should address pros and cons and indicate that the balance of such warrants consideration of the recommendation.

Often need further investigation to reach conclusions (open issues). There are many times when not enough information exists at the time of your workshop to make a definitive call on whether or not a proposed change is a good or bad idea. So be it. Write it up with such caveat or contingency. Don't hide it – just call it like it is. Note that the change may POTENTIALLY be determined to be feasible, etc.

As luck would have it, as I am writing this section the same day the local county dedicated a major drainage project that was a result of a VE study. When we proposed this radical change of how the area accomplished system drainage, we didn't know if it would work or not; hydraulic modeling needed to be done to confirm performance. We presented it as such. It was eventually modeled and determined to be more effective than anyone thought. Built, and successfully performed as modeled in a recent flash flood (non) – event. ☺

Recommendations not written in a way best for anticipated readers. Remember who your client is and who his client(s) are. Make sure that what you write-up can make sense to the anticipated readers. This may mean briefly explaining concepts down to a laymen level. Also,

remember that most of the report readers WERE NOT present in the workshop. What you know as common and/or understood terms, locations, etc., the readers may likely not be familiar with and will need reference.

Not enough time to develop complex and/or numerous alternatives (not developing alternatives). There are certainly times when one week or so is not enough time to properly write-up potentially numerous recommendations. I have had VE contractors address this via three different ways:

1) They find the time and write them all.
2) They will indicate time restrictions and may not fully develop some of the recommendations with lower potential; this will usually consist of not developing a cost estimate but pretty much address the rest of the pertinent elements of the recommendation.
3) Indicate (or may not indicate) time restriction and completely blow off writing anything on a number of alternatives.

As a client let me say this first: Contractor 3 will not continue to work for me. Further, Contractor 2 may still be working only if I'm totally on-board with the decision to short some proposals.

My opinion is NOT based on squeezing out the most for my money. I've had many occasion where, IN THE OPINION OF THE VE WORKSHOP TEAM, apparent 'lesser' alternatives were ultimately implemented by the project/process team. That is to say, as the VE Team we don't really know what the 'better' recommendations are at the time of the workshop (although we may think we know). There are potential diamonds out there; give them all a chance even if it cuts into profits. Consider it good advertising as there may be a time when that 'lesser' alternative turns out to be a big winner for you and your client.

Inconsistencies. It is quite common that proposal elements are presented inconsistently throughout write-ups. As indicated above, I've seen advantages appear as disadvantages and so forth. Quantity estimates and even unit costs often differ for the same element per various alternatives. Always check closely for inconsistencies.

Cost estimates usually order of magnitude. There are often times where not enough information is available to make a detailed cost estimate and order of magnitude or parametric costs must be considered. When this occurs it's ok. Don't fake your way through a cost estimate. Indicate what you are using for comparative purposes and that further refinement may be necessary.

Cost comparisons may not be 'apples-to-apples'. Whether you can develop a detailed or need to use a broader parametric estimate, always use the same base data for the existing and proposed change if at all possible. Remember again, the primary purpose of your estimate is to COMPARE one vs the other. So even if you have to use relatively bad numbers, if they come from the same data source they will be bad for each option and still may indicate pertinent relative economics. Using cost values from different sources may give an unbalanced advantage to one or the other option just as a result of the different generating source and not show true relative cost-effectiveness.

Life-cycle costs may not be accurately assessed and/or calculated. (Big take-away….) I'll start with the punch-line first: IN THIS PROFESSION IT IS IMPERATIVE THAT YOU KNOW HOW TO ACCURATELY CALCULATE AND PRESENT TOTAL LIFE CYCLE COSTS (LCC). (Ok, tell me what you really think, Frank….)

I've encountered three different types of VE facilitators (and about an equal number of each):

1) They know and understand LCC.
2) They do not understand LCC and admit such.
3) They believe they know and understand LCC but really don't.

Putting on my client hat again, of course have preference with No. 1s; really DO NOT have a problem with No. 2s as we can do what we need to do post study. No. 3s totally suck since we have to change what they do.

I'll go ahead and talk about some of the more common LCC screw-ups I see:

(Improper selection of an interest and/or inflation rate) – (Secondary big take-away here….) First, check with your client and see if his agency uses a current interest and inflation rate, and, if they have a preference or standard regarding economic comparisons (time period, use of nominal or real rates, preference for present worth or equivalent uniform annual cost, etc.) Make it easy on yourself and use their guidelines if they exist. For example, if you're working on a project/process for the federal government they have such standards. Check OMB Circular A-94 (Note: The US Army Corps of Engineers has a different interest rate for Civil Works projects).

(Use of nominal or real interest rates with inflated or non-inflated future costs) - Ok, know what your interest rate is (nominal or real). Nominal is generally the agency cost of borrowing where real is that cost adjusted for inflation (usually a LOWER number). When using the nominal rate, use INFLATED future costs; when using the real rate, use NON-INFLATED future costs (sounds counter-intuitive but that's how economists rock…) My preference is to use the latter because one really doesn't know what future inflation rates are going to be (if you do then VE ain't your calling).

(Use of totally guessed at future inflation rates) – Per above, who really knows what inflation rates will be in any given year. Give you an example of an extreme but true case back in the late 1970's. Although not a VE thing, energy projects applied inflation rates for energy (like 20% per year at the time) for an entire 50-year period. This in turn justified just about any capital

expense (thus the brief proliferation of nuclear plants then). That type of inflation was not only short-lived but actually reversed itself severely in the mid 1980's resulting in numerous financial debacles.

(Not using any discounting interest rate at all… and inflated future costs) – I've seen this more than a few times……..

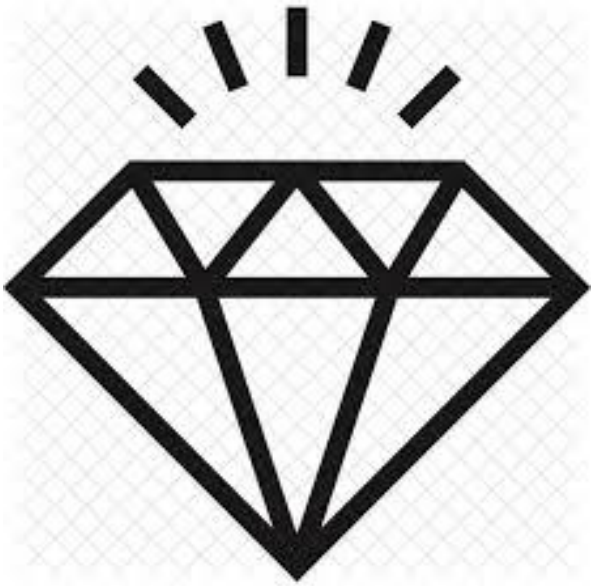
(Blindly plugging in numbers into a computer spreadsheet, calculator, etc. and not really knowing if the output is correct – often it isn't….) – See this a lot! Know whether or not your calc sheets are accurate.

(Using the wrong formula(s) to calculate present worth, etc.) – Got folk that think they're using the right calcs but not so.

(Designating future costs as LCC and not including initial costs) – I know, just a nomenclature item but widely misused. LCC is everything – not just the future cost component.

Ok, I can go on here but not necessary; the bottom line is: IF YOU ARE NOT FULLY COMFORTABLE WITH LCC CALCS AND USE, IT'S WORTH YOUR TIME TO GET TRAINED.

Presentation



CHAPTER 8

PRESENTATION PHASE

SUMMARY LIST OF GOALS, OBJECTIVES AND FUNCTIONS:

- **Communicate workshop results / Promote feedback**
- **Review project**
- **Review workshop activity**
- **Summarize results**
- **Present individual recommendations**
- **Show graphics/drawings**
- **Show technical and cost data**
- **Prepare PowerPoint, phone-in, NetMeeting, etc.**

(Other goals, objectives and functions?)

SUMMARY LIST OF ISSUES:

- **Key project team members not present**
- **Disagreement with project team members**
- **Project team members stating, "We're already doing that", when you know otherwise**
- **Presentation formatted to VE Team and not audience**
- **Illogical ordering/grouping of recommendations**
- **Presenting cost estimates without caveat of margin of error**
- **Over-emphasizing cost savings**
- **Forcing acceptance disposition at the presentation meeting**
- **Down-playing apparent secondary recommendations**
- **Combative client reps (in combination with combative team members)**
- **Presentation is too long**
- **Presentation logistics (room, projector, call-in, etc.)**
- **Presentation at a later date than last day of workshop**

(Other issues?)

(Discussion of Goals, Objectives and Functions)

Communicate workshop results / Promote feedback. The goal for this phase is certainly 'communicate' both to and from the client (client's reps). Successful presentation of workshop results should be thorough without being too lengthy and emphasize important points. Providing the opportunity for open discussion and feedback is also very important.

Review project. Although chances are that your audience is very familiar with the project/process being evaluated, a quick reference to what the VE Team started with should be presented. This serves as a foundation from which the workshop results can be based from. It's also possible that agency 'higher-ups' are present and they may not be as familiar with the project/process as others so such a brief re-cap may be in order.

Review workshop activity. Also, you should BRIEFLY show how the VE workshop was executed so the audience is reminded that results didn't come out of thin air but resulted from VE Job Plan activities. Do NOT go overboard with this – definitely keep it brief. The client is more interested in your results not the VE process.

Summarize results. Present the pertinent bottom line findings early in your presentation. Aside from the fact that key members of the audience may not stay for the entire meeting, it's good to spark interest as early as possible. I've experienced more than a few facilitators that don't even attempt to summarize findings or denote major items; they just start presenting individual recommendations starting with the first one.

Present individual recommendations. After presenting the above suggested summary you are ready to present individual recommendations. It is important to note that it is not necessary to present every VE item - usually not enough time for that. Best to just present a list of non-major items and note that further details will be presented in the VE report.

Show graphics/drawings. As stated above, a picture is worth a thousand words so if you have photos, drawings or any type of other graphics definitely utilize such for your presentation. In fact, it's a good practice to solicit all graphics from your VE Team as early as possible. Have them provide you with such before they write-up their recommendations so you have them in time to include in your presentation.

Show technical and cost data. As needed, present pertinent technical and cost data without going overboard. DO REMEMBER that both developed technical and cost information is PRELIMINARY and compiled in a very short time. With further review and analysis by the project/process team, numbers, etc. will likely change. Make sure you communicate this point to the audience (and include such a statement in your report document).

Prepare PowerPoint, phone-in, NetMeeting, etc. All of the above culminates in media preparation. Always ensure that what you plan to use (projector, conference call, NetMeeting, etc.) will work in the meeting venue provided by your client. ALWAYS HAVE BACK-UP FILES, etc. just in case something doesn't work. Have a 'PLAN B' and maybe 'C'.

(Discussion of Issues)

Key project team members not present. If you know ahead of time that key project/process staff cannot attend your presentation meeting then you may try to re-schedule with the client. If you can't or have no advance knowledge of key attendance, then go ahead and present as if they were there anyway. Nothing to lose, good practice and whoever is there may be positively influenced.

Disagreement with project team members. Often project/process staff may disagree with one or more of the VE recommendations presented. A couple of factors to consider here, first, if they bring up a valid point as to why the recommendation cannot be accepted, so be it. Be humble, agree, and push the general concept for potential future consideration. The other scenario would be if the objection is not valid. Go ahead and defend the VE item with minimal conflict. Use statements like, "We know that xyz has utilized this method for their project.", or, "We're pretty confident that this change would meet performance needs and be more cost-effective." Ultimately end up with something like," Ok, we are providing suggestions, not directives, so it's up to you to consider this; we hope that you do give it a chance."

Project team members stating, "We're already doing that", when you know otherwise.
One of my frequent favorites here…. So, let me give you a re-quiz as to the best response to the item statement:

a.) You're full of crap and we can show you your project documents to prove it.

b.) The VE Team fully supports your approach and will endorse it in our report as a recommendation.

c.) Sure, we'll take this out of the report.

The correct answer is, of course a.); the project/process staff that challenges you is looking for answer c.) so they can save face. You may want to settle for b.) and do indeed include it as a VE recommendation.

Presentation prepared for VE Team and not broader audience. A basic rule of presenting is to know your audience and prepare/execute your presentation accordingly. More than a few VE facilitators seem to forget this and present findings as if the entire audience attended the entire workshop. Remember that key client staff that you're presenting to will not be familiar with the emphasized items identified by the VE Team (see next item).

Illogical ordering/grouping of recommendations. In my not so humble opinion, just about everybody does a lousy job of ordering and grouping VE recommendations for both their presentations and the report document. Here's a suggestion: YOU MIGHT CONSIDER THE ARABIC SOLUTION IN ORDERING VE RECOMMENDATIONS, that would be like 1, 2, 3, 4, …. X. This system has been around for years and understood by most people. What one commonly sees in a presentation and again in the report is an order of items like, S-2, M-11, M-15, G-7, G-14, S-27, MS-13, S-35 ….. Such designation and order may make sense to the VE Team as it is based on the random order and numbering from the Creativity List and arbitrary category designation (letters). But to your audience that wasn't on the VE Team they see this as 'WTF'?..... So, by the time you get to your presentation meeting …

LOSE THE DAM CREATIVY NUMBERS AND ORDER RECOMMENDATIONS WITH REGULAR NUMBERS……..

Also, group common items together; many facilitators don't even bother to this for presentation and may also not do it in their report document (they stick to the Creativity List order….), sigh….. This comes off very badly for the non-workshop attendees/readers. Ok to use first letter designation for each category but again, order as 1,2,3,4 and not as designated form the Creativity List.

Presenting cost estimates without caveat of margin of error., and, Over-emphasizing cost savings. (Another big take-away….) Many VE facilitators love to emphasis potential recommendation cost savings. Nothing wrong with that except for the fact that VE generated cost estimates are done in a very short period of time, are full of assumptions and unknowns, may have inconsistencies with other VE alternatives in the study and will likely change when further reviewed. So, my recommendation here is to present very rounded numbers AND EMPHASIZE POTENTIAL FOR CHANGE UPON REVIEW. The reverse side of this is that when costs are over-emphasized and then they subsequently change, the entire VE recommendation loses credibility. Try summarizing via terms like 'The proposal may save significant (or moderate) cost', and not say the proposal will save $453,456.89.

Forcing acceptance disposition at the presentation meeting. Your client may have a procedure where VE recommendations are accepted or rejected as part of the presentation meeting. Try to avoid this if you can – try to convince the client to change this practice. My philosophy on this is based on a couple of things: first, in my opinion, the purpose of a VE study is to identify POTENTIAL project/process performance improvement and/or cost-saving concepts and specific measures. It's up to the client's project/process team to ultimately make a go/no-go decision once the recommendations ARE FURTHER EVALUATED. While it certainly is a VE function to soft-sell proposals, etc. it ain't our place to debate and argue disposition. Second, is the fact that when required to make a go/ no-go decision on something, adequate data and information must exist and be analyzed to make such judgment. The VE workshop is too short to produce adequately validated information. So, when faced with a go/no-go option, the project/process team member must often select no-go at this time solely on the fact that there hasn't been such validation even though they make believe the idea has merit.

Suppose your VE Team is in disagreement with a proposal rejection. Do you then document the rejection without rebuttal? The client certainly would not likely like to see that in a report. But would your team accept a one-sided bogus refusal of their good idea? Again, try to stay out of the disposition business.

Down-playing apparent secondary recommendations. Try not to short-sell the apparent relatively inferior recommendations. I've often seen second and third best choices ultimately get implemented and more effective than previously envisioned at the time of the VE workshop.

Combative client reps (in combination with combative team members). So, one or more of your client's project/process team wishes to fight your guys at the presentation meeting. Perhaps one or more of your guys elect to fight back in-kind. Do your best at controlling the situation. Try to use statements such as: "These are recommendations for you to further consider, not directives.", "There are things that we can look in to and work out later.", and of course, the 'ol chop breaker, "Well, we can agree to disagree." ☺ Try a little humor as appropriate.

Presentation is too long. Remember the three 'Bs' of presentation:

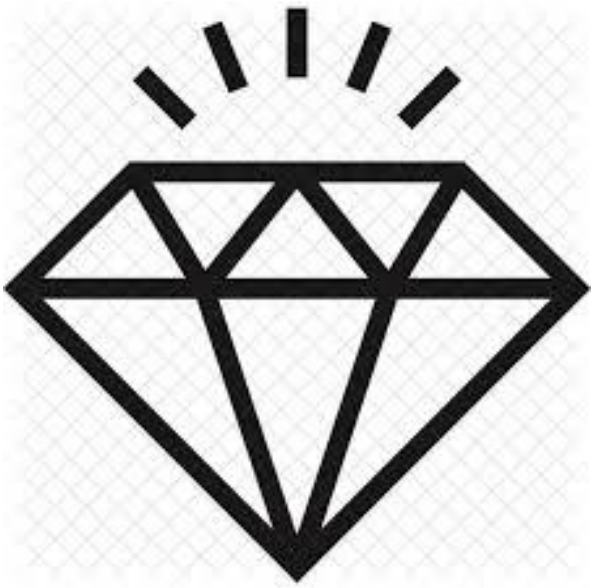
1.) Be brief. 2.) Be brilliant. 3.) Be gone!

Try to keep your presentation less than one hour; an hour and a half at the most. Beyond that, well, you're just gonna piss off your audience. Best way to control this is to possible NOT present all recommendations. Just compile a summary list of the minor ones (above comment notwithstanding, of course ;))

Presentation logistics (room, projector, call-in, etc.) SEE LAST FUNCTION ITEM ABOVE.

Presentation at a later date than last day of workshop. Many clients prefer VE presentations after submittal and review of a draft report. Can be a few weeks or so after the workshop. Pros and cons with this versus presentation on the last day of the workshop. Pros – you have a chance to review and polish recommendations, graphics, etc. Cons – may be hard to re-assemble the VE Team and the meeting will likely be virtual instead of face-to-face. Basically though, the same considerations per above will apply whether the meeting is at the end of the workshop or at a later time.

Post-Workshop



CHAPTER 9

POST-WORKSHOP

SUMMARY LIST OF GOALS, OBJECTIVES AND FUNCTIONS:

- **Complete VE study**
- **Prepare draft/final reports**
- **Participate in disposition meetings**
- **Resolve review comments**

(Other goals, objectives and functions?)

SUMMARY LIST OF ISSUES:

- **Client slow to provide review comments**
- **Review comments not reasonable**
- **Client wishes that you delete a good proposal**
- **Logistics for review meeting screwed up**
- **Key team members not available on client's review meeting date**
- **'Ambushed' by client's staff disagreeing with proposal(s)**
- **Ditto… and they are well prepared with facts and figures**
- **Realize that you have just a plain bad proposal included in your recommendations**
- **Late payment (no payment)**

(Other issues?)

(Discussion of Goals, Objectives and Functions)

Complete VE Study. Surely the goal of this phase is to complete the VE study. This includes completing all documentation and participating in any implementation meetings, etc. per your client's requirements.

Prepare Draft/Final Reports. I will try to roll-up all pertinent comments in this course book regarding report content and address related issues here at the same time. You likely have a standard format that you like to use for your reports; your client may have requirements or preferences as well which of course, should trump your standard. Regardless, your report should meet/consider the following:

- Be professionally done including completeness and consistency (self-explanatory).

- Be written for the prospective readers. Often I've encountered documents written as if the VE Team would be the only reader. This would include terminology and references that only people that participated in the workshop and/or are primary project/process team members would understand. Remember that your recommendations must gain end-user and client management approval. As such, I try to write reports in a way that the client's CEO can read it and make sense. Seems to work pretty well for the broader audience.

- With respect to the above, try to get to the point of the study in the first ten pages of your document. Executives usually do not read further than that. Also, presenting the bottom line upfront peaks interest and will keep readers focused and motivated to read the rest of the report.

- As mentioned in the above chapter I strongly suggest losing the initial recommendation numbering generated via the creativity list. Re-number and organize categories in a logical method that makes sense to the non-workshop participant reader.

- Again, per above, try not to overemphasize potential savings dollar amounts. Remember that you have preliminary numbers generated in very limited time so the values will change upon further review and analysis.

- Don't 'over-format' your document. Seen many documents formatted to the hilt with text boxes, cost boxes, LCC boxes and boxes for the boxes, etc. This may be comfortable to the facilitator, but again, think about the readers. Over-formatting can detract from your document. Also, as stated above, members of your VE Team may find such burdensome and take away from their potential writing content and/or quality.

- Recommend including a disclaimer noting that information presented was generated in a short period of time with limited input data. Should include note that planners/designers must evaluate further. Not really a legal protection thing, but reminds a reader not familiar with how VE supposed to work that what is presented is conceptual, preliminary stuff.

- Check for consistency – both data and writing style/format. Most likely your recommendations are written by multiple team members – some of which may be their first VE dance, etc. Pretty much all the time there will be inconsistencies in what is written and how it is written among different writers. While often painstaking, you must review, discover and revise such. Yes, you may have to re-write many recommendations. Note that your client (and his customers) will be negatively impressed otherwise.

- Prepare a complete draft report. Try to submit a complete or near complete draft report to your client. Later presentation of items not included in the draft may not pass later review, etc.

- Deliver your draft report promptly, but not recklessly so. You likely have time of delivery requirements that you must meet. Be on time, of course but deliver a quality product. Some clients want a pre-draft document submitted on the last day of the workshop. So be it, but include disclaimers galore. I've also had several providers that brag about completing the draft report on the past day of the workshop – regardless of requirements. To me, this document is worthless as it ALWAYS contains numerous errors, inconsistencies, etc.

Participate in Disposition Meetings. As stated above, I'm not a big fan of VE participation in post-presentation decision meetings. Many clients require such, however. I touch on few related issues below.

Resolve Review Comments. You will of course have review comments on your draft report that must be resolved. You will likely concur with most but may have rebuttal on some. Try to resolve your differences with your client. Also, be prompt with preparation and submittal of your final report.

(Discussion of Issues)

Client slow to provide review comments. Be pro-active without being a pain in getting your client to provide review comments. The longer things drag on the harder it

will be to recall potentially significant items that may be needed to complete or revise any given recommendation, etc.

Review comments not reasonable, and, Client wishes that you delete a good proposal. These issues can potentially be tough to resolve. Suppose your client wants you to make a change that you do not believe is technically correct, or perhaps even ethical? Well, first try to negotiate some solution or middle ground as things may not be totally go or no go. For example, my team proposed a radical project change that we fairly confidently estimated close to a billion in cost reduction on a two-billion dollar project. For un-disclosed, but I believe were non-honorable reasons, the client did not want to consider such a change (at the time; future circumstances have changed) and directed me to withdraw the proposal. After a fairly long, non-congenial negotiation, the client allowed us to publish the recommendation but without quantified cost savings. We were permitted to say something like 'potential for significant savings' or something but without numbers.

There are far more frequent occasions where the client's review yields comments that you do not believe are correct. Again, negotiate and perhaps compromise on documenting conflicting aspects of the recommendation if nothing else. You should consider professional ethics in whatever you do in such situations (see 'Ethics' in **Odds and Ends** below).

Logistics for review meeting screwed up. Often a post-study implementation meeting is held partially virtual. This can pose logistical problems in addition to those regularly associated with this type of meeting. Try to anticipate and have back-up participation logistics ready.

Key team members not available on client's review meeting date. Given that you've released your VE Team at the end of the workshop, it may be difficult to obtain all of them for a subsequent implementation meeting. This can be troublesome if their knowledge is key to any given recommendation. Try to best coordinate with the client on meeting date/time or contact the team member before the meeting and get educated as best possible on the particular item(s).

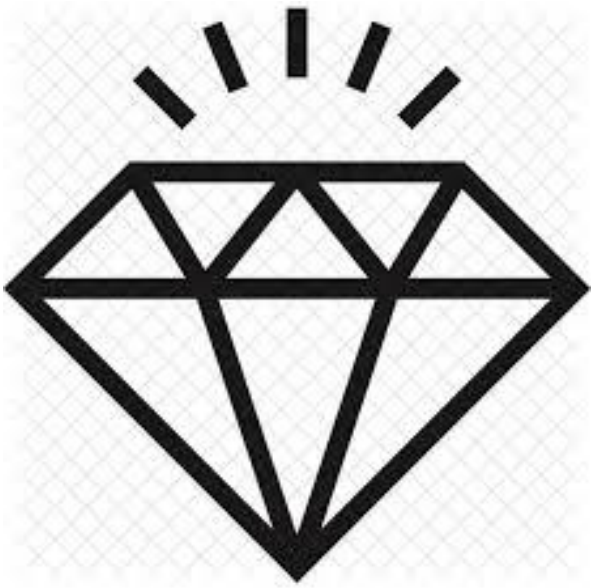
'Ambushed' by client's staff disagreeing with proposal(s), and, Ditto… and they are well prepared with facts and figures. Many a time you will go into an implementation meeting and the project/process team is hiding in the tall grass and slam dunk one or more of your proposals. Try not to fight even if they're dead wrong. Try to make a quick decision on whether or not they are indeed correct, in which case you graciously back out of the recommendation citing your teams thought process at the time, etc., or if they're blowin smoke. For the latter, respect their comments but defend your team's alternative in a as best a humble fashion as possible. Try to cite previous examples of application of the recommended change (hard to

argue with successful experience, etc.) And of course, you can really break their chops and 'agree to disagree'.

Realize that you have just a plain bad proposal included in your recommendations. …And there will be many times where your proposal really isn't the best thing to do. Graciously accept the decision but maybe cite why your team made the recommendation. I have a recent example where we recommended eliminating apparent redundant laundry facilities next to proposed classrooms. We were later told at the implementation meeting that the classrooms will also serve as temporary barracks thus the need for laundry units.

Late payment (no payment). Can't help you here as I've been doing the government thing where we're funded *before* we do work. But, I figure it's an issue in the private sector worth mentioning.

Odds and Ends



CHAPTER 10

ODDS & ENDS

Always consider your customer AND THEIR customer(s). As with all business endeavors, one must satisfy his customer. For VE we have our primary client - the entity rep that pays us. Your client likely has derivative customers – their boss, agency/company management, partners and especially product end users. And taking it even further your primary client's ultimate customers are either company stock holders or taxpayers. It is therefore imperative to consider all customers that may benefit (or be negatively impacted) by your VE study. VE recommendations may not affect multiple customers in the same way. Sometimes impacts can be 180 degrees opposite. You must always be cognizant of this and execute/document your workshop with this in mind.

'We' vs 'You'…. I'll designate this one as another important course take-away as I've gotten plenty of mileage out of it. When possible, and appropriate, try to address yourself and VE Team as 'we' as part of the client's team instead of us and you. This can give the client's staff a sense of unity of purpose and goals and help promote cooperation and participation. Gotta be careful though, and make it genuine. One thing I've seen is when a facilitator actually is part of the company/agency of the client and still refers to the project/process team as 'you' vs 'we'. A fairly good go-by is when you refer to past events, addressing the client's staff as 'you' is appropriate as you and your VE team obviously had nothing to do with such. But when you get around to identifying potential recommendations and new action, you may want to try to 'us and we' at this point as it communicates a shared investment/commitment to the future success of the project.

Ethics. Haven't seen too much on ethics in VE but have experienced some issues that I would say raise professional ethics concerns. I will attempt to list some of them but can't really offer how to handle each one as they really depend on the individual situation, although have offered some general comments on some of these above. Good to note and discuss:

- Under resourced to perform study
- Under staffed to perform study
- Discover controversial item/issue in the subject project
- Discover unsatisfactory planning or design work
- Discover design, or operational practice, that doesn't meet safety code
- Requested to withdraw a viable proposal and/or document bogus rationale for rejection

Name, rank and serial number (What's in a Name?)….. Don't know about you but I see a couple hundred new faces in various VE workshops in any given year and I am terrible with remembering names. Pretty embarrassing if you're leading a study and you constantly fumble with the names of folk in the room. Take a little time and do whatever you need to do (name map or something) to get people's names straight. I also like having the room re-introduce themselves on the SECOND day of the workshop and also when a new person comes in the room.

Realize that you aren't the smartest person in the room (even though you might be). Ok, as stated above you should get as familiar and educated with your subject project/process prior to your workshop. And, since you are leading the study, you may have to initiate discussion, questions, etc. Do not get carried away with the leader role and remember, however, that you are NOT the smartest person in the room and definitely not the most knowledgeable person regarding the subject at hand. Can be quite discrediting if you go too far and say something not accurate while presenting yourself as an expert.

Problem people (when you….. I …..) resolution technique. Every now and then you get a person attending your workshop that is hell-bent on making things fail for whatever reason. When straight forward types of things like your politeness, humor, getting that person involved etc. seem useless, you may want to take a break and somehow talk to that person in private. While I'm a big fan of physical violence at this point, most clients frown upon this so I was taught another technique in instructor's school that can be effective. Point out to the perp that 'When he does his disruption…. Then, you can't perform your task'… Usually the person gets the point that it's personal and they will ether back off or just leave the workshop. Not likely that they'll challenge you further….. But if they do……just kick their ass!

Invite vendors. Something you might want to consider that can enhance your workshop is inviting a product vendor or two that may be germane to your project. You may give them a limited amount of presentation/discussion time, best if early on in your Information Phase. This can stimulate thought and at a minimum, allow workshop participants to become familiar with the vendor's wares. Got to be careful to assure that the salesman's product is indeed applicable to the subject at hand and that you're not giving him a special competitive advantage over others (a particular government agency concern).

Virtual vs in-person or combination workshops. More than a few facilitators are adept at leading workshops virtually or partially via the net. I'm certainly not one of them and won't even attempt to do so. I believe that face-to-face interaction maximizes group dynamics, creativity, etc. Others have successful track records doing things on camera, however. Do strongly

recommend, however, that if you go virtual PLEASE assure that all the bells and whistles actually work and that you're not going to spend precious time or lose continuity trying to fix tech issues.

By-pass vs directly addressing functions and issues. Try to always maintain focus on functional requirements vs the project/process item or its related issues. Use your function analysis to identify possible better means of accomplishing tasks and/or solving issues. Try to 'by-pass' a troublesome item or issue. That is to say if Item X has a major issue, perhaps in lieu of addressing the issue, try to find an alternate means of accomplishing the need via something different that Item X. Pretty basic VE stuff but I often see loss of functional focus in more than a few workshops.

Use VE for other than projects/processes. Encourage your clients to use the VE Job Plan and your facilitation skills to execute other group activities. VE can readily be just slightly modified to meet the specific purpose of many group decision processes. As an example, the Army performs 'After Action Reviews' on a number of actions. This procedure calls for answering the questions, "*What did we want to happen?, What actually happened?, and, How do we improve things?*" This fits the VE Job Plan beautifully with just a minor adjustment. Flip-flopping the order of Function Analysis and Information Phases gets you there in this case (Function addresses 'What did we want to happen?', and Information answers, 'What actually happened?') The rest of the VE Job Plan efficiently gets us to identifying and evaluating improvements. In many cases, VE can better execute group activities vs what the entity normally does.

Alternate means and methods (e.g. F.A.S.T. Circle Diagram). Always be on the lookout for various new and improved VE means and methods. Note the inclusion of *improved* and not just new. Again, an example is the Function Wheel, created by Jeff Rude. This is a F.A.S.T. Diagram that uses concentric circles of functions in lieu of line connected boxes. Hierarchy is from the center out much like left-to-right on via the traditional method. In cases that I've seen it used it appeared to bring a different level of project understanding and seemed to be easier to create vs our beloved boxes. Some projects/processes would seem to be better served by one or the other so some discretion on this, and any other new means/methods, should be applied.

Information technologies. New and improved facilitation and/or documentation information technology is all well and good if used in a non-problematic nature. I mentioned a few things above about hindering writers not familiar with given specialized formatting, etc. Please assure that your bells and whistles actually work. I've experienced several unmitigated workshop disasters where fancy programs went nuclear and greatly adversely affected the quality of the VE study.

Don't be disparaging – during workshop, post workshop or in documents. Something I've seen more than a few times is when a facilitator or team member insults the project/process team and/or their product. It really isn't necessary to say (or document) terms like, 'bad design', 'bad planning', 'the cost estimator blew the estimate', etc. The effect of which hurts the VE study as the people that have to accept your recommendations need not be pissed off by your comments. Just stick to the facts, like, 'bids came in way above the cost estimate', communicates the same thing.

Avoid presenting the gross sum of potential cost savings. Gonna go out on a limb a bit and call this one a big take-away item since just about everybody does this (and ya'll wrong…. and I'm the only one doin it right…. ;)) Most facilitators love presenting a summary table of VE recommendations with a total potential savings of a relatively large number and think they are impressing their client. Nope. First of all, if you indicate massive total savings it makes your client look bad to his clients as it can easily be interpreted that he did a lousy job with the original project. Also, I've been around long enough to know that in general you're lucky to get half of your recommendations implemented, and, your estimated savings on each individual recommendation will likely reduce by half or more when fully evaluated. So in reality, you may ultimately end up with like a quarter of your projected savings – if you're lucky. Downplay cost-savings; your client will figure it out when things come to fruition.

Value Equation – with The Calculus!

What is Value ?

- **Value = $\frac{\textit{Performance}}{\textit{Cost}}$**
- **Value = $\int dP / dC$**
- **Value = $\int dPdt / dCdt$**
- ***Where t = 0 to n year economic period***

- **Value = $\int dPdt / dCdt$**

dP:	***dC:***
Direct/Collateral Benefits	***Direct /Collateral Costs***
Functionality	***O&M***
Owner/User Satisfaction	***Time***
Risk	***Risk***
(Project Specific)	***(Project Specific)***

THANK YOU!... AND ABOUT THE AUTHOR

I hope you enjoyed this book/course and found your time and money investment worthwhile. Putting this together was indeed a joy for me. So, a little about myself – graduated Tulane University (Civil / Environmental Engineering) a hundred years or so ago and currently hold professional licenses as a Civil Engineer and Certified Value Specialist; worked as a design engineer in private industry for a bit then for a regional flood control agency.

Last destination was with the U.S. Army Corps of Engineers, New Orleans where I started as a facility relocations specialist, then planner and a 22-year stint as Value Engineering Officer. In that capacity I managed a substantial VE program, facilitated studies, managed VE consultants and served on study teams for various other Corps VE workshops. I believe my situation allowed me to gain a very unique and broad perspective on how VE studies are performed. I hope I was able to share this knowledge with you and that you may benefit from it.

As for the present, I am enjoying semi-retirement, spending time with my wonderful wife, daughter and especially getting a big kick out of the paw-paw thing……..

Frank Vicidomina