

THE HUMAN SIDE OF VALUE ENGINEERING

Jim Wixson, CVS and Harold J. Heydt, Engineering Specialist  
IDAHO NATIONAL ENGINEERING LABORATORY\*  
EG&G, Idaho, Inc.  
Idaho Falls, Idaho

ABSTRACT

This paper addresses people, pride and performance and their interrelationship with the Value Engineering (VE) technique. It explores the importance of people for the successful application of the technique. It discusses leadership skills, verbal and non-verbal communication, team member recognition and participation, knowledge of right and left brain characteristics and the part each play in the job plan leading to the successful integration of philosophy and techniques to create change and improve performance.

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INTRODUCTION

"Seventy % of all quality improvement will come from cross-functional problem solving system/process improvements."<sup>1</sup>

There are two things a CVS or a practitioner of VE should be conscious of when facilitating or leading a VE workshop. ( Note: Within the context of this paper VE Facilitator/leader/practitioner are interchangeable.) The first is the techniques of VE as well addressed by the father of VE, Larry Miles and his students. The other is that people are the key to success.

Leaders in VE are at a door of opportunity going into the nineties. A recent survey of top US companies said the skills most sought after in the nineties will be team building and problem solving. What better combination than this is VE? Notice problem solving is not enough but needs to include team building. At the core of team

building is a respect of people. Having not met Larry Miles, but from reading *Recollections*<sup>2</sup> and talking to people who knew him, it seems Larry respected people and that is part of the VE philosophy.

VE PHILOSOPHY - RESPECT PEOPLE

"When the great leader's work is done, the people say, 'We did it ourselves'.<sup>3</sup>

An early theorist in the respecting of people was Rensis Likert. Likert proposed that greater employee satisfaction and increased organizational effectiveness would occur when using an employee centered leadership based upon trust and participation.<sup>4</sup> Likert believed that the leader should function as a facilitator who recognizes and rewards employee contributions, enhances interpersonal communications, accepts employee ideas, and involves the employee in decision making. Since CVS and VE practitioners function as leaders, an examination of Likert's four points may offer insight on how VE leaders could improve themselves.

The leader recognizes and rewards employee contributions. When picking the team, the facilitator picks people that are the best experts in the field and respected by their peers and companies. Tell the team their value. That is recognition! Also, recognition can be done on a VE team by simply listening to what a person says both during and after the workshop. Sometimes the leader is in the situation once the team is finished for the day where a participant needs to talk. The VE practitioner should listen to what a team member has on his/her mind. That is usually enough to help the team player surmount the problem without the issue/concern growing out of proportion.

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\* Prepared for the U.S. Department of Energy, Idaho Operations Office under Contract # DE-AC07-761DO1570

Also, during the management presentation, allow everyone to have a part in the presentation and recognizing the whole team in the introductions to management helps to give recognition to each person. An additional way is to financially reward the team for implemented ideas based on the cost savings and their contribution as team players. This ranges in industry from as little as 1% or as much as 50% of the potential savings for the entire team.

The second way Likert believed the leader could help was by enhancing interpersonal communications. This was popularized by management books in the 1980s as *Management By Wandering Around*, by psychologists as sensitivity training, and by myriads of "How to" books as body language, learning, and better understanding of the other person.

Why is communication so important? Have you ever been in a circle and played the game of whispering something into the ear of the person sitting next to you, and they whisper to the next, and so forth? What happens? When the statement comes back to you, it is usually something very different from what you first said. How this happens and why is in G. E. Parker's paper "Applying Understanding of Individual Behavior and Team Dynamics within the Value Engineering Process."<sup>5</sup>

What can the VE practitioner (VEP) do to help communication? Help the team understand the ideas of active listening, non-verbals, (provide a role model and show them by example (you are the leader)), and provide them with a process model on communication. Simply, active listening is being polite and waiting to ask questions till the other person is through talking, ask questions for clarification, and paraphrase.

Non-verbals are a little tougher to teach but making the team aware of them is half the solution. The leader should discuss two parts of non-verbals, body language and inference or the other person's viewpoint (OPV). OPV awareness and an occasional question from the VEP is usually enough. As for body language, there are many self-help books published to help the practitioner. Two are *Influencing with Integrity*<sup>6</sup> and *Body Language*<sup>7</sup>.

The next area the VEP can be of assistance is by providing a communication process model. The book, *Couple Communication I-Talking Together*<sup>8</sup> provides a good communication process. It has five steps. The first step is discussion of the facts, the second is the speaker's interpretation of the facts, the third step is the speaker's feelings, fourth step is for the speaker to say what they need and want, and the last step is for the speaker to say what they are willing to do to get that need(s) fulfilled.

The third part of Likert's recommendations is: accept employee ideas. The VEP does this when s/he records the person's ideas verbatim and by not allowing the team to criticize ideas. A good VE study ground rule for the team is to allow them to ask questions for clarity only or word discussion in a yes-if form.

The last part of Likert's leadership characteristics is: involve the employee in the decision-making process. VE does this in the analysis/evaluation phase of the job plan. This may not be enough. Recently Peters<sup>9</sup>, DePree<sup>10</sup>, and others have shown that going one step further is even better. DePree<sup>11</sup>, recommends that it is even better to treat the employee as a volunteer and empower the employees to make the decisions. VE practitioners can ask management to empower the team by having management tell the team that they have the capability and authority to carry out recommendations. The best time to do this is during the kickoff of the VE study. Do this and watch the effectiveness of the team multiply!

#### VA/VE TECHNIQUES - Whole Brain Utilization

Another human aspect of VA/VE is that it is a whole brain activity. That is, VA/VE requires the use of both the left and right hemispheres of the brain, another reason that the technique is such a powerful tool. The VA/VE technique is a balanced application of both right and left brain activity. The best results in any creative or problem-solving activity occur when the person alternates between the right and left hemispheres of the brain<sup>12</sup>.

Research has substantiated that the left and right hemispheres of the brain do distinctly different functions<sup>13</sup>. The left brain is primarily sequential in its activity. It is responsible for all ana-

lytical and verbal activities that the brain does. It takes information from experiences and learning stored in memory, and new facts that may be presented then attempts to assemble this information into a logical order. The left brain, in most people, enables us to speak and form thoughts into words<sup>14</sup>.

Opinion differs on exactly how the left and right hemispheres interact. Some studies suggest the interaction of the left and right brain may not be as distinct as previously thought. Still, the idea of "left brain" and "right brain" as a working metaphor is appropriate, especially when involving the thought processes such as creativity and problem solving<sup>15</sup>. This provides an avenue to explore the steps of the VA/VE job plan.

The sequential, logical thinking of the left brain draws on pre-existing codes stored early in life. It can recall complex motor functions in a computer like manner. This type of functioning is essential for orderly living<sup>16</sup>.

in a nonlinear and nonsequential manner relying instead on simultaneous processing of incoming information. It can generate or process a whole cluster of stimuli simultaneously which leads to a grasp of complex wholes<sup>17</sup>. A simple example of this is looking at the clouds in the sky. After a sufficient period, one can usually start to see familiar patterns in the clouds such as a face or an animal.

The functioning of the whole brain is best illustrated by "The Creativity/Learning Circle (Figure 1)"<sup>18</sup>. The left brain is represented by the upper half of the circle. This represents the information gained through traditional education, viewpoint and experiences of our own five senses. The function of the left brain is to draw information from experience and learning to find similarities, make identification, and establish reality; or the here and now.

The right brain function is represented by the lower half of the circle. This is imaginative

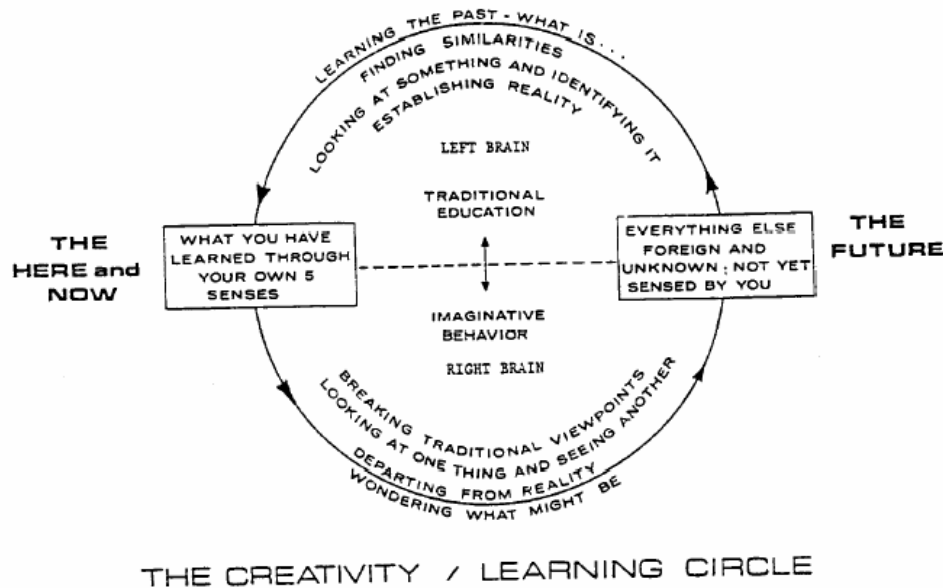


FIGURE 1

The right brain, on the other-hand, will always attempt to create logic from the presented information, even if there is no immediate logical pattern. The right brain, in most of us, functions nonverbally, specializing in visual, spatial, and perceptual information. It processes information

behavior represented by everything else that is foreign and unknown. The right brain can depart from reality, and wonder what might be. It can take complex stimuli and information, then, process it into many possibilities creating a new reality; or the future.

The VA/VE Job Plan capitalizes on the unique attributes of both the left and right brain. Figure 2 illustrates the structured steps of a job plan. Notice it has the traditional five steps plus a "step 0."

Step 0 is a preliminary planning and coordination step that involves the formulation of a problem statement; identification of scope, objectives, deliverables, and assumptions; and selection of team members. A team briefing is held in which team consensus is sought on the scope statement, objectives, deliverables, and assumptions. Also, the team makeup is analyzed to ensure that it has all the right players and that there is agreement among the team that these are the right players. Additionally, a VA/VE process overview is given in the team briefing to provide a review for those team members who have taken part in previous VA/VE studies/workshops, and to instruct those who have never participated.

Step 1, the Information Phase, uses the left side of the brain. Since this step involves the accumulation, sorting, and cataloguing of the information known about the problem, the left brain is very much at home doing these functions. A brief look at "The Creativity/Learning Circle" (Figure 1) places these activities in the upper half of the circle corresponding to left brain thinking. In step 1, the team is learning about the past, or what is. The typical questions like, "What does it do?", "What must it do?", and "What is basic function and what is the performance of the basic function worth?" (Figure 2) establish the reality of the problem.

Function Analysis and Function Analysis System Technique (FAST) diagramming are very important activities done in step 1. This is also a left brain activity. The functions the team has identified are put into a logical sequence that depicts the total problem within the scope lines of

### Value Engineering Job Plan

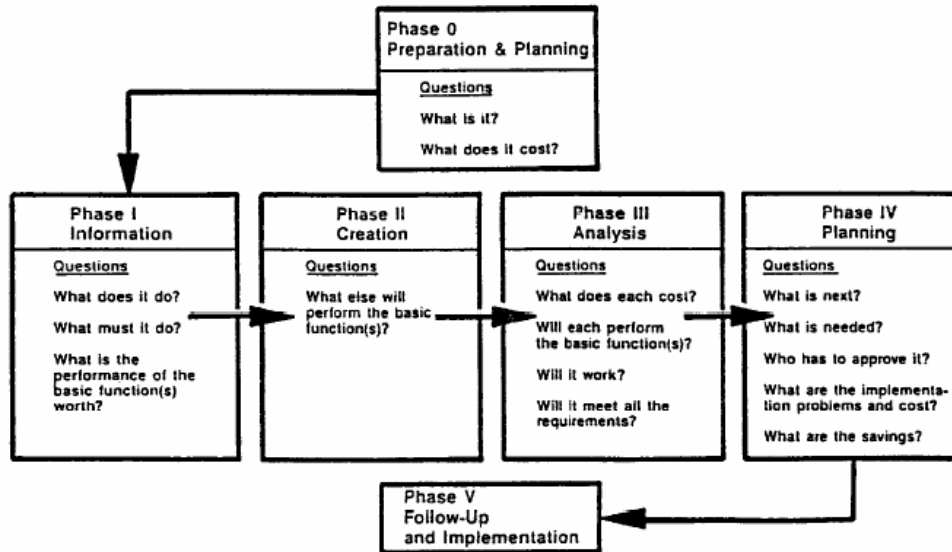


FIGURE 2

Step 0 is a right brain function providing intuition and a sense of the total picture before the start of the VA/VE study. Step 0 sets the stage for what is next. It provides a sense of inspiration that is necessary for successful problem solving.

the FAST diagram establishing the "reality" of the problem. Notice how this activity corresponds to the top half of the circle in figure 1.

Step 2 is the Creation phase of the job plan. This phase uses divergent thinking, a right brain activity. The team departs from the reality of the

problem and wonders what might be. For example, questions such as, "What else will perform the basic function(s)?" and "How else might we accomplish these functions?" are asked (Figure 2). The leader breaks the traditional viewpoint by forcing the team to look at one thing and see another. Therefore, defining, or more accurately, inventing the future.

The creation phase depends highly on the human aspects; a fragile part of the job plan. This is because of conditioning from early childhood to use only our left brain. We are taught to be very structured and organized in our thinking and are conditioned to think that there is only one right answer. Carefully break these old patterns of thinking by making it comfortable for the team to depart from reality and wonder what might be. There are many exercises available that help produce a "comfort zone" for right brain thinking. These should be used to their fullest extent to create an atmosphere that is conducive to right brain thinking.

Brainstorming is used in this phase of the job plan. Quantity of ideas in this phase takes precedence over quality of ideas. Encourage freewheeling and building on other people's ideas.

One structured technique that can lead to superior results is to force relationships between different things that are totally unrelated to the problem or object of study.<sup>18</sup> By using physical things such as animals, their habitat and characteristics, one can spawn fruitful ground for ideas and invention. For example, use a tiger and its habitat to make comparisons with, perhaps, an automobile. This technique serves mainly to get the "creative juices" flowing and to provide words that link ideas to the object of the brainstorming activity.

Creative imagery is another technique that can improve the creation phase.<sup>19</sup> By imagining yourself as a part of the thing you are trying to create or improve, one can spawn new ideas. For example, one inventor when perplexed about finding new uses for a standard tape measure, imagined himself getting smaller and smaller until he could "walk" inside the tape measure. Once inside, in his mind's eye, he could "see" many things that he hadn't noticed before. Things like the vacant space in the corners of the tape and

measure the reel mechanism that spun around when the tape was extended and retracted. Using this new information, he came up with an idea of cutting a hole through the walls of the tape measure, thus creating a window. Then he attached a disc to the reel mechanism. On this disc, he would emboss company logos and promotional information that would spin around as the tape was extended and retracted. This idea won the inventor a patent and he sold many thousands of them for a fine profit.<sup>20</sup>

These activities correspond to the lower half of the circle in figure one, which represents right brain thinking. By departing from the current reality, the practitioner/ leader is breaking traditional viewpoints by looking at one thing and seeing another, thereby, discovering the future and adding to the team's bank of knowledge. VA/VE further enhances this phase through the synergistic effect of the team. Because the VA/VE technique draws on the collective knowledge and experience of the team during the creative phase, significantly better results are achieved than by individual effort.

Step 3 of the job plan is the Analysis, or Evaluation phase. Here each idea is evaluated that was presented in the creation phase and compared against criteria that the team has come to consensus on. Comparing this phase to "The Creativity/Learning Circle" (Figure 1), notice that this corresponds to left brain thinking since comparisons are made and similarities found. Each idea is sequentially tested, looking at something and making identities, and establishing a new reality. This sequential thinking and comparison activity is characteristic of left brain thinking.<sup>21</sup>

Step 4 of the job plan is the Planning and Presentation phase. This phase requires both left and right brain thinking. Here the ideas the team has arrived at are planned (left brain) for implementation. Also, the team determines how to best present the new information and proposals to management. All this requires creativity and imagination, which are right brain functions.

Once all the steps in the action plan have been identified and assignments made for executing them, this information is presented to management. This act of presenting requires both logic and presentation skills. Thus, it is both a left and

right brain function.

Step 5 is the Follow-up and Implementation phase (Figure 2) of the job plan. This requires both left and right brain thinking also. First, there is right brain thinking to imagine and anticipate roadblocks that may occur. Contingencies to these unseen roadblocks must be imagined and developed. Then, methods of promoting the team's recommendations are devised. These imaginative functions require right brain thinking.

Once the plans are made and put into action, follow-up, review and reporting on progress is required. These require looking at the reality of the situation and reporting on the "here and now." These are all left brain activities.

Thus, it shows that the VA/VE job plan is a whole brain activity. It capitalizes on the unique characteristics of both hemispheres of the brain, and optimizes the use of the brain to get superior results. The synergistic effect of VA/VE further enhances this phenomena, which makes VA/VE one of the most, if not the most, powerful creative problem-solving tool ever invented.

#### VE PERFORMANCE - The integration of philosophy and techniques to create change

"To meet the challenges of the fast changing competitive scene, we must simply learn to LOVE CHANGE as much as we have hated it in the past."<sup>22</sup>

Most people when asked, "Do you 'Love Change'?", quickly reply with an emphatic NO! Still, upon further reflection, if change is viewed as an opportunity instead of a problem; an opportunity to put a little, or perhaps much "change" into our pocket, we start to have a totally different view of change. The things we hate about change are the problems it causes. Perhaps if we can find a way to overcome these problems so that they are much less painful, we can then learn to love change. So, how do we learn to LOVE CHANGE?

Albert Einstein once said, "The significant problems we face in life cannot be solved at the same level of thinking we were at when we created them." So, how does a leader learn to raise his/her level of thinking to overcome problems and learn to LOVE CHANGE? Or help a team to

LOVE CHANGE? VA/VE by definition is an organized effort directed at analyzing the functions of goods, services, and organizations. It is an intensive interdisciplinary group problem solving activity (figure 3). It's goal is to get only the necessary functions and essential characteristics in the most profitable manner by gently causing change. This shows that by its very nature, VA/VE is a powerful tool. It is a tool that can help us learn to LOVE CHANGE.

#### Value Engineering



An intense interdisciplinary group problem solving activity

As VA/VE is an intensive interdisciplinary group problem solving activity, it follows that this interdisciplinary group also must be a high performance team. It is in this context that VA/VE can help us love change. A high performance team is a very special designation awarded to a collection of people who, first, conduct their activities in an environment of trust and interdependence. This reduces the fear of criticism. The team feels energized by their ability to work together synergistically and are fully committed to a high level of output. Each member cares about how the other members feel during the work process.

It is this synergistic aspect about VA/VE that makes it powerful. In a recent customer survey, program managers at the Idaho National Engineering Laboratory (INEL)<sup>23</sup> were asked the question, "What do you feel the strengths of the VA/VE process are?" Over 27.3% of the responses listed synergism as a strength. 12.1% of the responses were "improved understanding of requirements", and 10.6% felt "buy-in and ownership were important strengths." Other factors that the respondents listed as strengths were: FAST Modeling, Concentrated Effort, Brainstorming, Evaluation of Alternatives, and Improved Communications. These factors are very important to the success of any project, process, or service. The customers of VA/VE who had experienced the

process first hand felt synergism was the greatest benefit.

Another aspect of VA/VE is "value thinking." The idea of value thinking comes from the definition of value, or value equals function divided by cost. The goal of any VA/VE effort should be to create a synergistic, high performance team, that uses "value thinking." As Alexander Cunningham, Vice President of General Motors North American Passenger Car Division put it in his 1985 keynote address to SAVE, "Value thinking is the glue that holds the whole thing together"<sup>24</sup> So, don't get stuck looking at change and hating it because it creates problems. Look at change as the generation of opportunity and welcome change in your jobs and daily life.

Another key in learning to love change is to anticipate change before it happens, then take the necessary steps to meet the challenges head on. This requires good planning. Most problems, whether simple or complex, can be solved early through planning. This will eliminate the emergency solutions that result from poor planning. VA/VE is a tool that when used early in a problem can generate far superior solutions to these problems than any other problem solving technique available.

Many program managers and project engineers have learned the value of being positive in their approach to the management of programs or projects. By using VA/VE up front in the early design stages, these managers gain benefits that they would not receive otherwise. In a customer satisfaction survey of a Federal Laboratory where VE has been used for five years,<sup>25</sup> the managers were asked, "What were the actual savings or benefits to the project as a result of using VA/VE?" 22.4% of the responses were that VA/VE saved money, 14.3% got buy-in, 14.3% improved design, 8.2% saved time, 6.1% improved system/project definition, 6.1% improved productivity, and the remaining responses consisted of improved reliability, improved process, and reduced downtime and design time.

Upon further analysis of these answers, five common groupings developed that represented the five major categories of 1) improved productivity, 2) improved design, 3) improved communications, 4) improved quality, and 5) improved customer

relations. Fitting the responses to this question into these five groups yielded some interesting results. 40.7% of the responses fit into the "improved productivity" category, 24.4% into "improved design." "Improved communications" represented 16.3% of the responses. "Improved quality" represented 14.1% of the responses, and "improved customer relations" represented 4.5% of the responses.

The conclusion is that the use of VA/VE on these projects is very beneficial even if a dollar value could not always be attached. The benefits the customers felt they were receiving were all very important to the success of any project and VA/VE was the tool that helped achieve the objectives.

It may be debatable whether the users of VA/VE in this study learned to "LOVE CHANGE." But they certainly learned that by being proactive and using the "value thinking" process of VA/VE early in the design cycle of their projects, or programs they got significantly better results than had they not used VA/VE. By using VA/VE early in their projects, they can turn their problems into opportunities for savings and improved performance. They found by using VA/VE a high performance team was produced that could raise its level of thinking to solve the significant problems faced on the project or program. It can be concluded that VA/VE is a powerful tool and the more proactive the potential users of the process are, the better the results.

#### VE PRIDE - HIGH SELF-ESTEEM AND CELEBRATION

Any discussion on self-esteem and particularly high self-esteem seems to bog down in the answer to the question, What is it? In the present context, it is one's love/ respect for oneself or feeling good about oneself. For most of the population receiving positive feedback is a good way to increase one's self-esteem. The roadblocks to high self-esteem are guilt and fear. In the setting of a VE team guilt and fear can manifest themselves in as many ways as there are VE team players such as fear of making a recommendation that is politically unpopular, fear of repercussions for not getting their regular work done, fear of working in a team setting, guilt for not wanting to

be part of the team, fear of public talking, fear of saying the seemingly ridiculous, fear of asking a dumb question, guilt for kicking the dog last night or not kissing the spouse goodbye, fear to make a decision, fear of failure, fear of success, procrastination, fear of rejection by saying no to something, etc.

As a VE practitioner/leader, there are many things that can be done to help the team members overcome these fears. For example, VE study ground rules such as there are no dumb questions or, when brainstorming, a team member does not have to state an idea and can just say they want to pass (notice the people empowerment) are two ways of overcoming these fears. Other things the practitioner can do: list 'sacred cows' during the team briefing, orient Senior Management on what can happen and ask them to encourage the team members to participate and discuss with the team what management's expectations are as far as catching up on work pushed aside or the value of the team in the company culture.

Other ways to build a high self-esteem in people over the short term are 1) teach time management skills, 2) reinforce positive behavior, 3) have fun, 4) get positive feedback from friends and co-workers, and 5) act empowered - become assertive (remember Likert?). The VE practitioner can teach time management skills by leadership. Have an agenda, set times as goals, follow them, and tick off completed parts of the agenda. This will show people an effective way of personal and meeting time management and overcoming procrastination.

On the second item, reinforce positive behavior, as a practitioner that can be done by your feedback both verbally and non-verbally. A most effective positive reinforcement is simply an appropriately placed smile.

On having fun, it is a two edged sword. First, fun creates endorphins, a powerful pain killer, that aids in improving self-esteem by making the person feel better and secondly, it improves productivity by enhancing creativity and building on synergy. Two good examples for seeing and hearing how fun can improve productivity are watching any *Odyssey of the Mind* competition or viewing the "60 Minutes" broadcast on Southwest Airlines and its president. In both, the theme is

while the people are having fun, creativity is increased, which leads to more fun and profit through synergy.

A VE practitioner/leader can help the team to have fun by having the team play games throughout the VE study. A good source for some relevant games (e.g., communications, team building, creativity) can be found in *Rieker*.<sup>26</sup> The other area is celebrate after the Management Presentation or the end of the VE study. The team has worked hard together, now develop a way for them to unwind and have some fun together. Have dinner together or go for a Pizza together or even just sit around and chat before calling it a day.

The fourth item follows right along, have the team (co-workers) recognize personal accomplishments. Last, the idea of acting empowered. Often one hears you won't get respect until you respect yourself or, in this case, become assertive and you will be empowered both internally and externally. Famous Amos, founder of Famous Amos Cookies, says it best

"Believe that whatever you can conceive, you will achieve." So believe you are empowered and you will be!

A leader/practitioner needs to role model an assertive personality. Simply, show people the process of how to say no politely. The process is: first, listen, second, say no immediately or use a conditional if, third, give one good reason you can't do it, and last, offer alternatives. Sometimes it is appropriate during the study to discuss the assertive behavior process model and use it as an alternative to passive or aggressive behavior.

#### THE BOTTOM LINE

As VE practitioners/leaders, attention to the people side as well as the VE technique is imperative for good performance. The people oriented aspects to keep in mind are: respect people through listening, recognize and reward accomplishments, empower and build consensus, the dual functionality of the brain and how to use it to enhance performance, people's resistance to change and that VE is a powerful tool to gently manage change, the value of synergism, and the importance of high self-esteem and celebration.



1991 SAVE PROCEEDINGS

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