

Thinking System? What is the next step?

Add the newer technique, and use the whole system.

Whats different about the newer techniques?

They fill needs in the present system, often get better results. Also they fit the system to administrative, management, service, process and software type of problems.

How do they augment the present VA technique system?

They get better answers to problems. They get more disciplined thinking on the right problem and in less time. They "set" the problems to be solved, precisely--and "tune" the minds working on them to that precise task. They provide an effective thinking system.

"Thinking System"--What do you mean by that?

A procedure that allows each one to get better results by the use of his own head.

Doesn't effectiveness in the "use of the head" depend upon the intensity of the need? If the problem is intense, desperate and immediate, doesn't it automatically cause maximum "use of the head"?

Maximum use, but not maximum effectiveness. Effectiveness is whats needed.

People have always had problems serious to them. If this gets better results, why didn't it develop naturally?

It has. Near the beginning of mans history, he survived mainly by the use of brawn. As centuries passed, this changed. It depended on the combination of brain with brawn. Today, this trend toward dependence more upon the contribution of the brain continues, at an accelerated rate. This system for securing better results per brain-hour is a normal and timely developement. Like Radar and other great advances, it only came forth when the need was intense and specific.

(a) Some material is from "Techniques of Value Analysis and Engineering, 2nd Edition", 1972, Miles, McGraw-Hill Book Co.

What is different about it?

It recognizes the necessity of "Mind-tuning", and the inter-dependence of four separate kinds of thinking.

What do you mean by "Mind-tuning"?

Before any mental time and effort are used on a problem-- a period of self-questioning is necessary. "Exactly what am I trying to do"? As in tuning a radio, this ends fuzziness, makes the task crisp, precisely defined, in harmony with my wishes, states it in my words, lays out exactly my area for effective mental work. When more than one work on a problem, in addition, it gets all minds to work on exactly the same problem, so that the outputs of all minds fit together in a useful pattern like a jig-saw puzzle. Without "Mind-tuning", for all of a group, the results of their mental work mis-match somewhat, as would parts brought by each from a slightly different jig-saw puzzle.

Would you say that this might add 10% to the effectiveness?

I've seen it add entire new problem solutions, change the whole direction of mental work, add 100% to effectiveness. A group had just started work on designing an additional warehouse at the factory, and having it built. They said their job was to follow through on the instructions of higher management by "Efficiently and economically designing and procuring the additional warehouse". During the "Mind-tuning" exercise, they first broadened their task to "Help to operate a competitive business profitably". Then in succeeding steps of disciplined thinking they provided sharp "Tuning" onto some specific areas, and found better solutions. Some material in present warehouses did not benefit from the enclosure. Some areas could be much better arranged. Some racking, shelving and handling equipment utilized present space better and reduced handling cost. \$11,000 was spent for these instead of \$125,000. for another warehouse.

Isn't the successful management or professional mind automatically tuned, by need, precisely to the problem or opportunity area of their job?

No, but they have the mental potential to be so tuned, and to produce solutions which otherwise would not develop.

It just doesn't seem right that men who have been successful in thinking work all of their lives benefit from being taught how to think.

The game of the man who has played golf all of his life benefits by more teaching. Thinking also is goal-oriented. It's important to achieve results. Results from any mind are increased as each kind of thinking is progressively done completely--

and, in its proper sequence.

What "Kinds" of thinking do you mean?

The first of four separate kinds is (1) "Information thinking, or, information searching, information developing, or growing". The quality of total thinking can never exceed the quality and completeness of information.

What's new about that? Thinking people have always gotten the facts about a situation before starting their solution-oriented thinking.

It's a matter of degree and of total separation. People also have always "thought". We're talking about achieving much better results from "thought", maybe 10% more, maybe 100% more. Since the ceiling on results from all subsequent thinking is placed by the quality of the information, "try harder", stick to information searching longer, dig deeper, creatively develop more facts, and better assumptions.

Assumptions? Don't we develop information to eliminate assumptions?

Yes, or, rather, to minimize assumptions. There will always remain some assumptions. But, sharply separate assumptions from facts. We call it "improving" the assumptions. Better information development identifies some assumptions as false and ends them. It identifies some as truth, and changes them to facts. In this type of thinking, after identifying and improving the assumptions, think intensely along the following lines: What new assumptions (which are probably true) would allow later thinking to be faster propelled toward superior solutions? Make such new assumptions, then constantly thereafter be alert to "improve" them with more facts.

Just what do you include in "Information"?

Knowledge about everything related or possibly related to the situation which exists or may exist. What happens? What has happened? What has succeeded? What has failed? What does competition do? What is to be accomplished? What is it that the customer really needs or wants? What are the desirable characteristics with respect to size, weight, appearance, durability, etc.? Secure all pertinent information: costs, quantities, vendors, drawings, specifications, planning cards, and manufacturing methods data as well as actual samples of parts and assemblies where practicable. In the case of new products, secure all information that is available: all design concepts, preliminary sketches and drawings, preliminary cost estimates, etc. Examine the basic engineering, the basic manufacturing, and if a service, the basic service system operation. Surround the situation with more facts than one person has yet viewed in one picture.

All of this, and we haven't yet given one thought to the problems solution?

Right! Now we'll change to a second kind of thinking--
(2) "Analysis" thinking, ~~see what~~ kind of a problem we have, decide what solution we want to achieve and "Set the Problem", in practical, solvable terms. We're not trying to look good on the playing field, we're going to make a good final score.

How do we start this "Analysis" kind of thinking, before we even have different possible solutions to consider?

Now extensive essential "function" thinking is developed. What does the customer or user really need and/or want, precisely? Functions are separated for single study, then are grouped as needed for best solution. Single functions, and often grouped functions are evaluated.

Evaluated? What do you mean by that?

Based upon the information at hand, the probable avenues for improvement, comparisons to the cost of producing similar functions, and the extent of the real need, a figure of appropriate cost is assigned to each function, and/or to each group of functions. This is the cost which it makes sense to believe that the function or functions will be secured for after a reasonable amount of disciplined thinking.

But you still haven't "Set the Problem"?

After we develop a few more answers we will. What are the meanings? What are the total problems? The individual problems? The reasonable goals and plans? What are the key problems to be solved first? What solutions seem reasonable? What end result is reasonable? What steps-first, second, third, etc.-are indicated? What additional information is required? What unlisted assumptions are being made? Are the assumptions now valid? What solutions does it make sense to search for? Approximately what savings or benefits might each of the best approaches bring? Exactly what parts of the problem or overall problems should we seek out better solutions for first? What specific needs, when well met by better solutions, would "unlock" very beneficial solutions for the project? Now the problem can be established or "Set".

What's the difference between the problem we had at first and the problem we have "Set" now?

Let's take an example. As competition increased it became necessary to think more effectively in domestic refrigerator design. The original problem was: "We need a cold control relay, still with high quality, but for much less than its present \$9.00 cost".
As a problem is set it is put into words ready for the creativity

type of thinking which will follow immediately. Also, the functions are divided, or grouped so that each unit becomes a "thinking package". Now the problem is stated:

How might we sense temperature for	\$.60
How might we actuate contacts for	.80
How might we interrupt current for	.50
How might we provide adjustment for	1.00
How might we mount and protect for	2.00
How might we please the customer (aesthetics)	.10
Total -----	<u>\$5.00</u>

Now, you see, the original problem has become a series of very specific problems, all in functional language, each solvable in its own parameters, with a total that meets the needs of the business, \$5.00 cost instead of the \$9.00.

We had one problem before, now we have six problems, is that progress?

Yes. We might have one keg of nails, but we don't make any progress until we take them out and drive them one at a time.

So now we change our thinking to the third type (3) "Creative"?

Yes. All judgement thinking is temporarily withheld. The minds must be sparked to "roll free", making associations they never have made before. No person must be present who is not sufficiently disciplined to withhold judgement thinking. This creative thinking can be, and must be effectively done to provide suitable directions for the next type of thinking.

Creative thinking, per se, has been around a long time, hasn't it?

No. About the same as Value Analysis. The late Alex Osborn got it well started. Others have added since. Anyhow it can be well learned from existing publications and courses, and must be mastered by anyone who hopes to compete in problem solving in a competitive field. It is a vital, indispensable step in effective disciplined thinking. Einstein said, "When there's a problem to be solved, Creativity is more important than Logic".

I've heard it said that children are more creative than adults?

They are, they haven't been taught so many inhibitions. It is useful to consider the human mind as containing certain knowledge bits, or pieces, and an ability to bring these diverse knowledge bits, which have never before appeared in the "same mental picture", together into one focus long enough to consider "What benefits to my present project might result if I combined them in the solution"? In this concept good useful creativity is maximized if

the individual is in possession of two factors: (1) the knowledge bits required to deal with the task at hand and (2) the mental ability to readily join diverse, unrelated bits of knowledge into one temporary picture.

What is the "End Product" of this Creative thinking on a problem?

A long list of approaches, which fit the specific "How Might We....." statements of the problem. Properly completed, these stretch the mind, and the imagination still further. In this listing should be found some approaches which will meet the needs of the problem.

That's three kinds of thinking, what's the fourth?

(4) "Judgement" type thinking, as opposite from creative as north is from south. Now the task is to sort out one or more approaches to the problem solutions, from this list.

Now you go through the list scratching out the ideas that are ridiculous or worthless?

Absolutely not. An approach may at first blush appear ridiculous. But it may not be at all. It may be that the way we, at the moment, are thinking of using that approach, is what is ridiculous. Real Judgement thinking--which is selecting, minimizing dis-advantages, and maximizing advantages, will change that approach to a winner. The real essence of Judgement thinking, is (1) selecting an approach which would (when improved and developed and extended) meet or exceed the present need, (2) Minimizing the disadvantages of that approach, and (3) Maximizing the advantages of it.

Can you tie all of this "Disciplined Thinking" together in a fairly simple example?

I believe so. I'll cut 4 hours work to 3 minutes reading time, only hitting the high spots.

"The plant engineer of a cement plant in the desert received instruction from company headquarters to put a dust collector on top of a group of 8 silos. He, with two associates, started the design, preparing to secure bids, buy it and have it installed. Preliminary figures showed that it would cost about \$40,000."

Engineering management at that moment, by accident, appeared on the scene and said, "We have a consultant here for today who believes his Disciplined Thinking System might help our operation, let's select any one of your problems or opportunities and see how it works". They selected the above program.

In this case their minds were no doubt already Tuned to the same problem?

Yes, but the wrong problem. But first note how much time was used in each type of thinking.

Mind setting	45 mins.
Information thinking and Assumptions improvement	2 hrs.
Analysis thinking	30 mins.
Creative thinking	30 mins.
Judgement thinking	15 mins.

What did they "Think they were trying to do"?

"Economically and efficiently design and buy a dust collector and have it installed". Their instructions were so clear, and came at a time of such intense emphasis on ecology, that, as you see it took 45 min. of hard "leading" to allow them to clear their minds and re-tune.

What finally, were they trying to do?

"Assist in operating a profitable competitive business". Then specifically, "to minimize or end dust".

Then they proceeded to information development and assumptions improvement?

Yes. In the two hours of (1) "Information" thinking, much information was brought to the surface. A few items which were quite pertinent are:

There was not always dust
There was dust when a silo ran over
There was dust when the very bottom cement was being taken from the silo
Cement flow is caused by 30 # air infusion at silo base
There was dust when the 150 # air pressure line was used instead of the 30 #, to cause cement to flow
The 150 # line was often used when the 30 # line was not functioning
Between the compressor and the silos was a low place where the 30 # line went under the road. Too frequently water, rust and other contamination collected there, clogging it
Dust drops out of a stream of air whenever the cross section of the duct is increased (therefore velocity decreases)
Some of the silos were always partly empty
While the exact formulation of the cement in various silos often differed, differences were so slight that dust from any one would not contaminate any other
It costs \$1,000. per year to clean up around the silos
Another \$1,000. per year of cement is wasted.

Probably 10 times this much information was developed. However, those listed here are useful information "bits".

It seems to me that some of the solutions are obvious now, without going into a long rigamorole of disciplined thinking?

Partly true, but we don't want a part solution, we want a full solution. Always thorough work in Mind Tuning is essential, else we would be working on the wrong problem, or differing problems. Often thorough work in Information Thinking so illuminates the problem that good work in the remaining thinking steps, proceeds very fast, and very effectively.

Proceed with the (2) "Analysis" thinking.

Now we decide: What are the meanings? What solution do we want? What specific problems shall we solve?

We want a good business solution if possible, then will go beyond if desirable to meet ecological needs.

Possible saving is \$2,000. per year

Company practice is to liquidate expenditures in 2 yrs

This means maximum expenditure of \$4,000.

Basic problem then is "End this dust with \$4,000 expenditure"

The various causes for the dust were discussed, providing direction for further thinking

For the Creative Thinking to follow the problem was set:

"How might we reduce dust"?

Why not be complete about it and use "How Might We End Dust"?

Ending dust requires judgement. Now we want creativity. Minds will roll much freer on the subject of "reducing" than of "ending". Then later judgement can put together a package that ends it. (3) "Creative" thinking followed. A few of the most pertinent of the dozens of approaches listed, are noted here:

Stop running over the silos

Move the 150 # line so it will not reach the silos

Clean out the 30 # line

Reroute the 30 # line overhead, so it won't stop up

It seems to me there are some very good suggestions here.

Wait! You are already judging. Do a thorough job of creating before you start judging, or you miss some very good solutions. Now to finish creativity:

Vent the emptying silo through the top of a part empty one

Vent the silo being filled through the top of a part empty one

Now we are ready for judgement thinking.

Now let me do the (4) "Judgement" Thinking for you, and see how it matches the work of the engineers.

Alright, but first lets review. Judgement thinking is selecting the best approaches, then minimizing their disadvantages, keeping at it until the needs of the problem are fully satisfied.

Move the 30 # line overhead. Move the 150 # line away. Put a duct system over the silos.

Good, now note how eager you were to judge. Everyone wants to judge. Some will start judging during (1) "Information" Thinking, and again during (2) "Analysis, and again during (3) "Creativity". To become a disciplined thinker, and develop the really good problem solutions requires real mental discipline and mind training.

Now lets finish the (4) "Judgement" Thinking. To re-route the 30 # line overhead, and to move the 150 # line would cost about \$2,000. To build a ducting above the silos in such manner that if a dust collector were later installed, it would fit right on, would cost another \$2,000. The dust is now substantially, if not completely eliminated and the cost is \$4,000, which is only twice the annual cash saving. In conclusion, the expenditure will now be \$4,000., instead of the planned \$40,000. The thinking task was well done.

You've made a case for Disciplined Thinking alright, now how do you propose to get it learned and used?

Four ways.

1. By consultants helping management and administrators produce more services or product per dollar.
2. By Universities teaching to advanced students and special groups.
3. By seminars taught to professional, administrative and management people by consulting firms and Universities.
4. By activities of S. A. V. E.

Any special suggestions how S. A. V. E. might accelerate this?

Yes, very much so. Members join S. A. V. E. to learn. Members come to meetings to learn and to gain experience in using the special techniques of its profession. Teach them, and give them experience using disciplined thinking in the package with the other V A techniques at their chapter meetings.

How do you propose that this be done?

Put it right in the chapter program, perhaps two out of each three of the meetings, so they will have knowledge and skill in excess of non-S. A. V. E. people. There is so much that works so well to learn. Give the members a chance.

Where would you get the leaders?

From one of three sources, and the third might be the best.

1. From leader-teachers of proven competence in the group.

2. From leader-teachers of proven competence from outside of the group.
3. By assigning three months in advance, to two or three of the members, who will accept the assignment, have two to four pre-meetings to learn, plan and decide how they will conduct the session and lead their associates into good learning.

People come to meetings for either of two reasons, (1) they have a chance to learn something interesting or useful, or (2) they are taking part in teaching someone else,--then the teacher always learns even more than the student.

It would help if you would suggest specific subjects, each appropriate for one chapter study meeting.

I'll do so. But first, let's remember that our chapters are not made up of members, all of whom received good complete training in the V A approaches, and good experience using them. But rather, of people with interest who want to learn, of partial knowledge who want to learn more, and of experience who want to deepen their skills. So this learning should weave some of the especially strong techniques in with the disciplined thinking, so each learner is assured of a strong working package of knowledge and skill.

I'll buy that, now give us some.

1. Setting, or "Tuning" the minds of any group working a V A task, in order to achieve superior results from the group effort.
2. Setting problem or project in solvable terms. Often results can be trebled or time halved by superior problem setting.
3. Identifying difficult functions more effectively, making useful separations and groupings.
4. Evaluating functions in dollars more expertly. Means for handling more difficult or involved functions.
5. Penetrating the difficult but rewarding situations to secure much more essential information.
6. Identifying assumptions more effectively, sorting them from facts more assuredly, improving the accuracy and usefulness of assumptions.
7. Deciding what the facts and assumptions of the task mean. Gaining a sense of the probable magnitude of achievement practical. Shaping work toward that magnitude.
8. Practical, effective creativity. This meeting should improve our effectiveness 10 to 25%.
9. Superior effectiveness in selecting best alternatives from VE creative work.

10. Effective minimizing of disadvantages so that good new solutions which meet the needs of the business or service will become practical.
11. Great gain results from using the "Blast, then Refine" approach effectively. More means for using this approach on the difficult ones.
12. Double the ability to gain support and action of other professional and management people, through eliminating or minimizing embarrassment to them.
13. "Growing" all of the professional and management people in your environment in the progressive use of more and more of the VE system.
14. Breaking the log-jam when it appears that the achievement is destined to be minimal.
15. Using the whole VE system effectively to achieve the needed results.
16. How offshore competitors--England, Sweden, Germany, Japan--are each using the VE system.
17. An evening of constructive self-appraisal, including a rating sheet which each will make about himself, which will be kept confidential by himself.
How effective am I?---
 In problem setting
 In problem solving
 In securing nearly all information
 In separating assumptions from truths
 In teaching
 In administration, organizing my work and the work of others to secure superior results.
 In communication to, and getting the support of, professional and management people.
18. A meeting following the above in which one person who has felt a need in each of the above areas tells "What I am planning and doing to strengthen myself in that area, (for example problem-setting)".

An ambitious program.

But very achievable.

It might absorb too many of the chapter meetings. Members benefit from learning from the experience of related professions--- quality control, industrial engineering, purchasing, marketing, during some chapter meetings.

That is valuable experience, but it can be learned by visiting occasional meetings of those professional societies. S. A. V. E. members joined for the purpose of "growing" their knowledge and skill in Value Analysis and Engineering Techniques, and their effective use. As our society matures, it will provide them more and more opportunity to do so. In fact, that was the avowed, and stated purpose of the founders of S. A. V. E.

In conclusion:

Value Engineers will contribute to the competability of their employers, and will prosper in direct relation to the extent to which they learn and develop skill in the total package of techniques which includes present techniques, Disciplined Thinking, and other new techniques.

(b)

As fast as management arranges for its "Thinking" personell to learn and to use the Disciplined Thinking System, it can raise both the quality and the quantity of results from each.

L. D. Miles

- (b) See also "Value Analysis to Improve Productivity", Carlos Fallon, John Wiley & Sons, 1971, for valuable assistance in increasing the quality and quantity of mental results.