# Decision Making and Problem Solving

**A Seminar for Tri-C LEAD Professionals**
**Presented by Bob Vaughn**
**Friday, March 22, 2002**

*Goals: By the end of this afternoon, you will…*

- *Understand the Problem Solving and Decision Making processes*
- *Be able to use several tools for improving your creativity*
- *Be able to use several tools for more effective analysis of choices*

## Schedule

Introduction & Pretest
Creativity in Decisions & Problem Solving
Overcoming Barriers
Selected Tools
Turning Creativity into Practicality
Aspects of Analysis
Selected Tools
Other Issues
Wrap-up & Post Test

# Decision Analysis Sheet – Part A

**In one sentence or less, specify the decision you need to make:**

_____

### Is this decision necessary?

- What will happen if no decision is made? _____
- Are there advantages to not making the decision? _____
- What are the disadvantages? _____
- Do you have the authority and power to make and implement the decision? _____

    If not, why are you involved? _____
- Could someone else make this decision better than you? _____

    Who? _____ Why don't they? _____

### How important is it?

- How much is the probable cost? _____

    How's that compare to your total budget? _____
- How long is the commitment? _____
- Can it be changed later? _____

    How expensive or messy would a change be? _____
- How soon does it have to be made? _____
- Who else is involved? _____

### What limits apply to this decision?

- List all major factors which will impact or be impacted by this decision:

    People _____

    Equipment _____

    Facilities _____

    Time _____

    Competition _____

    Management skills _____

    The economy _____

    Budget, now and future _____

    Other? _____

# Decision Analysis Sheet – Part B

**Information Required**
List *at least* four things you need or want to know in order to be able to make this decision:

- _____ ( )
- _____ ( )
- _____ ( )
- _____ ( )
- _____ ( )
- _____ ( )

In the parentheses, rank order them by importance to the quality of the decision.

**Sources of Information**
What primary or secondary sources of information are available to help you make this decision?
(People, records, documents, websites or other data sources, articles, books, consultants, etc.)

- _____
- _____
- _____
- _____
- _____

**Risk in the decision**
How much risk is involved in this decision, and how did you determine that?

- _____

**Plan for collecting the information**
How will you collect the information you need?

_____

_____

_____

# Decision Analysis Sheet – Part C

**What technological influences affect this decision?**

_____

_____

_____

**Should this decision be made by a group? \_\_\_\_   Why or why not?**

_____

_____

**With whom do you need to discuss this decision?**

_____

_____

**What could affect the timing of this decision? (Deadlines, budgets, cyclical work flows, personalities, etc.)**

_____

_____

**What else should you do to increase the acceptability of this decision to those individuals who will be affected by it?**

_____

_____

_____

# The M.I.T. Creativity Checklist

**OTHER USES?**
- <u>New Ways to Use As Is?</u> (Like using helicopters to patrol high tension lines over mountains.)
- <u>Other Ways, if Modified?</u> (Like the wallboard manufacturer who added a line of jigsaw puzzles.)
- <u>How About Salvaging?</u> (Like the rubber company who found that wasted strips of surgical tubing could be sold as rubber bands.)
- <u>What Other Use Could Be Added?</u> (Like telephone companies installing recordings to furnish the latest time and temperature.)

**BORROW OR ADAPT?**
- <u>What Else Is Like This?</u> (Like the studies of birds made by aircraft pioneers.)
- <u>What Parallels Does the Past Provide?</u> (Like what modern dress designers do in devising new creations from ancient art.)
- <u>Could Other Processes Be Copied?</u> (Like the Japanese technique of copying nature by sticking grains of sand into oysters to produce genuine pearls.)
- <u>What Other Ideas Might Be Adaptable?</u> (Like Diesel, who got his engine ideas from a cigar lighter.)

**GIVE IT A NEW TWIST?**
- <u>What Other Shape?</u> (Like the buggy maker who tapered the roller bearing which had been invented 400 years earlier by Leonardo da Vinci.)
- <u>What Other Form?</u> (Like detergent powders instead of bars of soap; or liquid soap instead of either.)
- <u>How To Create New Looks?</u> (Like shoes that show women's toes.)
- <u>What Could Color Do?</u> (Like what the automobile industry did in 1955 to make it the biggest new-car year in history.)
- <u>How About Motion?</u> (Like Christmas tree lights that bubble.)
- <u>How About Sound?</u> (Like a clothes dryer which shuts off singing, "How Dry I Am.")

**MORE SO?**
- <u>Longer Time?</u> (Like the baker who featured slow baked bread.)
- <u>Greater Frequency?</u> (Like the doctor who originated the idea of lighter but more frequent meals for ulcer victims.)
- <u>Increase Strength?</u> (Like reinforced heels and toes in hosiery.)
- <u>Increase Height?</u> (Like circus clowns on invisible stilts.)
- <u>Greater Width?</u> (Like the center strip on newer superhighways.)
- <u>Include Plus Ingredients?</u> (Like fluoride in drinking water or toothpaste.)

**LESS SO?**
- <u>What If Lower?</u> (Like the recent trend in motor cars.)
- <u>What If Narrower?</u> (Like men's ties, lapels, hat rims, etc., every few years.)
- <u>What If Lighter?</u> (Like new railroad cars which weigh no more than trailers.)
- <u>Streamline?</u> (Like tank-type vacuum cleaners.)
- <u>Condense?</u> (Like full sized umbrellas that fit into purses.)
- <u>Eliminate?</u> (Like tires without tubes.)

MIT Checklist continued

## SUBSTITUTE?
- Other Parts? (Like fluid drive instead of gears on cars.)
- Materials? (Like argon instead of a vacuum in electric light bulbs.)
- Other Processes? (Like stamping instead of casting.)
- Other Power? (Like using air to run windshield wipers.)
- Other Way? (Like the airlift that saved Berlin.)

## REARRANGE?
- Change Patterns? (Like one way streets.)
- Revise Layout? (Like new arrangements in department stores.)
- After Sequence? (Like storytelling in the movies with flashbacks.)
- Transpose Cause and Effect? (Like doctors do in making diagnoses.)
- Repackage? (Like popcorn that comes in its own microwave bag.)
- Regroup? (Like new defensive systems in football.)

## REVERSE?
- Transpose? (Like putting the engine in the rear of the bus.)
- Down Instead of Up? (Like the furrier who attaches his labels upside down so it can be read when the coat is over a chair.)
- Switch Roles? (Like films about female executives with male secretaries.)
- Up Instead of Down? (Like dining room lights which throw a beam upward from the floor to a reflector on the ceiling.)
- Do the Opposite? (Like Howe, who perfected the sewing machine by designing a needle with the hole at the bottom instead of at the top.)

## COMBINE?
- How About Alloys? (Like the newest mixes of synthetic fibers.)
- What Old Ideas Could Be Merged? (Like window washers which combine a brush with a built in hose.)
- Ensembles? (Like shirts with neckties and handkerchiefs to match.)
- Book Appeals Together? (Like drugstores selling razor blades to those who ask for shaving cream.)
- Combine Purposes? (Like Benjamin Franklin did when he got tired of switching glasses and invented bifocals.)

# A Checklist For Designing Innovative Ideas
# To Increase Their Acceptance
Robert H. Vaughn © 1993

- <u>Base It On A Need</u>. People better accept changes if they see a reason for them.
- <u>Pre-Sell the Idea to Key Individuals</u>. Ideas which have never been heard before tend to be rejected. Figure out who:
  - will be affected by the change?
  - will really make the decision to implement it or not?
  - will do the evaluation of the proposal?
  - opposes the change, and why?
  - favors the change, and why?

  Meet with those people on a one-to-one basis and discuss your idea. Limit your pre-selling when you know the person opposes it. In that case, tell where you're going, but not how you'll get there. That gives the person a chance to discuss it, but not enough detail to derail it.
- <u>Communicate Simply</u>. Understand your audience, and explain the idea with simple, clear terms, similes & analogies, effective graphics, etc.
- <u>Request a Decision to Change</u>. Do this before deciding how to change. Being presented with six options, or not changing, the latter may seem so much easier than evaluating the options to decide how to change.
- <u>Don't Over Plan or Under Plan</u>. Too much detail wastes time if the answer is "no" or "yes, but..."; Too little detail risks making you look unprepared.
- <u>Listen Creatively to Suggestions</u>. Don't fall in love with your idea so much that you can't accept valid criticism or make improvements in it.
- <u>Avoid Group Presentations</u>. Group dynamics get in the way. Getting approval from a single decision maker is best, if possible. Sometimes you can send a memo that says, "Unless I hear otherwise, we will begin next Monday to ...." You'll know whether or not that will fly.
- <u>Consider the Timing</u>. Expensive decisions sell best in good financial times, etc.
- <u>Present Positively</u>. Your suggested change should have more going for it than against it. Still, no change is perfect. Defuse criticism by admitting the possible negative results and how you will deal with them.
- <u>Changes Will Be Most Easily Accepted When They Are:</u>
  - As small (i.e., not radical) as possible.
  - Reversible (call it a pilot test, etc.) rather than permanent.
  - The product of input from several people, rather than just one.
  - Enthusiastically presented, but not oversold.
  - Conservative (i.e., believable) in their promised benefits and costs.
  - Presented as options, not ultimatums.
  - Presented simply in a form with which the audience is comfortable.
  - Open to discussion.

# Pretest on Decision Making

Circle either true or false:

T     F     1. We all make hundreds of decisions every day.

T     F     2. All decisions are made in an essentially similar pattern.

T     F     3. Choices should be evaluated as they appear.

T     F     4. Decision making applies to all phases of management or supervision.

T     F     5. Creativity is not necessary in *most* decision making,

T     F     6. Intuition is more important than rational thought in the early stages of decision making.

T     F     7. Limits should be established early in the decision making process.

T     F     8. Tolerance for risk influences decision making for managers.

T     F     9. Good decisions are both properly made and effective.

T     F     10. Organizational decisions tend to be more "convoluted" than "straightforward" in nature.

List several decisions which you either have made in the past couple of weeks or which you will need to make in the next several weeks. These will serve as the basis for discussion during this program.

# Post Test on Decision Making

Circle either true or false:

T     F     1.  We all make hundreds of decisions every day.

T     F     2.  All decisions are made in an essentially similar pattern.

T     F     3.  The first step in decision making is to determine if one is really needed.

T     F     4.  Deadlines are an influence on a decision's importance.

T     F     5.  Decisions which can be changed later are often less critical.

T     F     6.  Technological capability is an example of a limitation in decision making.

T     F     7.  Most of us are born with more creativity than we use.

T     F     8.  Being stuck in a rut is an example of an emotional block.

T     F     9.  We can improve our creativity with practice.

T     F     10. Choices should be evaluated as they appear.

T     F     11. Decision making applies to all phases of management or supervision.

T     F     12. Checklists and catalogs are idea generating tools.

T     F     13. Intuition is more important than rational thought in the early stages of decision making.

T     F     14. Limits should be established early in the decision making process.

T     F     15. Tolerance for risk influences decision making for managers.

T     F     16. Listing possible sources of information, then trying to determine which is most important is a simplified form of Pareto Analysis.

T     F     17. A decision matrix can be used to aid almost any decision.

T     F     18. It is better to present ideas to individuals than to groups.

T     F     19. Brainstorming can be done by any individual to help make decisions.

T     F     20. "Framing" the decision properly is helpful, but not essential.

# Philosophy about Decision Making & Problem Solving

*" Cheshire Puss, would you tell me, please, which way I ought to walk from here?"*
*"That depends a good deal on where you want to get to," said the Cat.*
*"I don't much care where ---" said Alice.*
*"Then it doesn't matter which way you walk," said the Cat.*
*"--- so long as I get <u>somewhere</u>," Alice added as an explanation.*
*"Oh, you're sure to do that," said the Cat, "if only you walk long enough."*
- Lewis Carroll

*If your only tool is a hammer, you tend to see all problems as nails. Having a versatile, well stocked toolbox is essential for a good manager.*
- Bob Vaughn, *Decision Making & Problem Solving in Management* © 2000

*"More than any time in history, mankind faces a crossroads. One path leads to despair and utter hopelessness, the other to total extinction. Let us pray that we have the wisdom to choose correctly."*
- Woody Allen

*Always look for the second right answer -- or maybe the third.*
- Bob Vaughn, *Decision Making & Problem Solving in Management* © 2000

*"Trust yourself. You know more than you think you do."*
-- Benjamin Spock, M.D

*"The pure and simple truth is rarely pure and never simple."*
- Oscar Wilde

*"If you have always done it that way, it is probably wrong."*
- Charles Kettering

*"Too often, our minds are locked on one track. We are looking for red – so we overlook blue. Many Nobel Prizes have been washed down the drain because someone did not expect the unexpected."*
- John D. Turner

*"Life is full of choices.... and sometimes all of them are yucky!"*
- Joanne Lee

*"Did you ever have to make up your mind? Say 'yes' to one and leave the other behind? It's not often easy; it's not often kind. Did you ever have to make up your mind?"*
- The Lovin' Spoonful

*"It is much more pleasant to make the decision than to justify it."*
- Malcolm Forbes

*Acquisition of facts does not constitute knowledge.*
-Anonymous (From Vaughn, *Decision Making & Problem Solving in Management* © 2000)

*"Often a choice is made early in the process, with the subsequent activity devoted to confirming the early choice."*
- McCall & Kaplan (From *Whatever It Takes ...*© 1990)

*"Skilled decision makers aren't overloaded with data; they can focus on high payoff information."*
- Klein & Weick (From "*Decisions*" in *Across the Board* © 2000)

# Barriers To Creativity[1]

Perhaps is was in kindergarten, or certainly by first grade, that you learned that society doesn't always appreciate creativity. We must -- to a point -- limit our natural childlike tendencies to do things our own way. While this can be taught in ways that don't unnecessarily inhibit creativity, the usual pattern is simply to encourage conformity.

*"Color within the lines, Johnny."*
*"No, Sally, frogs are not red and blue; they're green."*
As we get older, we face more and more rules:
*"If any of you have to go to the bathroom, raise your hand."*
(*I always wondered how that would help*.)
*"Drive on the right side of the road."*
*"Work starts at 8:00 a.m."*

Some rules (such as the one about driving) are obviously necessary for safety or for the functioning of society in an orderly way. Others, however, are not. The most insidious barriers to creativity are those unnecessary blocks we place on ourselves for a variety of reasons.

J.L. Adams, in his book *Conceptual Blockbusting* (publisher W.W. Norton & Co © 1974), lists six types of conceptual blocks which interfere with our ability to explore and manipulate ideas, i.e., to be creative. They are:

*Emotional Blocks*. Examples of emotional blocks include fear of making mistakes, failing or taking risks; too much need for security, order and structure; preference for judging rather than generating ideas; impatience, which denies the chance to sleep on it or let ideas gestate sufficiently; and others. A manager who chooses to not try out using self managed work teams may have an emotional block to the concept. Using these teams defies the traditional structure and certainly involves some risks.

*Perceptual Blocks*. Many of these exist, including seeing what we expect to see, not being able to view things differently, etc. These blocks prevent the person from clearly perceiving either the problem itself or the information which is necessary to solve the problem. Too many people spend inadequate time defining the problem, in order to get on with the "important" part of solving it. This is a foolish tendency. The manager who has decided that the maintenance department is inept may be blinded to the real problem of equipment that is beyond repair.

*Cultural Blocks*. Taboos. Traditions. Excessive belief in logic, reason, numbers. Distrust of fantasy, intuition, and different drummers. In short, behaving the way we're "supposed to" is conforming, not creative. As will be discussed in chapter ten, organizations themselves have a culture. While conformity may be essential to a manager's acceptance by peers and superiors, it may also inhibit the implementation of needed changes.

*Environmental Blocks*. Distractions such as the telephone and chatty colleagues. Lack of cooperation from co-workers. Autocratic bosses. Bureaucracy. Things in the workplace which keep you from being creative. Work environments are filled with environmental blocks. No single technique works to overcome these, but time management techniques can sometimes reduce them.

*Intellectual Blocks*. These keep you from understanding concepts necessary to work on the problem. If you don't have the academic training or mental abilities sophisticated enough to understand and deal with the issue, it's difficult to be creative. It could also be that you're locked into a bad approach. Managers who have been promoted from the ranks of workers often find themselves falling behind technologically, especially in fast changing fields. Their subordinates may understand new and advanced techniques which would work, but the manager might resist these fearing loss of control.

*Expressive Blocks*. Inadequate language skill to express and record ideas in a manner which can be understood by others. This could also apply to using the wrong or inappropriate medium to express concepts, such as trying to express a visual idea orally or a mathematical idea in visual terms. In today's more diverse workplaces, managers may find themselves with subordinates and peers who -- literally -- speak different languages. It takes so much energy for routine communications in these environments that creativity may be reduced.

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# BRAINSTORMING & Variations [2]

*Overview:*

Brainstorming and its common variations are used as creative, inductive or idea generating tools. Brainstorming can be applied to nearly any situation where alternatives must be developed, whether for planning or problem solving. *Group interaction is required*. (Other techniques are discussed later in the chapter which can be used by an individual if a group is not practical.)

*Ground rules for effective use of Brainstorming include the following:*
- *Size of the group*. Groups smaller than 4 or larger than ten become awkward and less productive. Larger groups should be subdivided. Smaller groups might try some other techniques or temporarily add other people who might have some worthwhile perspective on the problem.
- *Mix of the group*. Homogeneous groups tend to produce uncreative ideas. When possible, use a group for brainstorming which is varied in background, age, job category, etc. The diversity will usually enhance the creativity generated.
- *Quantity of ideas is the goal*. This means that you go for volume, not quality of ideas. The participants should be encouraged to combine ideas, improve on each others' ideas, hitch hike on things already suggested, etc.
- *No evaluation of ideas or negative thinking*. That's reserved for the next step in the decision making stage, not now. Evaluation at this point tends to inhibit people from being free flowing.
- *Intentionally wild ideas*. Sometimes throwing out a few completely off the wall ideas will loosen up a group and encourage alternative viewpoints. Some leaders start with a silliness session to get the creativity juices flowing. It doesn't work for everyone.
- *Limit the time*. About 15 minutes at least, and 45 minutes at most.
- *Don't discuss the issue ahead of time*.

*Jobs of the group leader for Brainstorming:*
- Make sure all participants know and follow the ground rules.
- May use warm up techniques to get the group participating.
- May also need to define the problem and set the structure by which you'll proceed.
- Keep the discussion "on track".
- Record ideas in a way they can be viewed by the group (flip chart, etc.)
- If you paraphrase as you write the idea, confirm with the person that you've captured the essence of what they intended.
- Participate, if desired, but don't judge or edit the ideas.

*Potential problems or cautions with Brainstorming:*
- The group can inhibit the members. Skillful leadership or structure may be needed to insure everyone's participation toward the most effective list of alternatives.
- The members can inhibit the group. For example, an expert or a higher-level manager as a team member may discourage others from participating.
- Too much play or getting off track.
- Criticism or negative thinking, even subtle, can ruin the effectiveness of the process.
- Homogeneity of the group which all thinks alike or has worked together can inhibit creativity.
- Effective leadership and group facilitation is essential.
- Doesn't work well for decisions with high risk or uncertainty.

*Common Variations in Brainstorming:*
- *Structured Brainstorming* can combat problems such as one person dominating the discussion or others not contributing. Once the problem has been described, each person is asked to contribute

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one idea at a time in turn. If he or she doesn't have an idea, they pass. This continues until everyone has passed in the same round.

- *Nominal Group Technique* can be used to allow individual creativity to work before it becomes inhibited by the group. This process requires people to think silently, first, writing down their ideas. They then contribute to the list in round robin style. Each person can question the contribution to clarify what is meant, but should not challenge or analyze it. NGT also ends with a voting process which asks people to choose their favorite several (one to five) ideas, thereby giving the group a sense of popularity of the ideas, once they've been presented. This voting either narrows down the number of options to consider in the next decision making step, or actually begins the analysis. It can be used with traditional brainstorming, as well.

- *Gordon Technique* can be used when the problem might suggest "obvious" solutions to the participants, thereby inhibiting creativity. For example, if we have a problem that's always been dealt with in one way, it's natural to block out other ways of doing it. In this process, the group is called together to come up with ideas about a subject *known only to the leader*. The leader starts with a very broad and abstract definition of the problem, getting responses to that, then subsequently narrowing the statement through several stages, each time retaining previous suggestions which still apply to the narrower statement.

- *Brainwriting* is a variation where each person gets a sheet of paper and anonymously writes their ideas on the question. After a few minutes, each person passes their sheet on to the next person who elaborates and adds any more of their own ideas suggested by what they just received. The sheet then goes on to the next person until all people have contributed to each original list.

### What to do with the lists:

The purpose of Brainstorming is to create extensive lists, and because evaluation during the process is prohibited, the result is -- of course -- lots of ideas, many of which are likely to be impractical or impossible to use.

To make the lists usable, the ideas must be objectively evaluated. First, eliminate any truly unworkable ideas. CAUTION: The person making this decision will approach it with his or her biases. Be sure the idea is actually unworkable before it's eliminated. The remaining ideas should be grouped and similar ones combined. The grouping is so we can determine what information needs to be collected to evaluate them,  and where the same information can be used on more than one evaluation. Finally, a priority should be established as to which ones get evaluated first. The basis for the priority might be cost (which ones are cheapest), likelihood of success, ease of evaluation, or whatever makes sense to the decision makers.

### Group evaluation of the ideas:

Many of the ideas may be workable, and perhaps more than one will be used. If the analysis of which is best isn't too complicated, it may be practical to use the brainstorming group to narrow down the options or even choose which to use. A means of doing this (mentioned in the NGT paragraph above) is to take a vote.

Let's say that 45 ideas were generated by the brainstorming process. The leader could ask everyone to look over the list and choose the five they think will work best. After everyone's had a few minutes to do this, a vote is taken on each item with each person getting five votes. The result is a list of favorites, based on which ones got the most votes.

This process will only work when the group itself has adequate information to make the evaluation. It tends to be a popularity contest among the ideas, rather than a quantitative or objective evaluation. But, if any number of ideas will actually work to solve the problem, then the most popular one might be a reasonable choice.

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[2] Excerpt from: *Decision Making and Problem Solving in Management …* © 2000, Robert H. Vaughn