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REDUCING COMPLEXITY IN CONCEPTUAL THINKING USING CHALLENGE MAPPING

by
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Management of Innovation and New Technology
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Abstract

It is often difficult for groups of people to think together innovatively, especially in situations which are ill-defined and involve complex issues. A unique conceptual thinking method for reducing complexity and identifying strategic and tactical challenges (goals) and relating them to one another is introduced. The method, Challenge Mapping, can be deliberately applied to help individuals, groups and whole organizations think through, clarify and conceptualize complex, ambiguous, and strategic issues and increase understanding of fuzzy situations both from big picture and specific standpoints. Challenge Mapping is a special tool of the Simplex system of applied creativity which synergizes analytical and imaginative thinking through four stages, emphasizing problem generation and conceptualization prior to solution development and implementation. Such emphasis is not taught in formal education. On the contrary, most students leave school totally immersed in the *solutions* they have learned, then find that in every day work these solutions don't often match the ill-structured problems they encounter. The most important skill needed seems to be *finding* and *defining* the right problems to work on. Examples of real world applications of Challenge Mapping are shared.

Reducing Complexity in Conceptual Thinking Using Challenge Mapping

Why Problem Definition is So Important

Asked what he would do with only one hour to save the world, Albert Einstein said, "I would spend 55 minutes defining the problem and then five minutes solving it". He believed that the best problem solvers were those who could define problems in new ways. The same belief has been expressed by many famous problem solvers such as Polaroid inventor Edwin Land who said "If a problem can be defined, it can be solved" and the famous educational psychologist John Dewey who wrote "A problem well stated is half solved".

There are two very different kinds of problems and decisions people encounter in their work and personal lives. The first kind is of a more "programmed" nature. Solutions to this first kind are based on rigorous training on the job or in school, experience, analytical skills and knowledge of rules and procedures pre-designed to handle similar situations. The second kind are of a more "non-programmed" nature. Non-programmed problems usually have never been encountered before and have no pre-set rules and procedures to guide their handling. They are sometimes caused by changing circumstances. Such problems are typically less structured, unpredictable, and ambiguous as to "what is wanted". The main challenge is to discover and define "what is wanted" because nobody really knows. Often sensing, anticipating and defining the problem is more difficult than solving it. Non-programmed problems require additional skills such as problem and opportunity sensing, fact gathering, problem defining, creating and evaluating diverse options, and implementing new things that have never been tried before. They require the use of imagination, non-linear thinking and some risk-taking.

Skills in both of the above kinds of problems are vital for effective work performance and personal happiness. However, our traditional formal training and education addresses primarily the former, the more "programmed" kind of problems. We tend to learn formulas, problem "types", and rules and procedures. In a more stable world of the past, this was tolerable. However, it is no longer sufficient. In business – and in industry, government, and institutions – in the world outside of school, nobody defines your assignment. And you almost never get a grade. In fact, what is needed most is the ability to operate independently. That's another matter. The challenge becomes to somehow teach ourselves and others how to live with the anxiety of not knowing what we are "supposed" to do and how to begin to find out what to do by ourselves – when there are no assignments and no signposts and the territory is uncharted.

The main purpose of this paper is to share a learnable, deliberate process of conceptual thinking which is designed not so much for creating good answers and solutions but rather more for discovering good questions and challenges, working through an ill-structured situation, turning a sudden crisis into an opportunity, or scoping out a complex project. This process is called Challenge Mapping and employs the Basadur "Why - What's Stopping?" Analysis (Basadur, Ellspermann and Evans, 1994) to uncover specific challenges being faced then relate them to one another. This process increases understanding of the situation both from a big picture and a specific standpoint. By applying Challenge Mapping, an individual or group can think through, clarify and define a complex, ambiguous, or strategic issue in a much more efficient and less frustrating way to identify specific problems and challenges within a milieu of vague, global issues and convert philosophical motherhood statements into precisely targeted problem definitions.

For example, relatively vague statements such as "morale is bad here"; "communication is our biggest problem"; "we need more employee involvement"; "we are a customer focused organization"; and "innovation is our first priority" are transformed into more specific, simply worded challenges such as "how might we help our employees take pride in their every day work?"; "how might we increase the amount of face to face contact every employee experiences with employees from other departments?"; "how might we make it easier for every employee to create and implement improvements to our procedures, products and services?"; "how might we reward our employees for trying to increase customer satisfaction?"; and "how might we make sure we bring to market at least one successful new product each year?" The success of Challenge Mapping and Why - What's Stopping? depends on the skill of the participants in applying them. This skill includes being able to use simple and specific words in asking questions and providing answers. Challenge Mapping and Why – What's Stopping? are part of the Simplex system for applied creativity which is more fully described in Basadur (1995) and whose effectiveness has been scientifically evaluated (Basadur, Graen, and Green, 1982; Kabanoff and Rossiter, 1994).

Problem Definition from an Organizational Perspective

The word "problem" has been defined in many ways. One way is as a gap between the present and some desired state of affairs (Evans, 1991). However, the word "gap" can carry a positive, negative or unknown connotation, providing three different views. A positive gap exists when a fine opportunity is sensed for an innovative product or procedure which will move the state of affairs upward, higher than the present baseline even when the present baseline is satisfactory or the best seemingly possible. For example, Land (1972) attributed his Polaroid

camera invention to his ability to discover and define a problem where seemingly no problem existed. A negative gap exists when there has been a drop in performance below a baseline that needs to be corrected. An unknown gap exists when our base state of affairs has been or soon will be wiped out by environmental changes beyond our control.

Of these three connotations of 'problem', the tendency in organizations has been to consider mostly the second (negative). The Kepner and Tregoe (K-T) Method (1965) for problem defining explicitly recognizes the concept of a 'gap' as a *deviation* or drop from a formerly satisfactory level of performance. It provides a methodology for determining the root cause of this deviation and the person or persons associated with the root cause. One typical technique for determining root cause is to use a cause and effect diagram in which potential causes of a deviation are brainstormed within predetermined categories. Another approach is stairstepping which involves determining the cause of a situation and then the cause of the cause, and repeating until the lowest, most basic cause has been reached (Huge, 1990). Brightman (1988) extends these approaches by involving groups to explore different possible causes for a problem in a method called the Alternative Worldview Method. Brightman states that the method is successful "because it helps us do what we naturally do best – seek causes".

Each of the techniques described above are reasonable to try to use to define problems. However, Brightman, Elrod and Ramakrishma (1988) notes that few of these are actually used by managers. One of the reasons is that these tools do not always fit the problems faced by people in day-to-day work. Only a small proportion of the problems require finding the root cause to enable returning to a well defined baseline performance level. Furthermore, people sometimes waste time determining the root cause of a problem that is entirely the *wrong* problem to be considered. A classic example is the one involving "slow elevators", in which the more

accurate problem definition was not that the riders were waiting too long for the elevators, but that they *perceived* themselves as waiting too long (Hesse and Woolsey, 1980). Finding the root cause of slow elevators is a waste of time when the real objective is to find a way to help people enjoy their waiting time more. A larger proportion of everyday problems require setting higher goals above the baseline performance level or inventing new products with new base levels or, finding entirely new goals in new directions to take advantage of environmental change. These types are less structured and do not lend themselves to strictly sequential, logical reasoning from a predetermined base point.

A second reason for lack of use of these techniques is that there are human behavioral deficiencies that prevent people from following such systematic procedures even for problems that call for them. Managers' propensity to spend most of their time acting in haste to correct situations rather than taking the time to think them through is documented by Mintzberg (1973). The following section describes problem definition from a behavioral perspective taking into account these human deficiencies. These behavioral deficiencies can be perceptual, attitudinal or cognitive in nature.

Problem Definition from a Behavioral Perspective

Elbing (1978) identifies the following perceptual biases that interfere with problem analysis and that often cause managers and other organizational members to act hastily and to handle problems ineffectively. They tend to: evaluate before investigating, thus precluding inquiry and a fuller understanding of the situation; equate new and old experiences, searching for the familiar rather than the unique in a new problem; approach problems at fact\e value, rather than ask questions to unearth reasons underlying the problem's more obvious aspects; direct

decisions toward a single goal, not recognizing that most problems really involve multiple goals that need simultaneous handling; confuse symptoms and problems; overlook 'unsolvable' problems and concentrate instead on simpler concerns; and respond automatically or act before thinking (sometimes called the 'knee jerk' effect).

Basadur, (1994b) identifies the following attitudinal, behavioral, perceptual, and cognitive shortcomings. People wait for others to find problems for them to solve rather than take the initiative to seek them out. Important problems that cross organizational, functional and departmental lines are often avoided: "That's not our problem". People often make the premature assumption that "it can't be done". Too much knowledge of the particular field causes them to experience 'tunnel vision' and to lose childlike inquiry and challenging of custom. Unsubstantiated assumptions are accepted as facts. People are unwilling to take the time to discover the real facts, which might lead them to refreshing new ways to define the problem. They emphasize problem solutions rather than problem definitions, believing tat "I already know what the problem is". Failure to observe and consider trivia and to investigate the obvious prevents individuals from finding a balance between narrowing the problem too much (missing the 'big picture') and broadening the problem too much (not breaking it down into small enough subproblems). This shortcoming can be further fuelled by people's inability to sufficiently use imagination to connect seemingly unrelated matters.

Harnessing the Imagination

The methodology for problem formulation provided in this paper encourages the use of a systematic thinking process that overcomes such perceptual, behavioral, attitudinal and cognitive inadequacies. This process incorporates logic, sequencing and imagination. One of the keys to

imagination is often expressed as divergent thinking (Guilford, 1967). Another key is deferral of judgment. Divergent thinking is the nonevaluative generation of information from a given source with an emphasis on variety (Roe, 1976). The imagination is used to generate multiple alternatives while deferring judgment (i.e. evaluative thinking) until this generative thinking is completed. In the earlier elevator example, the imaginative problem definition statement "How might we make the people enjoy their waiting time more?" served as an alternative to "How might we make the elevators go faster?" A third key, convergent thinking, is important in choosing and focusing in on important and leverageable issues, facts and problem formulations. Basadur and Finkbeiner (1985) identify deferral of judgment, active divergence and active convergence as three separate behavioral skills required to harness the imagination in organizations.

Divergent thinking consists of two parts, deferral of judgment and active divergence. Deferral of judgment is the skill of separating divergent thinking from convergent thinking. By resisting the tendency to prematurely evaluate options, deferral of judgment sets the stage for active divergence. Active divergence is the skill of aggressively thinking of a wide range of options no matter how 'wacky'; appreciating new, different points of view and thoughts not only as possible endpoints but as building blocks to create more new thoughts; and believing that generating novel options is not a mysterious process confined to a few unusual, 'offbeat' people but a normal process that should involve everyone in the organization.

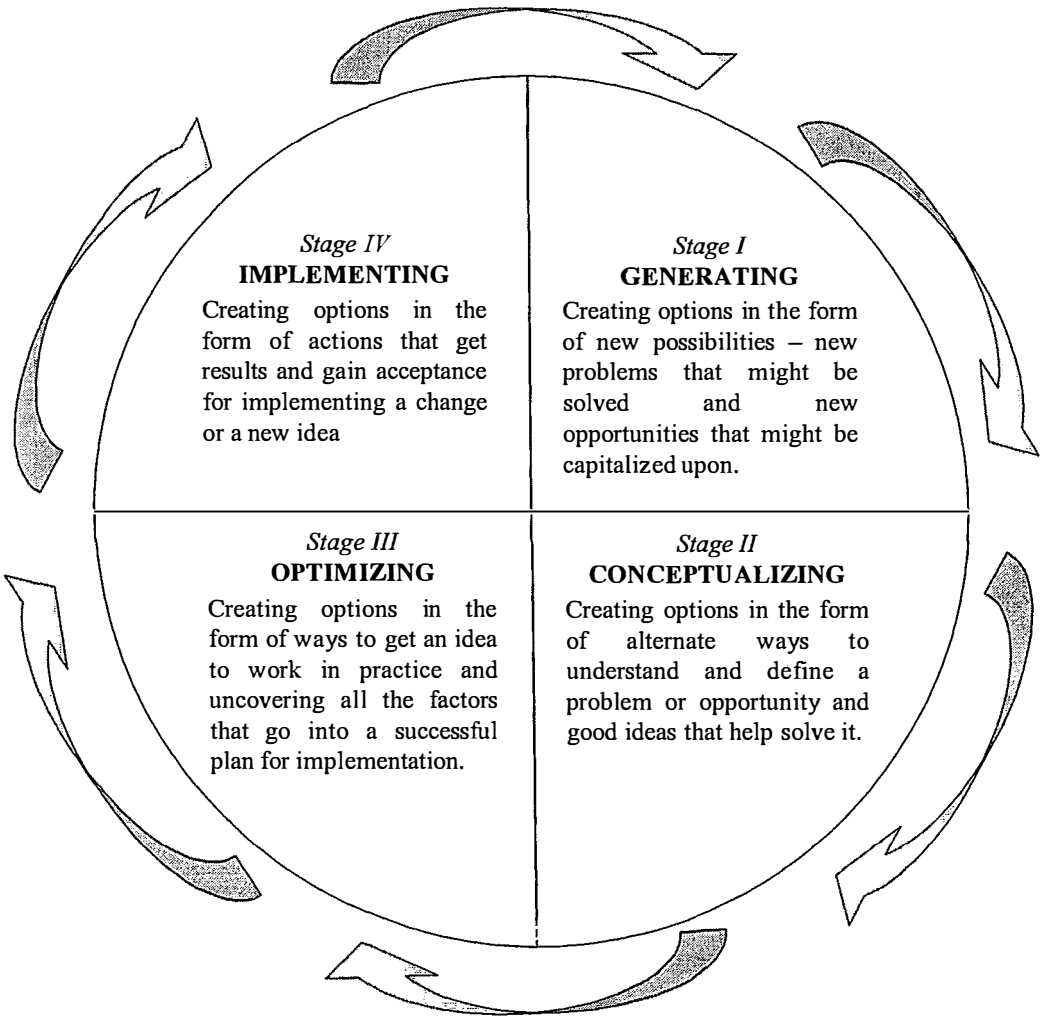
While deferral of judgment and active divergence are necessary, they are less than sufficient for harnessing the imagination. Active convergence is a skill that resists the tendency to loiter in divergent thinking. Active convergence decisively selects and acts upon good options and leads to the ultimate implementation of change.

The Process Approach to Creativity

Attempts to categorize the study of creativity (e.g. Murdock and Puccio, 1993) frequently emphasize the four "Ps": product, person, press (environment) and process. The focus on the fourth P is apparent in research that models creativity as a *process*. For example, Basadur (1979, 1982, 1992) portrayed individual, team and organizational creativity as a dynamic, circular four stage process (Figure 1) of continuously finding good problems, (generating), defining them (conceptualizing), solving them (optimizing), and putting good solutions into practice (implementing).

Figure 1

The Four Stages of the Simplex Innovative Thinking Process



Generating means continuously and deliberately discovering and surfacing new and useful problems to be solved. In organizations, this includes generating new products or services by anticipating new customer needs, by discovering ways to improve existing products, services, procedures and processes, or by identifying opportunities to improve the satisfaction and well-being of organizational members and pertinent groups outside the organization. Conceptualizing means keeping an open mind and defining such new problems and opportunities (regarding them as "fuzzy situations") accurately and creatively to clearly visualize the big picture and to identify more specific challenges and insights and relate them to one another. *Optimizing* means developing new, useful, imaginative solutions to these challenges. *Implementing* means successfully putting such new solutions into action. Each implemented solution leads to new, useful problems to be discovered -- hence the circular process. Research shows that effective organizations do what it takes to mainstream such a process (make it an everyday habit among its members) for continuous innovation and for intrinsic motivation (Basadur, 1992; 1993; 1997). Research also shows that skills in such a process can be deliberately developed (Basadur, 1979, 1994a). To make the process work, skills in sequential diverging and converging thinking are necessary within and between the stages. In practice, the process is represented as eight diverging-converging steps within the four stages as follows:

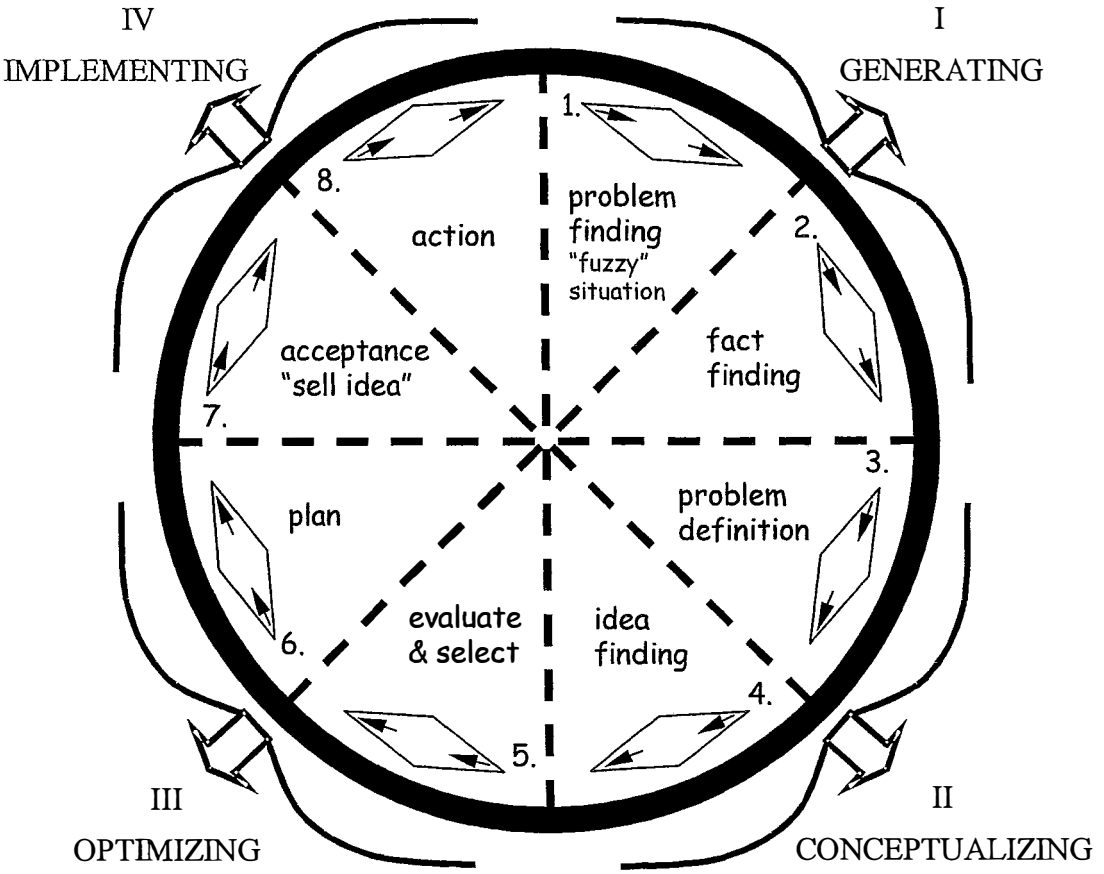
- Generating: problem finding and fact finding
- Conceptualizing: problem definition and idea finding
- Optimizing: idea evaluation and action planning
- Implementing: gaining acceptance and implementation

These eight steps make up the complete circular Simplex innovative thinking process shown in Figure 2.

Basadur, Graen and Green (1982) identified a two-step mini-process called *ideation-evaluation* in which diverging and converging thinking occur sequentially separated by deferral of judgment in each of the eight steps of the Simplex process, also shown in Figure 2.

Figure 2

How the Four Stages Correspond to the Eight Steps of the Simplex Process



Skills in Problem Formulation

This paper concerns itself with the thinking skills needed to work through only the first two stages, and primarily the problem definition step in Figure 2. Rather than try to find *answers*, the goal is to clearly isolate the right *questions*. These two stages constitute *problem formulation* rather than solution formulation.

For optimal results a process leader should be used to facilitate and synchronize a group in its flow of sequential diverging thinking and converging thinking (Basadur, 1995). The leader models these thinking skills (and the supporting attitudes and behaviors) and builds the group's own capability to use the process. Participants are encouraged to remain open to and seek out fresh points of view while diverging, and to apply objectivity and good judgment while converging. Tables 1, 2 and 3 list the attitudinal and behavioral skills required for good diverging and converging thinking and for the separation of the two in the problem formulation phase of the creative process.

There are three steps in this problem formulation phase. Once a problem, trend or opportunity has been sensed (Step 1), it is deliberately viewed as a "fuzzy situation", merely a starting point. Fact finding follows (Step 2). Participants are prompted to share perspectives and stretch their thinking to generate information and different perspectives about what they know or think they know, what they don't know but wish they knew, what they may be needlessly assuming, what would be different if the situation were resolved, and what they have already thought of or tried.

The participants then reach consensus on their most important ("key") facts (active convergence). These key facts are used in turn to divergently generate as many concrete, specific and optimistic challenges as possible, listed as questions beginning with the words, "How might we...". Participants defer judgment and avoid prematurely assuming that any specific challenge is the "correct" one. Each "How might we?" represents a unique challenge. By discussion and consensus, the group chooses a small number of challenge statements they consider as the more important ones. This completes the initial divergence-convergence portion of the problem definition step.

Table 1

Behavioral Skill in Deferral of Judgment in Problem Formulation

- Avoid making premature, negative judgments of fledgling thoughts (both when working alone and with others)
- Visibly value, appreciate, and welcome other points of view as opportunities to strengthen thinking, rather than as a threat to one's ego
- Patiently maintain an awareness that some facts are more difficult to perceive (more invisible) than others
- Question assumptions for validity and search out hidden, unconscious assumptions which may be unwarranted
- Tackle problems with an optimistic "can do" attitude rather than prematurely concluding that it "cannot be done" because "I can't see how"
- Tend not to jump prematurely to a conclusion as to what the "real problem is" in a situation
- Avoid attaching negative connotations to problems; such prejudgment may bias fact finding efforts
- Visibly stay open-minded to others' versions of the facts
- Often pause deliberately to try an unusual approach to define a problem instead of automatically relying on an old approach
- React positively to new radical thoughts as opportunities to build fresh new thinking

Table 2

Behavioral Skill in Active Divergence in Problem Formulation

- Search out many different facts and points of view before attempting to define a problem
- Define problems in multiple and novel ways to get a variety of insights
- Clarify problems by breaking them down into smaller, more specific subproblems and also by opening them up into broader, less limiting challenges
- Deliberately extend effort to create additional unusual, thought provoking potential ways of defining a problem
- Give credit for divergent thinking by others; praise others for alternative viewpoints and try to build upon and strengthen such alternatives to increase variety of choice
- Turn premature, negative evaluations of ideas into positive challenges to keep the creative process flowing; that is, change negative "We can't because..." thoughts into positive "How might we...?" thoughts
- Share information and ideas freely with other people and departments hoping to build understanding of problems
- Get teams to formulate problems in ways which transcend individual and departmental considerations.

Table 3

Behavioral Skill in Active Convergence in Problem Formulation

- Take the time to select, clarify and focus upon the most significant facts available prior to attempting to define a problem
- Recognize and accept the critical few best problem definition options in terms of "broadness" vs "narrowness" of focus and insight provided
- Open-mindedly develop and use multiple, unbiased criteria for selecting from among problem formulation options, rather than letting preconceptions or hidden motives sway decisions
- Take the risk of failing or being criticized for being different for selecting novel problem definitions
- Be willing to accept and participate in consensus decisions about problem formulation and move on decisively in the problem solving process
- Do not wait for the "perfect" option to emerge; instead take reasonable risks to finish the problem formulation stage

The Why - What's Stopping? Analysis and Challenge Mapping

Next, a secondary divergence-convergence in problem definition is performed employing the "Why - What's Stopping? Analysis". Using the selected challenges as a starting point, the group creates a Challenge Map, with broader challenges placed higher and more specific challenges placed lower. When moving down the map from the top, the questions "What's stopping us?" and "What else is stopping us?" are used to elicit specific impediments and create narrower challenges. Conversely, when moving up the map, the questions "Why?" and "Why else?" are asked to identify potential benefits and create broader challenges. Judgment and analysis are deferred while the map is being built, permitting new and sometimes hidden or

unexpected challenges to be discovered in both directions. The simple four-step questioning process in Table 4 is used to create and place each new challenge and an example follows.

Table 4

The Simplex® "Why – What's Stopping?" Creative Analysis™

Step 1.	Ask the complete question: "Why...?" or "What's Stopping...?" of the selected challenge. (Also, ask "Why else...?" and "What else is stopping...?").
Step 2.	Answer in a complete simple sentence.
Step 3.	Transform the answer into a new challenge.
Step 4.	Place the new challenge on the map and validate its broader/narrower relationship to the challenge in Step 1.

A Manufacturing Example

In a situation where a manufacturing department was faced with numerable product defects here is how the method was applied.

(1) Ask "Why" of What's Stopping us... from the starting point problem definition. For example, if the original challenge is "How might we decrease the number of defects in Product X?", the "why" question then becomes "Why would we want to decrease the number of defects in Product X?" The "What's stopping" question becomes "What is stopping us from decreasing the number of defects in Product X?"

(2) Answer the question in a complete sentence. The answer to the "why" question might be that "We have too many returns of Product X from our customers." An answer to the

"what's stopping" question might be "We reward employees only for high quantity of output, not high quality." Optional answers are produced in one of two ways, either by simple extended effort or by deliberate use of the word "else" as in "Why else would we want to decrease the number of defects in Product X?" and "What else is stopping us from reducing the number of defects in Product X?"

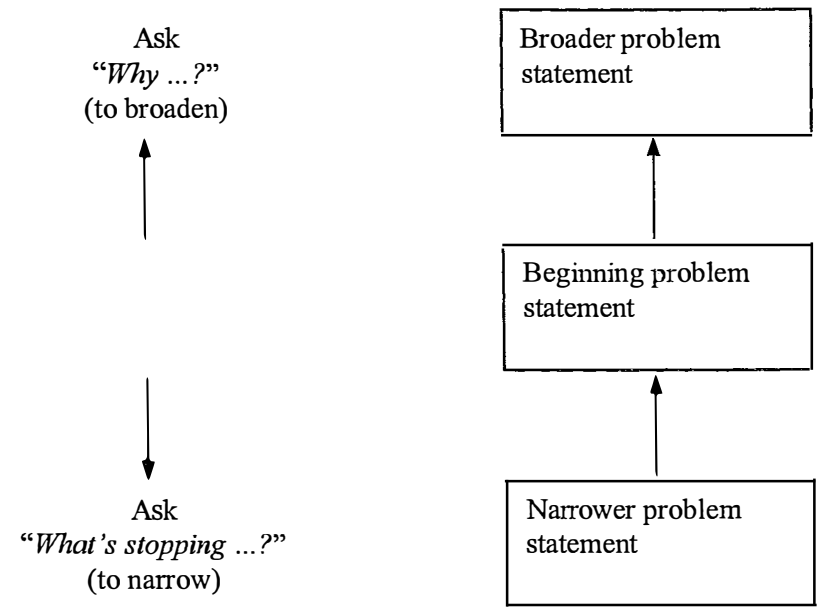
(3) The answer to the question is then transformed imaginatively into another problem formulation. For example, the answer to the "why" question above might become transformed into "How might we reduce the number of Product X returns from customers?" or "How might we make our customers more satisfied with the Product X they are receiving?" The answer to the "what's stopping" question might become transformed into "How might we get our employees excited about improving the quality of Product X?" or "How might we reward our employees for reducing the number of defects in Product X?" or "How might we get our employees to give high attention to both quantity and quality when making Product X?"

(4) Each new challenge is placed according to the question it answers. Figure 3 shows the theoretical placement of the problem statements. The placement can be checked by reversing the question to the newly formulated challenge. For instance, in the example above, the answer to "What is stopping us from decreasing the number of defects in Product X?" is that "We reward employees only for high quantity of output, not high quality" resulting in a new problem statement of "How might we reward our employees for reducing the number of defects in Product X?" To check if this problem statement

meets the "why-what's stopping" logic, we can reverse it by asking, "Why would we want to reward our employees for reducing the number of defects in Product X?" If one answer is "We want to decrease the number of defects in Product X" we can see that we can easily transform this fact into the original problem statement "How might we decrease the number of defects in Product X?"

Figure 3

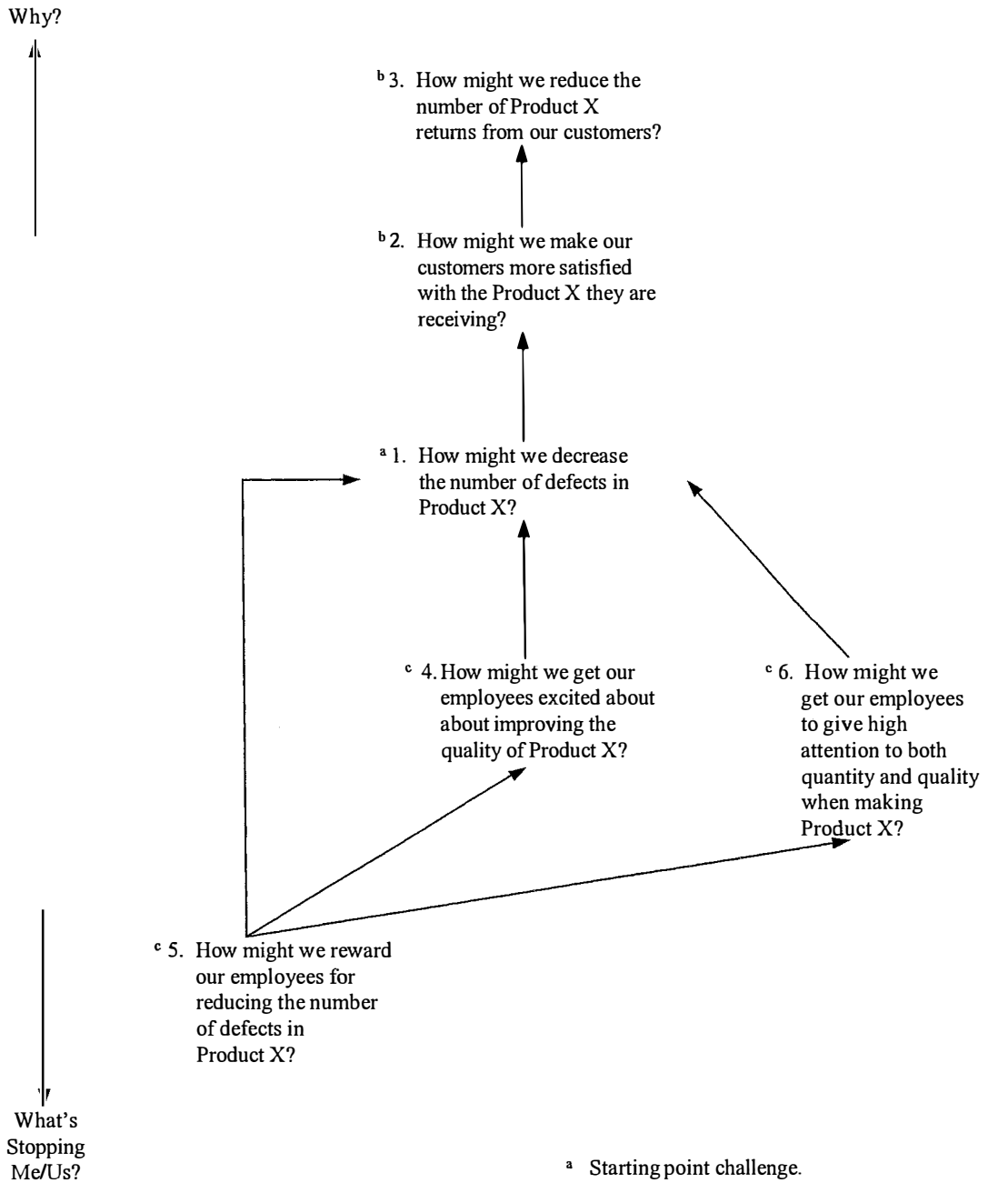
Placing of Problem Statements



Once the new statement is checked via the reversal question, an arrow is drawn from the lower challenge to the higher challenge. Optional problem definitions are placed side-by-side and checked in the same way with arrows always connecting the lower challenge, a subproblem, to the higher challenge, a broader problem. Figure 4 shows a step-by-step visual example.

Figure 4

Visual Example of How the Three-Step Thinking Process Works



[a] Starting point challenge.
[b] Optional challenges created by asking "why?" of starting point challenge.
[c] Optional challenges created by asking "what's stopping us?" of starting point challenge.

If the new problem statement does not "fit" when the reversal question is asked, it is recommended that the card be placed to the side temporarily and go back to step 1 in the 4-step process. It is likely that the fact or problem formulation was not well-stated as discussed in the next section or that the answer provided to the why or what's stopping? question was "off target" (did not answer the question actually asked, but in fact, answered a different, unasked question).

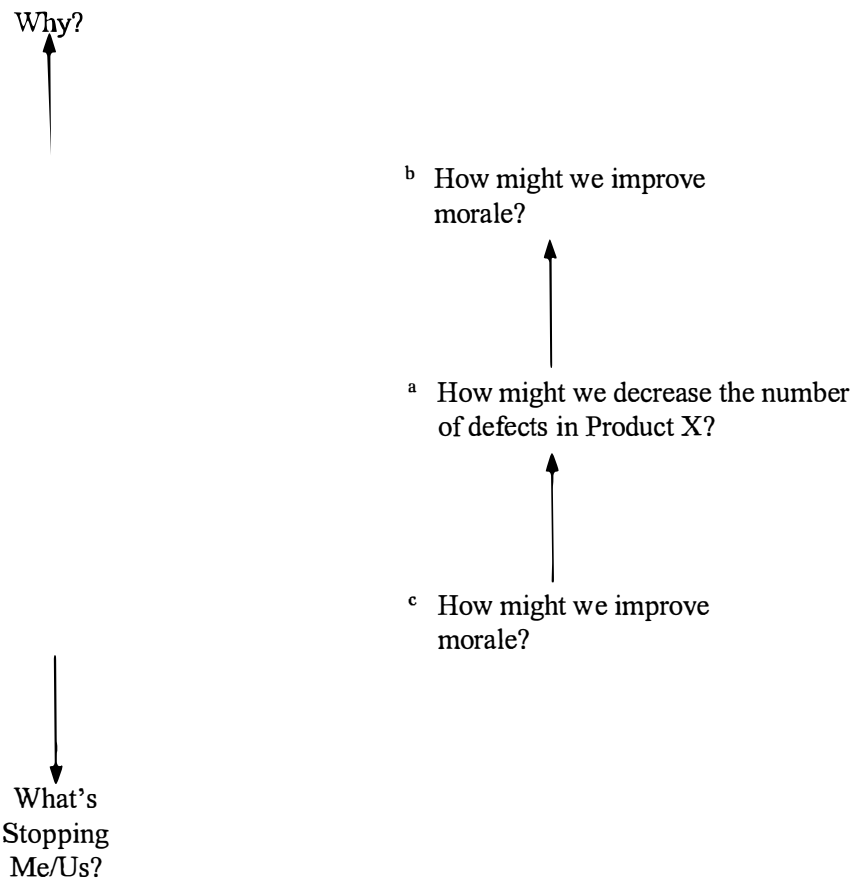
Avoiding Vagueness

It is vital to provide answers to the 'why' and 'what's stopping' questions which are simple, clear and specific. Suppose the original starting point challenge was "How might we decrease the number of defects in Product X?" (as in Figure 4) and the question "why else (would we want to reduce the number of Product X defects)?" were asked. If one knew another accurate answer to be "our employees feel badly about so many rejects being made" but one chose to answer more vaguely instead that "morale is low", this could result in the new challenge "How might we improve morale?" being placed *above* the original challenge. Now suppose the question "what else is stopping us?" were offered to the same original challenge. If one knew another accurate answer to be "people are not paying much attention to quality" but chose instead to answer more vaguely, "morale is low", this would result in the new challenge "How might we improve morale?" *below* the original challenge. Then the same challenge would appear both above and below the original as shown in Figure 5. Such circularity violates the rule that 'why?' broadens the problem and 'what's stopping?' narrows it.

If the more specific, clear and simple answer had been provided instead, the three challenges could be ordered hierarchically without ambiguity as shown in Figure 4.

Figure 5

What Happens When Answers to Why? and What's Stopping? are Stated Too Vaguely



[a] Starting point challenge.
[b] Optional challenge created by asking "why?" of the starting point challenge but answering vaguely ('morale is low').
[c] Optional challenge created by asking "what's stopping us?" of the starting point challenge but answering vaguely ('morale is low').

A Product Development Example

A research team at Procter and Gamble was given the directive to develop a bath soap which could compete in a superior way against the newly launched competitor product 'Irish Spring'. The team had prematurely defined the problem in the following way: 'How might we produce a better green striped bar of soap?' After several months of solution generation they were unable to design a green striped bar of soap which tested superior to Irish Spring. They had rushed into solving a poorly defined problem. By asking some good fact finding questions, creating a divergent list of "How might we" challenge statements and deliberately applying the "Why-What's stopping" analysis, a new, broader and more creative problem definition was developed. This powerful statement of the problem was "How might we produce a more refreshing bar?" One team member immediately pictured freshness in the form of fluffy clouds in a blue sky while another member said freshness made him think of the sea coast. In a very short time frame a new and very successful product was conceived: Coast bath soap. The key to the team's success was a less restrictive, broader problem definition. The "pie" was made bigger: better green stripes was only one way of achieving better refreshment. The refreshment pie was bigger than the green-striped pie.

An Interfunctional Team Example

Another example of broadening the problem, increasing the pie and increasing the amount of total satisfaction available is a Frito-Lay packaging dilemma. An interfunctional team had been formed to reduce costs and was bogged down solving the challenge "How might we reduce packaging department costs?" The team's manufacturing members had identified a new packaging system which saved enormous amounts of time and money. The individual bags of potato chips were being packaged standing upright in larger boxes for delivery to customers.

The new idea involved laying the bags on their sides in the boxes. The sales department team members were not at all satisfied with this solution because on delivery, customers open each box and count the bags before signing the receiving documents. Thus the new idea would result in extra time and frustration for the customer and slow down the salesperson who would make fewer sales calls per day. Obviously, an important challenge for sales was "How might we continue to make our required quota of sales calls per day?" By working together with the attitude of achieving full satisfaction for both sides, and by following the discipline of the Simplex creative process, a new problem definition was identified. "How might we lay the bags flat yet still allow the customer to quickly know how many bags are inside the box?" Several solutions immediately became evident, including providing each customer with a weigh scale so that opening the box and counting was unnecessary. Rather than argue and disagree over solutions which appear to conflict because they address two different challenges, the creative process resulted in a new expanded challenge that encompassed both original challenges. In the union-management bargaining context this would be an example of making the pie bigger, where many more and more creative solutions could be generated to the expanded problem definition. Some of these solutions would be capable of providing complete satisfaction to both parties.

Completing the Challenge Map

The "Challenge Mapping" and "Why - What's Stopping? Analysis" thinking techniques are integral to the Simplex system of applied creativity. Challenges are always stated in "How might...?" format. The questions "Why?" and "Why else?" and "What?" and "What else is stopping?" are asked of a selected challenge to begin and then repeated with the new challenges resulting. During the group's extensive Why - What's Stopping? Analysis, some of the "How

might we?" challenges from the initial divergence-convergence portion of the problem definition step find their way back onto the map, and many new ones are created to fill in crucial links.

The group then selects the challenges that are believed especially critical and merit either further fact finding and more detailed exploration or solutions and action plans. If further fact finding and exploration is decided, for each of the selected challenges the major impediments preventing its solution are identified by asking the questions repeatedly: "What's stopping us?" and "What else is stopping us?". This results in additional challenges to add to the challenge map. The top challenges are then selected from the final map.

The Extent of the Challenge Map

The extent of a Challenge Map is limited by two considerations: "Happiness and Bliss" and "Do it". "Happiness and Bliss" is the theoretically broadest challenge. In a business this might equate to "How might we increase the long term profitability and viability of our Company?" "Do it" occurs when, by asking "what's stopping" takes us so low on the hierarchy that the problem statement is so well defined it is itself a solution which can be easily executed, thus "do it". For example, "How might we telephone our customer and invite him/her to lunch?"

It is not necessary to reach these limits on maps developed. The intent of the map is to develop a better problem formulation, that is, understand how different problems and sub-problems relate to one another and to help the stakeholder(s) choose the best problem definition or angle on the problem. The following heuristic is recommended in the development of the map:

(1) Ask "why" and "why else" of the original problem statement until all slightly broader problem statements are uncovered. This will usually result in 2-5 broader problem statements.

(2) Ask "what's stopping" and "what else is stopping" of the original problem statement until all sub-problems are uncovered. This will usually result in 1-10 sub-problems.

(3) Review the map for challenges the stakeholder(s) wish to explore further either to break sub-problems down even further or to explore broader "purposes". Do not forget to check for "what else is stopping..." or "why else...".

(4) Have stakeholder(s) review the map for "points of maximum leverage", i.e., the problem statement(s) they believe best define their problem. If this convergence cannot be achieved, return to step 3 to explore the map further on those challenges the stakeholder(s) believes have most merit.

A Strategic Planning Example

Here's how a strategic plan was developed by a division of a major oil company. A team of managers met for a day and were given some training in the Simplex creative problem solving process, particularly fact finding and problem defining, including the "why - what's stopping" analysis. After doing some fact finding together, the members were urged to put aside preconceived notions about what was meant by words like mission, goals or objectives. Then they were asked to put aside their judgment and free-wheel in order to generate as many challenges as they could that might be important for the company to resolve. From a lengthy list, they identified a small number that they agreed were the most critical challenges.

A facilitator wrote these challenges on index cards and stuck them on a large white sheet of paper on the wall. The team could then move challenges from one place to another and re-word a challenge or even discard one challenge and make another. The team members clustered in a semi-circle facing the sheet in order to involve everyone as fully as possible in this mapping process. The team placed these most critical challenges in a hierarchical map using the "why - what's stopping" process (Figure 6). Then the members began to identify additional challenges by asking why various critical challenges should be resolved (what would be the intent or

benefit?) and what was stopping them from resolving various critical challenges. Each answer became a new challenge; all the challenges were stated in "How might we?" form and placed either above or below the previous challenge in the map. Beside these new challenges or beside the original challenges, the team placed yet further challenges that it identified by asking "why else?" and "what else is stopping us?" of any challenge.

As this process continued, the team found that the challenges began to fall naturally into five separate levels in the hierarchy. The facilitator asked the team to label each level in their own terms, such as "mission", "vision", "strategy", "goal", etc. The group decided to label the top challenge in the map as their vision. The next four levels were labeled mission, objectives, strategies and programs. The group agreed that the word "programs" incorporated processes, projects, products, tactics and actions. This approach meant the group didn't have to bother arguing over definitions for these terms. The members assigned "definitions" that made sense to them, and were able to focus on what critical challenges the company had to meet.

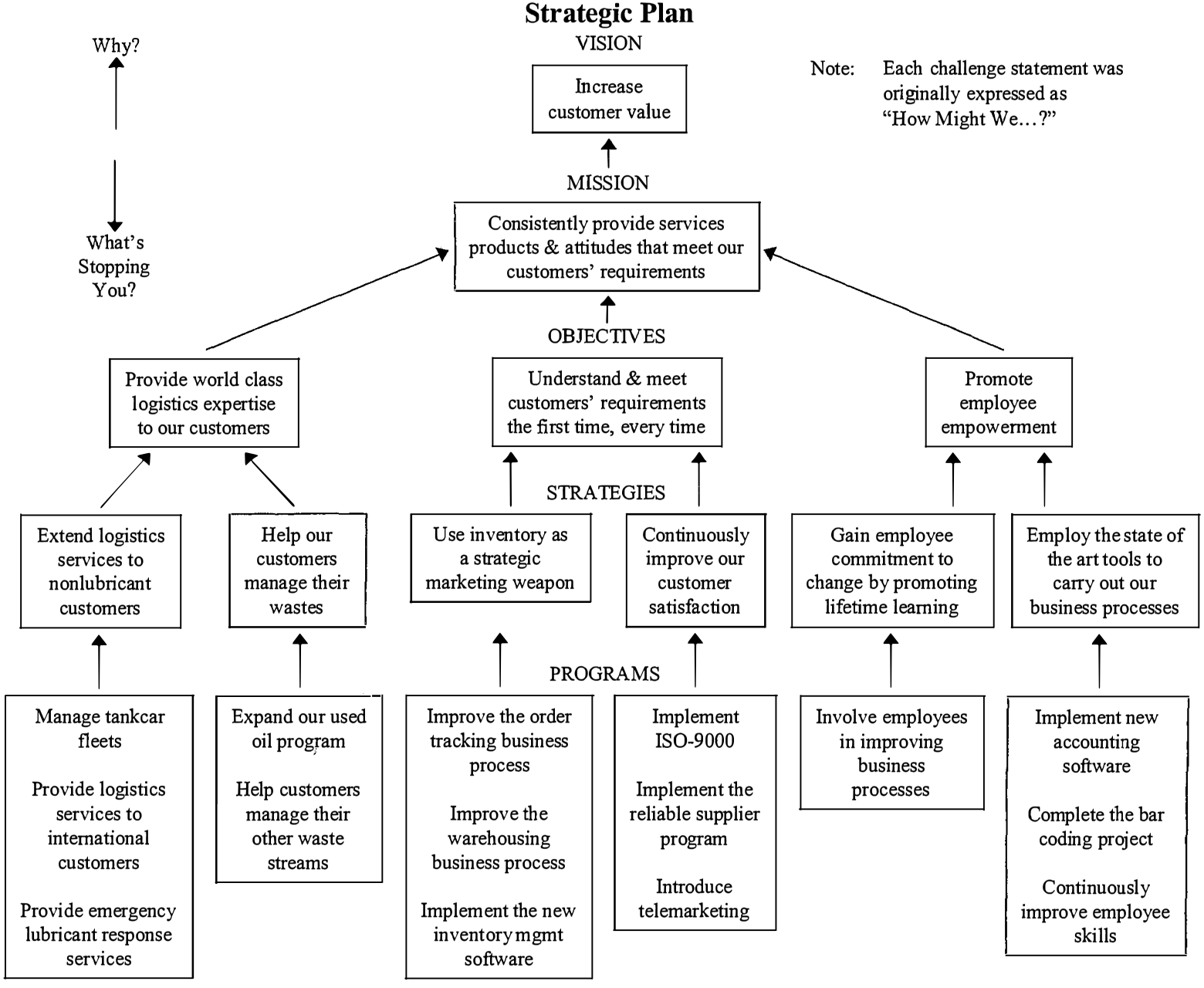
More important, the action-oriented tactical programs at the bottom of the hierarchy were now clearly linked to the more broad, strategically oriented challenges at the top – something that many organizations find difficult to do. In the latter organizations, the top and bottom levels are often divorced: people at the top set out the important goals and objectives, but people at lower levels take actions that might not even lead to those goals and objectives.

Building Ownership, Understanding and Empowerment

If groups of employees at all the company's levels undertake similar exercises – creating their own strategic maps and plugging them into the "corporate map" – then they acquire more ownership for their tasks. They better understand how what they do helps the company meet its

Figure 6

Example of a Division's Strategic Plan as a Challenge Map



overall strategic objectives. They can then make much more accurate or useful decisions about which of their own challenges to tackle, and can even create better challenges to address. This strategic mapping process also becomes an excellent tool for empowering people. Instead of simply being given standard solutions to implement without knowing why, employees now have to discover for themselves their own critical challenges and tailor their own innovative solutions to meet them.

This mapping process allows a company to compress a huge amount of knowledge into one page as in Figure 6. Each department can distribute to its employees a single-page copy of the "corporate" map integrated with its own departmental map. This document then is easily reviewed and updated. Individuals can set goals for themselves – create their own maps – that are aligned with department goals and guides their daily activities accordingly. As an even more powerful alternative, any employee from the president down can display on his or her computer terminal the company's current strategic map and a particular department's map to see the most important challenges and how they link together, and easily revise maps.

In a chaotic climate of constant change, challenge mapping not only permits the involvement of all employees in innovative and strategic thinking that is "on the money", it is also a powerful method to involve customers as partners and to align innovation efforts with customers' key challenges. Similarly, it is a hands-on method of connecting and aligning upper management visions and goals with ground floor operations in a way that everyone can understand, contribute to, and become excited about.

Another Example: Sorting Out Management of Technology Issues

The upper levels of a Challenge Map represent the more strategic challenges (the main goals). A group of senior managers wrestling with difficulties in the management of technology

(MOT) created the Challenge Map in Figure 7 (Basadur, Potworowski, Pollice and Fedorowicz, 2001). The ultimate strategic challenges identified concerned gaining market advantage over competition by lowering costs and introducing better product features faster (challenges # 1, 2, 3, 4, 5, and 6). The four most important tactical challenges identified are shown in Table 5 and are highlighted in the dashed ovals on the Challenge Map as #'s 30, 33, 35, and 36.

The next highest levels of the Challenge Map represent somewhat more operational challenges that support the ultimate aims. The managers identified the following five challenges right beneath the top ones: selecting the right technology from options (#7); getting people to put new technology into use more quickly (#9); promoting cross-fertilization of new technology from one part of the company to another (#10); moving ideas faster from R&D to the customer and vice versa (#11); and minimizing product introduction intervals (#15). Of these, promoting better cross-fertilization from one part of the company to another was selected as the most critical (#10).

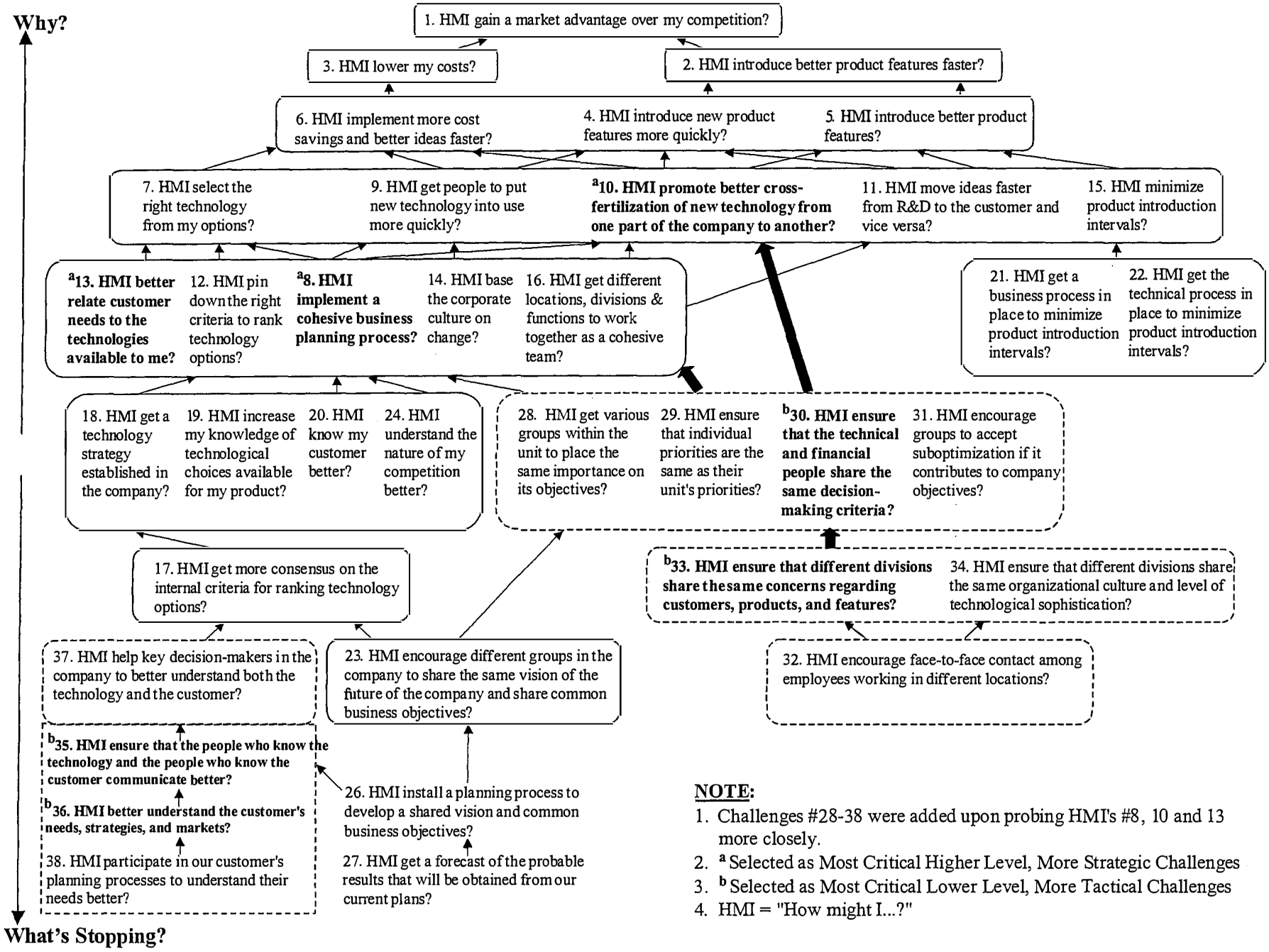
Seven challenges at the next level down were identified as how to: better relate customer needs to technologies available (#13); pin down the right criteria to rank technology options (#12); implement a cohesive business planning process (#8); base the corporate culture on change (#14); get different locations, divisions and functions to work together as a cohesive team (#16); get a business process in place to minimize product introduction intervals (#21); get a technical process in place to minimize product introduction intervals (#22). Of these, #13, how to better relate customer needs to technologies available, and #8, how to implement a cohesive business planning process, were selected as the most critical.

The middle and lower parts of the Challenge Map include more tactical challenges which support the challenges in the upper parts. The challenges near the middle of the Challenge Map were how to: get a technology strategy established in the company (#18); increase one's

knowledge of technological choices available for products (#19); know one's customers' needs better (#20); get various groups within the same unit to place the same importance on its objectives (#28); ensure that individuals' priorities are the same as their unit's priorities (#29); ensure that the technical and financial people share the same decision making criteria (#30); and encourage groups to accept sub-optimization if it contributes to company objectives (#31). Challenges just below these included how to get more consensus on the internal criteria for ranking technology options (#17); how to ensure that different divisions share the same concerns regarding customers, products and features (#33); and how to ensure that different divisions share the same organizational culture and level of technical sophistication (#34). Of all of these middle level challenges, the two most critical selected were: how to ensure that the technical and financial people share the same decision making criteria (#30), and how to ensure that different divisions share the same concerns regarding customers, products and features (#33).

The lowest levels on the Challenge Map contain the most tactical challenges that support all of the higher level challenges. The two selected as most critical were: how to ensure that the people who know the technology and the people who know the customers communicate better (#35), and how to understand better the customers' needs and markets (#36). Six additional tactical challenges identified were how to: help key decision makers in the company to better understand both the technology and the customer (#37); participate in customers' planning processes to understand their needs better (#38); encourage different groups in the company to share the same vision of the future of the company and share common business objectives (#23); install a planning process to develop a shared vision and common business objectives (#26); get a forecast of the probable results that will be obtained from current plans (#27); and, encourage face to face contact among employees working in different locations (#32).

Figure 7
The Challenge Map



NOTE:

1. Challenges #28-38 were added upon probing HMI's #8, 10 and 13 more closely.
2. [a] Selected as Most Critical Higher Level, More Strategic Challenges
3. [b] Selected as Most Critical Lower Level, More Tactical Challenges
4. HMI = "How might I...?"

Table 5

The Four Most Important Additional Challenges
Derived by Probing the Three Most Critical Challenges

How might we...

30. ... ensure that the technical and financial people share the same decision-making criteria?

33. ... ensure that different divisions share the same concerns regarding customers, products, and features?

35. ... ensure that the people who know the technology and the people who know the customer communicate better?

36. ... better understand the customer's needs, strategies, and markets?

Summary and Discussion

Challenge Mapping is a powerful tool for reducing complexity and identifying clearly defined problems for solving across a wide range of applications. Just as the diverse group of senior managers (above) was able to agree on the critical challenges about MOT among them, so too can any diverse group within a company, or even between a company and its suppliers or customers working as a team. Challenge Mapping is also an excellent tool for empowering people. When groups of employees create their own strategic challenge maps and plug them into the corporate challenge map, they acquire more ownership for their goals and tasks, better understand how their activities help the company meet its strategic objectives, and make more accurate or useful decisions about which challenges to tackle. In addition, this mapping process allows an organization to compress a huge amount of knowledge onto one page that can easily be copied, viewed, reviewed and updated.

The construction of the challenge map is a combined creative and analytical exercise. Divergent thinking is required to generate both the multiple 'why else' and 'what else is topping' problem statements. In addition, divergent thinking is required to transform the answers into meaningful new challenges. Analytically, the methodology requires a disciplined approach using 'why' to broaden and 'what's stopping' to narrow so that problem statements 'fit' into a logical hierarchy.

The process of mapping often leads the stakeholder(s) to an 'aha' experience. If, for instance, the stakeholder originally defined as a symptom as the problem, upon asking 'what's stopping?' the 'real problem' will emerge. In addition, some stakeholders narrow the problem too much in the beginning (they cannot see the forest for the trees), so that by broadening the problem, they gain a perspective and a better, more leveragable problem definition. Or, the stakeholder's try to 'eat the elephant' instead of breaking the problem down into 'bite size chunks'.

Problem definition is particularly difficult on ill-structured problems. Stakeholders do not know when they initially try to define the problem whether they have a 'good' problem statement or not. The 'why-what's stopping' analysis *does not* choose the correct problem statement for the stakeholder(s). It does create a meaningful visual representation of the problem so that the stakeholder(s) can consider how to strategically approach the ill-structured 'mess'. The stakeholders must then consider which problem definition(s) they believe will best lead to an improvement of the 'mess'.

Implications and Future Research

There are many implications suggested for this analysis. It is currently being utilized in industry as a strategic planning tool to link strategic goals with operational objectives where the stakeholders ask "what's stopping us from attaining (goal)?" In production facilities, this tool assists direct employees and technicians in understanding how their tasks and projects 'fit' into the bigger picture in their company. In research and development, it helps identify the correct objectives to be pursued to create a new product. By asking 'why?', the real intent of a new product initiative is often revealed, opening up room for novel solutions. Importantly, this tool also assists multifunctional teams in understanding the complete 'mess', not just their portion and helps these teams choose more leveragable problem definitions to solve.

A significant implication is that the challenge map, once constructed, can become an ongoing tool in addressing and solving large problems. Some organizations post the 'why-what's stopping' analysis on a conference room wall with checks by the subproblems solved and names/dates by other subproblems which others are in the midst of solving.

The person who first asks the right question or restates the problem in an exciting, insightful way is invaluable. Even more valuable are Process Leaders who can facilitate others to do so. Skilled problem definers use key facts to create many different challenges. They can break large problems into smaller components, and see the bigger picture into which smaller components fit. And by deferring convergence, they can continue to reformulate the problem to develop a clearly superior "angle", which then stimulates creative solution generation.

Research (Basadur and Gelade, 2001) shows that the majority of people in organizations favor the implementation and optimization stages of applied creativity over the conceptualization and generation stages. Perhaps the most important line of future research to pursue is how to

increase understanding of the importance and willingness to develop appreciation of and skills in conceptualization and generation in organizations. At a minimum, ways to develop a greater awareness of the conceptualization and generation stages as complementary partners to implementation and optimization need to be developed. Finally, finding ways to introduce complexity reducing creative thinking tools such as the why-what's stopping? Analysis and Challenge Mapping into school, college and university curricula is likely the most important challenge ahead – to give young people concrete tools to handle the increasing complexity of the world into which they are being immersed.

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