

MANAGEMENT OF INNOVATION AND NEW TECHNOLOGY RESEARCH CENTRE

SIMPLIFYING ORGANIZATION-WIDE CREATIVITY-A NEW MENTAL MODEL

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> WORKING PAPER NO. 107 November 2002



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Simplifying Organization-Wide Creativity – A New Mental Model

by

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November 2002

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Abstract

Competitive advantage no longer depends on access to labor, capital, processes or technology. The real competitive edge comes from the organization's people, smart people who know, who can learn, who can think, and make new things happen. Putting knowledge to work innovatively from top management down and organization-wide at every level for tangible business results is the key.

This paper presents a new theory of organizational creativity which integrates elements from previous models of cognition, knowledge, intelligence and learning and a psychological instrument, the Creative Problem Solving Profile (CPSP) Inventory.

We suggest that innovative thinking in organizations involves two distinct cognitive processes. The first, <u>Apprehension</u>, concerns the acquisition of understanding or knowledge. The second, <u>Utilization</u>, concerns the application of understanding or knowledge. Two different modes of Apprehension and two different modes of Utilization give rise to four cognitive functions which together delimit the conceptual space of creative thinking and comprise a dynamic four stage process of organizational creativity. An individual's blend of relative preferences for these four stages defines his/her unique process style and is measured by the CPSP.

The authors' real world experience how top corporations involve employees at all levels in putting their knowledge to work by doing innovative thinking that is "on the money" is shared.

Simplifying Organization-Wide Creativity – A New Mental Model

Introduction

No matter where you look around the world today, organizations face a common challenge: the need to improve their performance in order to capitalize on rapid change. In North America, crash restructuring and downsizing have become a way of life as organizations struggle to regain market share from global companies producing higher-quality products. Companies try overnight to become more quality-conscious and customer service-oriented. In Eastern Europe, managers and employees struggle to establish new behaviors and procedures that will allow their companies to compete in the free market. Third World countries hungry for economic development look for growth markets around the world. In Japan, organizations that once had a clear target –to match and surpass North American quality and customer service—now lack a blueprint for further progress.

A Simple Blueprint

Organizational research suggests that an effective organization is one that displays three specific characteristics: efficiency, adaptability and flexibility (Mott, 1972). Efficiency allows an organization to implement and follow routines. Every organization, large or small, continually turns out specific goods or services. The effective organization follows a well-structured, stable routine for delivering its "product" in high quantities and high quality and at low cost. In yesterday's relatively stable world, organizations might have been able to concentrate on efficiency alone. If we still bought buggy whips, the organization's sole concern would be simply to produce lots of high-quality, low-cost buggy whips. But in a changing world, efficiency alone is not enough.

In a way, adaptability is the other side of the coin. While efficiency implies mastering the routine, adaptability means mastering the process of changing the routine. Adaptability is a proactive process: it allows the organization to deliberately and continually change its routines to improve quality, raise quantities and reduce costs. Adaptable people and organizations anticipate problems and opportunities, and develop timely solutions and new routines, such as higher-quality buggy whips or, say, automobile self-starters. Adaptability is disruptive. It requires looking outside the organization for new technologies, ideas and methods that may improve or completely change its routine. Adaptable organizations are willing to accept new solutions quickly. The most effective organizations are both efficient and highly adaptable.

While adaptability is a continual, proactive process of looking for ways to change, flexibility is more short-term and reactive. Flexibility allows the organization to react quickly to unexpected forces or disruptions without getting mired in organizational bureaucracy. It allows the efficient organization to stay on its feet to deal with the disruptions while maintaining its routines. It also helps convert sudden crises into golden opportunities.

Creating Competitive Advantage: Beyond Efficiency

Competitive advantage no longer depends on superior access to labor, capital, process or technology. These things are still needed, but *everyone* has them. And so, the real competitive edge comes from the organization's *people*, smart people who *know*, who can *learn*, who can *think*, and who can pass on learnings to others. They go beyond efficiency to adaptability and flexibility every day. For the first time in history organizations are beginning to discuss the importance of managing knowledge and learning, and use terms such as "knowledge workers" and "intellectual capital". Major worldwide consulting companies are offering sophisticated

systems for "knowledge development" and "knowledge management", and have established internal positions such as "Chief Knowledge Officer" (CKO).

Knowledge Development and Management appears to be defined largely as Knowledge *Sharing* – developing systems to spread knowledge so everyone has access to it. This suggests a change from the old "command and control" method of managing that many companies still employ (i.e., pass on information only on a "need to know basis", "play your cards close to your vest", and "tell them what to do").

While the concept of moving from the "command and control" minimal sharing approach to widespread sharing of knowledge is a positive move, this is still not sufficient. Organizations must go beyond merely learning and sharing knowledge organization-wide. This is only one of two important dimensions for long term growth and prosperity. A second dimension – that of *using* that knowledge innovatively organization-wide must be mastered. When both dimensions are mastered we have a "Thinking Organization". Only in this way can senior management tap into a massive organizational resource, that is by learning how to leverage the innovative thinking skills of every individual, regardless of their level, to create the sustainable competitive advantage that every corporation and organization is striving for.

Beyond Learning and Knowledge Sharing - A New Mental Model

Thinking organizations do more than acquire and spread knowledge; they *utilize* knowledge creatively to provide a continuous competitive edge and continuously improve customer satisfaction. In a thinking organization, its not just having knowledge shared; it is also knowing how to use it. For example, a major North American Airline recently ran into a situation where all of its employees had all the knowledge they needed but no one seemed to

know how to use it when a snow storm paralyzed their home base airport on a Friday night. All but ten of the airline's two hundred scheduled flights were ultimately cancelled as the weekend dragged on.

The snow had been expected all week, arrived on schedule, and continued through Monday. Almost 20,000 increasingly angry customers spent a frustrating weekend in a survival mode: waiting to get more information; trying to find alternative flights; deciding whether to switch to renting a car or taking the train; and wondering if they should try to find a hotel room, sleep on the floor or wait a little longer before deciding anything. All of the airline's hundreds of ground employees knew everything there was to know about the planes, the de-icing plans, the weather and the cancellations, but none of them knew what to do with the information beyond regurgitating what they did and did not know (mostly from their computers) when asked. None knew how to turn this crisis into an opportunity. None knew how to seize the moment and make their customers feel cared for and important.

Their actions indicated that they believed that the important challenges for the airline were, for example, "how might we clear the snow as soon as possible?" and "how might we get a few more planes flying in spite of the weather?" While important, these challenges are very limiting. In fact, there were other even more important challenges that seemed to be outside their awareness. For example, "how might we keep our customers feeling well-cared for?"; "how might we provide our customers with plenty of donuts and coffee?"; "how might we keep everyone's spirits up?"; "how might we find sleeping cots for everyone?"; "how might we make everyone feel as comfortable as possible while they wait?"; and "how might we get our president in here to shake hands all around, help out and show everyone his concern?" Thinking up innovative challenges beyond the obvious and seeing the big picture is one of the most important

parts of the innovative thinking process, a learnable process which converts mere information into creative action.

Instead, the entire airline "froze" in its tracks. The next week, the senior executives issued a formal public apology, the government suggested an inquiry into the airline's competency and the airline offered a costly seat sale to try to win back their customers' loyalty. In this example, all the knowledge that was needed was available but a lack of innovative thinking skill on the part of the entire airline, top to bottom, made the knowledge useless. *Nobody knew a common procedure for turning a crisis into an opportunity.*

What if the airline's employees had known how to think innovatively together? What if they had a common thinking process organization-wide for recognizing opportunities and problems and converting them into positive innovative action for customer satisfaction? What if they were skilled in a common problem solving language that permitted quick communication of uncertainties, facts, opportunities, ideas and action steps? What if everyone knew how to let others know what they were thinking in a way that the others understood quickly and could join in? We suggest that there is such a learnable innovative thinking process. This process is built upon the principle that learning (gaining knowledge) and inventing (using knowledge creatively) are part of the same continuous process, and is the basis for a new mental model for organization-wide creativity.

Learning and Inventing: Two Parts of a Continuous Process

Learning (apprehension of knowledge or understanding) and inventing (utilization of knowledge or understanding) can be considered as halves of a continuous process of innovative thinking, one that can be used by any individual, any team or any organization in everyday life.

Gordon (1956; 1971) suggested that inventing and learning may be regarded as opposite forces which feed each other in turn. Inventing can be characterized as a process of *breaking old* connections or patterns. Learning is characterized as a process of *making new* connections or patterns. When we learn, we "make the strange familiar" (by making new connections between new phenomena and current understanding). This permits us to view new phenomena in old ways. In contrast, when we invent, we "make the familiar strange" (by breaking old connections which compromise current understanding). This permits us to view old phenomena in new ways. Thus the processes of inventing and learning flow into one another in sequence in a continuous cycle. Figure 1 models this continuous process of inventing and learning.







Adapted from Wm. J.J. Gordon (1971, 1956)

It is on the left hand side of Figure 1 that new "paradigms" or patterns (ways of thinking and doing) become established. New processes are learned and become well known and comfortable habits. It is on the right hand side that such old established paradigms or patterns are broken. New processes that produce better quality goods or services are invented to replace previous processes. When an old *familiar* paradigm or pattern such as a well established business process is broken, the new one replacing it feels very *strange* and uncomfortable to everyone affected. They are experiencing a process of *un*learning, *breaking* connections with past understanding and letting go of old habits and beliefs. As time goes on, the new process becomes less strange, and more familiar. This is a learning process – *making* new connections and adopting new habits and beliefs.

Phlogiston

For example, once upon a time, about 300 years ago, chemistry teachers taught students that the reason some things burned and others did not was that the former, like wood, contained lots of "phlogiston" and the latter, like metal, did not. The students got full marks for connecting phlogiston to burning on their examinations. Some years later, a research chemist discovered that after a quantity of pure magnesium was set ablaze in his test tube, the resulting ash weighed *more* than the original magnesium, not less as he had expected. The phlogiston theory did not fit this discovery, and the chemist had to make up a new theory. He decided that there must be something in the air (he called it "oxygen") which combined with the magnesium to make a new compound with an increased weight (he called it "magnesium oxide"). He called this new theory "oxidation". All the students in his class then had to do what their teacher had done, that is, break their old familiar connections with phlogiston and make new connections with this strange,

new, unfamiliar concept, oxidation. For today's students, oxidation is the theory which they learn, that is become familiar with. Some centuries from now, a new better explanation for fire will be discovered, and students will have to break the old familiar paradigm of oxidation, and begin making a new strange paradigm more familiar by making new connections once again.

The Thinking Organization

Thinking organizations understand the difference between (1) gaining and sharing knowledge (making the strange familiar) and (2) using that knowledge to create new things and solve problems creatively (making the familiar strange). They know that combining the apprehension of knowledge with the utilization of knowledge creatively is the formula for continuous innovative thinking and sustainable competitive advantage.

Thinking organizations encourage both efficiency thinking (perfecting current routines) and innovative thinking (breaking old routines and creating brand new ones). Such simultaneous attention to these opposing ways of thinking requires mastering of a disciplined innovative thinking process. Such a process can be modelled as cycling through four stages or quadrants as in Figure 2 (Basadur, 1997; Basadur, Ellspermann and Evans, 1994). It begins with Stage 1, the sensing, acquiring and generation of new trends, opportunities, problems and other potentially relevant new information. This is what Simon (1977) called "opportunistic surveillance". The process cycles through Stage 2, the conceptualization of such newly generated information into well understood and insightfully defined problems, then Stage 3, the development and optimization of practical, well thought out solutions. It proceeds to Stage 4, the implementation of the new solutions, and then the cycle begins anew. Each stage favors opposing kinds of knowledge apprehension and knowledge utilization. The first two stages represent "*old pattern*".

breaking" (making the familiar strange) and the latter two stages represent "*new pattern making*" (making the strange familiar). Field research by Carlsson, Keane and Martin (1976) showed that the research and development (R&D) process in organizations follows such a continuous, circular flow of creating new knowledge to replace old knowledge.

Figure 2

The Four Stages of the Innovative Thinking Process.



The Two Dimensions of the Innovation Process: Opposite Ways of Knowledge

Apprehension and Knowledge Utilization

We suggest that each stage of the innovative thinking process requires a unique combination of one of two opposing ways of *gaining* knowledge (apprehension) and one of two opposing ways of *using* knowledge (utilization). The innovative process requires four distinctly different thinking orientations represented by these four special combinations of how knowledge and understanding – "learning" – are gained and used.

As shown in Figure 3, one method of apprehension is by direct, concrete experiencing. This is what Guilford (1967) defined as the mental operation of "Cognition" (the immediate discovery, awareness, rediscovery or recognition of information in various forms). This is also what Basadur and Gelade (2002) defined as "experiential intelligence". Some people gain understanding preferentially by such "physical processing" of information. The opposite method of apprehension is through detached, abstract thinking (pondering). This is what Guilford defined as "Convergent Production" (the generation of information from given information where the emphasis is upon achieving unique or conventionally accepted best outcomes and the given information often fully determines the response). This is also what Sternberg (1996) defined as theoretical, analytical intelligence. Some people gain understanding preferentially by such "mental processing" of information.

These two contrasting modes of Apprehension can be further differentiated as follows. Convergent production can be equated with Apprehension by rigorous thinking – "finding the answer" where "finding" is something more than mere retrieval and "the answer" suggests that the domain is so systematic, ordered, rational and deterministic that there are rules or principles for converging on the solution. Convergent Production is the ability that dominates formal

education and is almost synonymous with curriculum assimilation (Meeker, 1969). However, Cognition represents a different method of Apprehension: more open; less restrictive; focused on pure knowledge acquisition by non-directed, non-deterministic, non-rational experiencing and absorption through the senses. Meeker (1969) suggested that in terms of the dynamics of learning, Cognition seems to be the primary process since every other mental activity presupposes perception and awareness of stimuli. We suggest that all individuals (and organizations) apprehend knowledge and understanding in both ways but in differing relative amounts (ratios) which contributes to their uniqueness.

Figure 3

Four Combinations of Different Methods of Gaining and Using Knowledge



(by mentally processing information)

Also as shown in Figure 3, one method of knowledge utilization is for *creating options*. This is what Guilford defined as the mental operation of "Divergent Production" (the generation of information from given information where the emphasis is upon variety and quality of output from the same source). The opposite method of knowledge utilization is for *evaluating options*. This is what Guilford defined as the mental operation of "Evaluation" (reaching decisions or making judgments concerning criterion satisfaction of information). These two contrasting modes of Utilization can be differentiated as follows. Divergent Production is non-judgmental while Evaluation is judgmental. The purpose of Divergent Production is to generate options, while the purpose of Evaluation is to choose among options. Thus, Divergent Production and Evaluation are polar-opposite operations. The former operates on knowledge (information) non-judgmentally to create options focusing on increasing variety; the latter operates on knowledge judgmentally to evaluate options, thus reducing variety.

Thus, Figure 3 is organized into two distinct bipolar dimensions. The first dimension, Apprehension, concerns acquiring knowledge or understanding in two different ways. One is relatively more open, non-rational, experiential, non-analytical and divergent and the other is relatively more closed, rational, theoretical, analytical and convergent. In a similar vein, Jung also differentiated between irrational and rational mental functions (Hyde & McGuinness, 1994). The former were called "sensation" and "intuition" and the latter "thinking" and "feeling." The second dimension of Figure 3, Utilization, concerns applying knowledge or understanding (however acquired) in two different ways – non-judgmentally creating new information to increase the variety of options (Divergent Production) and judgmentally reaching decisions about new information to reduce the variety of options (Evaluation). Farnham-Diggory (1972) suggested that both kinds of utilization are essential to creative performance.

The recognition of Apprehension and Utilization as distinct mental operations is also apparent in the work of Osborn (1953), who pioneered the study of the deliberate development of creativity. Osborn modeled the brain as having four functions: absorb, retain, create, and judge. "Absorb" and "retain" involve the <u>acquisition</u> of knowledge: "create" and "judge" involve the <u>application</u> of knowledge (using imagination and judgment). Osborn advocated the deferral of judgment principle in which the "create" and "judge" functions are used independently, and also suggested that people learn a three-step process of creative problem solving, beginning with fact finding (Apprehension) followed by idea generation and idea evaluation (Utilization). Myers (1994) established the bipolar judgment-perception (JP) scale, measuring the degree to which individuals prefer to perceive (Apprehension) or to evaluate and decide (Utilization). Again, we suggest that all individuals and organizations utilize their knowledge in both ways but in differing relative amounts (ratios) which contributes to their uniqueness.

Organization-Wide Creativity

The Thinking Organization realizes that it must flow through the entire innovation process continuously and thus must build strengths in each of the four stages or quadrants. It realizes that both dimensions in Figure 3 are vital and that it must nurture the dynamic tension between the polar opposites on each dimension. The organization and its individual employees honor the importance of each stage of the innovation process. Following is a description of each stage.

Stage 1: Generating

Generating involves getting the innovation process rolling. Generative thinking involves knowledge apprehension through direct experience and knowledge utilization by creating options. This results in questioning, imagining possibilities, sensing new problems and opportunities, and viewing situations from different perspectives. People who are strong in generating skills prefer to come up with options, or diverge, than to evaluate and select, or converge. Generators gain understanding by what they experience, including the feelings that come with those experiences. This includes not only their own feelings but those of others as they empathize with them. Generators become aware of problems and opportunities from what they concretely experience. What they experience and feel, they turn into new options. They see relevance in almost everything and think of good and bad sides to almost any fact, idea, or issue. They dislike becoming too organized or delegating the complete problem, but are willing to let others take care of the details. They enjoy ambiguity and are hard to pin down. They delight in juggling many new projects simultaneously. Every solution they explore suggests several new problems to be solved. Thinking in this stage favors problem finding and fact finding activities.

Stage 2: Conceptualizing

Conceptualizing keeps the innovation process going. Like generating, it involves creating options. But rather than gaining understanding by direct experience or through feelings, it favors gaining understanding by detached, abstract thinking. What Conceptualizers understand through analysis and rational, systematic thinking, they turn into new options. This results in discovering insights that help define problems, creating theoretical models to explain things, and putting new ideas together in new ways. People strong in conceptualizing skills enjoy taking diverse

information and scattered possibilities from the generator stage and making sense of it. Conceptualizers need to mentally understand: to them, a theory must be logically sound and precise. They prefer to proceed only with a clear grasp of a situation and when the problem or main idea is well-defined. They dislike having to prioritize, implement or agonize over poorly understood alternatives. They like to play with ideas and insights and are not overly concerned with moving to action. Thinking in this stage favors problem defining and idea finding.

Stage 3: Optimizing

Optimizing moves the innovation process further. Like conceptualizing, it favors gaining understanding by detached, abstract thinking. But rather than create options, an individual with this thinking style prefers to evaluate options. What Optimizers understand through rational, systematic, and orderly analysis, they use to evaluate situations and options. This results in converting abstract ideas and alternatives into practical solutions and plans. Optimizers rely on mentally testing ideas rather than on trying things out. People who favor the optimizing style prefer to create optimal solutions to a few well-defined problems or issues. They prefer to focus on specific problems and sort through large amounts of information to pinpoint "what's wrong" in a given situation. They are usually confident in their ability to make a sound, logical evaluation and to select the best option or solution to a problem. They are less interested in "people problems". They often lack patience with ambiguity and dislike "dreaming" about additional ideas, points of view, or relations among problems. They believe they "know" what the problem is. Thinking in this stage favors idea evaluation and selection, and action planning.

Stage 4: Implementing

Implementing completes the innovation process. Like optimizing, it favors knowledge utilization for evaluation. However, it favors knowledge apprehension by direct concrete experience rather than by detached, abstract thinking. What Implementors experience and feel, they use to evaluate situations and options. This results in getting things done, and trying ideas and options out rather than mentally testing them. People strong in implementing prefer situations in which they must somehow make things work and get results. They do not need complete understanding in order to proceed, and adapt quickly to immediate changing circumstances. When a theory does not appear to fit the facts, they will readily discard it. Others perceive them as enthusiastic about getting the job done, but also as impatient or even pushy as they try to turn plans and ideas into action. They will try as many different approaches as necessary, and follow up or "bird dog" as needed to ensure that the new procedure will stick. Thinking in this stage favors gaining acceptance and implementing.

Blends, Styles and Profiles

In summary, Generators like to get new things started based on what they experience and feel. Conceptualizers like to ponder many possibilities based on their carefully thought out understanding. Optimizers like to zero in on the best solution or answer based on their carefully thought out understanding. Implementors like to get things finished by using what they experience and feel. These are four distinctly different orientations. However, virtually no one can be adequately characterized by only one orientation. Rather, everyone enjoys a blend.

All individuals, teams, and organizations can be characterized by their peculiar blends of these four distinct orientations or styles. An innovative team requires strengths in all four

orientations; that is, in all four stages of the innovative thinking process of Figure 2. Team members must learn to use their differing styles in complementary ways. Basadur and Head (2001) showed that teams with heterogeneous mixtures of the four styles outperformed more homogeneous teams (although the reverse was true for team member satisfaction). An organization's unique blend may change over time or from one situation to another. With rapid changes in markets and technologies, for example, some large corporations more recently have had to balance their traditional emphasis on optimizing and implementing with more generating and conceptualizing.

How the Process Works

The innovation process, as modelled in Figure 2, works as follows. Generating ideas for new products, services and methods must start somewhere. Individuals inclined toward generating are continually scanning the environment, picking up data and cues from customers, suppliers and others, and suggesting possible opportunities for change and improvement. Thus, the generator stage is where new information and possibilities are raised – usually not fully developed, but in the form of starting points for new projects. People who tend to have dominant conceptualizer styles lead the pulling together of the facts and idea fragments from the generator phase into well-defined, insightful problems and challenges and more clearly developed ideas and projects worth further evaluation. Good conceptualizers give sound structure to fledgling ideas and opportunities. People with optimizer strengths usually lead in taking these welldefined ideas and finding a practical best solution and detailing efficient plans for proceeding. Finally, those who enjoy the implementation phase of innovation will lead in carrying forward the practical solutions and plans to implement them. This includes convincing colleagues or customers of the worth of the changes, and adapting the solutions and plans to make them fit real-life situations and conditions.

Thus, each of the four stages in the innovation process is characterized by two activities:

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

Specific Process Skills are Needed

In order to execute this innovation process, individuals and organizations must learn and apply three specific skills within each of the eight activities across the four stages. These three specific process skills include attitudes, behaviors and mental skills which overlap and support each other (Basadur, Graen and Green, 1982; Basadur and Finkbeiner, 1985); Basadur, 1994) and bring life to each stage and activity.

One process skill is active divergence. This skill shows up when one demonstrates the following characteristics:

- continually seeks new opportunities for change and improvement;
- views and seeks out ambiguous situations as desirable;
- searches for potential relationships beyond the known facts;
- willingly looks for alternative ways to define and understand a problem or opportunity;
- eagerly tries unusual approaches to solve a problem;
- extends oneself to seek out additional possible solutions and additional factors for evaluating solutions beyond the obvious.

A second process skill is active convergence. This skill shows up when one:

- takes reasonable risks to decide among options and proceed instead of waiting for the "perfect" answer;
- shows willingness to help one's team reach consensus by viewing differences of opinion as helpful rather than as a hindrance;
- follows through on implementation plans;
- does whatever it takes to ensure successful installation of new procedures.

The third process skill is deferring judgment. This is the ability to separate the first two

skills above. One's skill in deferring judgment shows up in several ways, as follows:

- a deliberate open-mindedness to new thoughts and opportunities;
- deferral of action on a problem in order to seek out facts;
- an awareness of gaps in one's own experience and tolerance of situations in which things are less than clear-cut;
- a realization that the early stages of innovation require the patience to discover the right questions before seeking the right answers;
- an open-mindedness to putting new solutions into action.

The Simplex Process – Organization-Wide Creativity in Practice

Above we have modeled organizational innovation as a continuous, dynamic, circular four stage process of (1) Generating: discovering good problems to solve (deliberately seeking out new opportunities and viewing unsatisfactory situations as "golden eggs"); (2) Conceptualizing: defining those problems (crystallizing and understanding the key challenge); (3) Optimizing: developing new solutions; and (4) Implementing: putting the solutions into action. In practice, the four stages can be divided into eight smaller steps, each employing the three process skills above as a sequenced diverging and converging thinking mini-process called ideation-evaluation (see Figure 4). The complete process is modeled in Figure 5 including the sequenced mini-process in each step, and is called the Simplex Creative Problem Solving process. It extends earlier three and five step linear creativity process models (Osborn, 1963; Parnes, Noller and Biondi, 1977) and was developed through real-world organizational field research and application experience (Basadur, 1974, 1979, 1992). Basadur, Graen and Green (1982) demonstrated that skill in applying each step of this process and the process as a whole could be deliberately developed. Additional supporting field research for the practicality of applying the process in organizations is summarized in Basadur (1982, 1987, 1994, 2000).











The Simplex Creative Process as a Whole

Measuring Individual Styles and Preferences

The Creative Problem Solving Profile (CPSP) Inventory

The Creative Problem Solving Profile (CPSP) inventory, measures an individual's unique blend of preferences for the four stages of the process in Figures 2 and 5. By plotting one's inventory scores on a two dimensional graph as in Figure 3, one can display one's own preferred blend of the four different stages. One's largest quadrant on the two dimensional graph represents one's preferred or dominant style. The sizes of the other quadrants represent supporting orientations in turn. One's unique blend of styles is one's *profile*.

Figure 6 shows how individual differences in orientation can yield different creative problem solving process styles and profiles. For example, if the area in quadrant 1 is larger than in the other three, the primary process style is generating; if quadrant 2, then conceptualizing; if quadrant 3, then optimizing; and if quadrant 4, then implementing.

Figure 6

Examples of Different Profiles of Creative Problem Solving With the Same Style Dominant and With Different Styles Dominant



Each of these styles reflects individual preferences for ways of gaining and using knowledge, as further explained by Basadur, Graen and Wakabayashi (1990), Basadur (1998a, 1998b), and Basadur and Gelade (2002), who described the CPSP's purpose, theoretical foundations; development, scoring interpretation, reliability and validity.

States Not Traits, and All Four Quadrants are Creative

This creative problem solving profile (CPSP) inventory is not a personality test. Some companies ask their employees to take personality tests to determine their individual thinking and problem solving styles. However, employees fear the potential uses of the test results. They wonder whether they will be shuffled around or asked to change their personalities if their test shows them to be a poor fit for their job. Constructing a creative problem solving profile (CPSP) is much less formal and less threatening. It measures *states*, not *traits*. It is merely a tool to help an individual, team or organization understand how to increase innovation in a supportive environment. No one quadrant is considered any more "creative" than any other. All four quadrants require creativity and merely different kinds of creativity. Each quadrant contributes uniquely to the overall innovative process and innovative results. If the profile is administered through a human resources department, employees should receive a thorough explanation of how and why it works. One major goal is to capitalize on an individual's preferred orientation, thus making his or her work more satisfying. It may also point out development opportunities. Another goal is to tap resources in all four quadrants to help the individual, team or organization cycle skillfully through the complete innovation process.

Your unique creative problem solving profile merely shows which particular activities of the Simplex creative process you gravitate toward. You must be skillful in *all* stages; however

you probably enjoy some stages more than others. Everyone has a different valuable creative contribution to make to the innovation process as a whole. Your particular style reflects your relative preferences for each of the stages of the innovation process: generating, conceptualizing, optimizing, and implementing. Your thinking processes cannot be pigeonholed in any single quadrant. Rather, they're a combination or blend of quadrants: you prefer one quadrant in particular, but you also have secondary preferences for one or two adjacent quadrants.

Organizations Have Their Own Profiles

Entire organizations also have their own innovation process profiles. An organization's profile reflects such things as the kinds of people it hires, its culture and its values. For example, if an organization focuses almost entirely on short-term results, it may be overloaded with implementers but have no conceptualizers or generators. The organization will show strengths in processes that deliver its current products and services efficiently. But it will show weaknesses in processes of long-term planning and product development that would help it stay ahead of change. Rushing to solve problems, this organization will continually find itself reworking failed solutions without pausing to conduct adequate fact finding and problem definition. By contrast, an organization with too many generators or conceptualizers and no implementers will continually find good problems to solve and great ideas for products and processes to develop. But it will never carry them to their conclusion. You can likely think of many examples of companies showing this imbalance in innovation process profiles.

Working with Individuals

How an individual, team or organization combines these different ways of gaining and using knowledge determines their innovation process profile. When you understand these differences, you can shift your own orientation in order to complement the innovation process preferences of others. Equally important, you can take various approaches to working with people. You can decide on the optimum strategy for helping someone else to understand something. And you can decide who to turn to for help. Understanding these differences also helps you interact with other people to help them make best use of the complete creative process. The CPSP provides a common innovative thinking and problem solving language. For example, you can help strong optimizers discover new problems and facts, or present new problems and facts to them. You can help strong implementers better define challenges, or present welldefined challenges to them. You can help strong generators/initiators evaluate and select from among solutions and make plans, or present to them evaluated solutions and ready-made plans. You can help strong conceptualizers to convince others of the value of their ideas and push them to act on them, or push their ideas through to acceptance and implementation for them.

Working with Partners

Taking this idea one step further, if you understand a customer's unique profile, you can partner up and help that customer move through the innovation process more effectively. You can also shift your own orientation to complement the customer's orientation. An innovative organization requires a healthy balance of members whose orientations complement one another and those of its customers, suppliers and other outside partners. This balance gives the

organization a continuous supply of new problems, new ideas, new solutions, and new processes, products and services from both inside and outside its "boundaries".

Working Cross-Functionally

Maintaining this healthy balance is most important for the organization's interfunctional teams. While there are many exceptions, people who work in similar occupations or departments usually gravitate toward one dominant quadrant (Basadur, 1995). Because their secondary preferences differ, their individual profiles may differ. But they have more in common with each other than with people in other occupations or departments who rely on different ways of absorbing and using knowledge.

For example, people in industrial engineering, training and development, and other improvement and change-initiating departments often favor the generator style. Employees in market research, strategic planning, and R&D often favor conceptualizing. People in accounting, finance, engineering and systems development gravitate toward optimizing. And people in manufacturing production, logistics/distribution/warehousing, sales, administrative support, customer service and operations favor implementation. No matter which process style an individual prefers, however, a team's members have to learn to use their differences to advantage. When you're assembling a team, especially one involved in continuous improvement and innovation, you must put together people who enjoy working in different steps around the Simplex wheel: finding new problems and opportunities; clarifying and refining those problems and creating ideas; developing practical solutions and plans; and making new solutions work.

Whether you're working in teams or not, helping individuals learn to shift among orientations also ensures that the entire organization has a complete blend of process styles. In

fact, your dominant orientation is less important than your ability to shift among the different orientations. Your preferences for certain quadrants within the innovation process are not static "traits", but rather dynamic "states". You can learn to work in any of the four CPSP quadrants in order to complement others in a given situation.

Toward More Complete Thinking in Organizations

A lack of completeness in thinking is evident in many organizations. Some individuals in the organization may display excellent analytical thinking skills but they may often demonstrate inadequate innovative thinking skills. They tend to be great at making short-term profit decisions—figuring out, for example, how many jobs a new piece of equipment can eliminate, that's the easy, analytical part. The hard, innovative part is convincing head office not to lay people off but to reassign them into other important positions to build future business or improve operations and quality. When decisions require more than mere mathematical calculations, we do a lot of poor problem solving. Many examples from the senior author's real world experiences of such shortcomings (and suggestions for overcoming them) are provided in Basadur (1995). Four selected examples follow below.

Stage 1 Example: Trusting myself and my colleagues

One recurring pattern in organizations is the inability to trust oneself and one's colleagues. This results in no one wanting to ask for help or to surface organizational or interdepartmental problems needing solving. (These are called problems that fall "between the cracks".) Some thoughts that run through employee's heads are:

• "I fear asking for help as it might be seen as incompetence."

- "I don't dare mention my real problem before my fellow managers. That would be displaying weakness."
- "I don't think the group's members trust one another enough to share what is really going on."
- "This isn't really my problem, so why risk bringing it up?"

A manufacturer's top management team once asked me to demonstrate how the four stage innovative thinking process (Figure 2) works. I told them the only way to learn how was to experience it on the team's own problems and they agreed. When we began work, we started with the first stage in the process – generating – that is surfacing problems and anticipating, seeking and sharing opportunities for improvement. To my surprise, the team members were reluctant to venture any of their problems. I felt like a dentist extracting teeth. It soon became obvious that each individual feared that one of their *own* problems might be selected and that they risked exposing themselves to negative judgments about their handling of the problem to date. So it was better to not say anything. There was obviously no process in this company for surfacing organizational problems.

Stage 2 Example: Redefining the problem

Still at Procter & Gamble, I was asked for help by a product development team also formed at short notice to respond to a competitor's new product. Colgate's green-striped Irish Spring had been the first striped soap bar introduced to North America. With its aggressive advertising campaign emphasizing "refreshment," Colgate's new product was finding ready consumer acceptance.

Procter & Gamble worked by the rule that, if we were the second entrant into a new market, we had to demonstrate a product's competitive advantage before we could carry out a

market test. When I asked the team what was going wrong, they said that they had been unable to produce a green-striped bar that worked better than Irish Spring in a consumer preference blind test. The team had experimented with several green-striped bars, all of which merely equalled Irish Spring in blind testing. It became evident to me that the team had chosen, probably unconsciously, to define its challenge as, "How might we make a green-striped bar that consumers will prefer over Irish Spring?"

During a creative problem solving meeting, we applied a special creative thinking tool called the "Why - What's Stopping?" Analysis (Basadur, Ellspermann and Evans, 1994) designed to help develop alternative ways to conceptualize our challenge. Repeatedly asking why? and why else? (did we want to make a green-striped bar that consumers would prefer over Irish Spring) and "what? and what else?" (was stopping us) yielded many alternative challenges. The flash of inspiration came from an answer posed from a consumer's point of view: "We want to make a bar that makes people feel more refreshed." This led us to the new challenge: "How might we better connote refreshment in a soap bar?"

This less restrictive challenge, which included no mention of green stripes, gave us more room for creative solutions. We broke this problem into three separate components – "How might we better connote refreshment in appearance, shape and odor?" – and then focused our imaginations on solutions. Beginning with the product's appearance, the team members visualized scenes, images and situations that suggested refreshment. One pictured himself at the sea coast. Another imagined sitting on a beach and looking at a blue sky and white clouds. Later, when the team sat back to evaluate its many solutions, these two ideas were selected and combined. The result was a blue- and white-swirled bar with a unique odor and shape. The product quickly achieved market success under the brand name Coast. Solving this problem once it had been properly defined took the team mere hours. By leaping prematurely into solutions, the team had wasted almost six months before coming up with that problem definition.

Stage 3 Example: Breaking through patent barriers

After solving the refreshment bar problem, we still weren't finished. We had to conduct another round of innovative problem solving. Before we could sell the new soap formula, we had to overcome a patent problem in the machinery design. There were already no fewer than six worldwide patents restricting how you could blend blue and white soap pastes. We had to find a machine design in order to make our product without infringing on anybody else's technique.

We assembled diverse points of view in a small technical team of engineers, technicians, lawyers and even a few people who were unfamiliar with this technology. After the team had spent some time in fact finding, including discussing sketches of the patented processes, a breakthrough solution soon came from a simple observation by the team member with the least technical knowledge and education. This person noted a small detail that the others had completely overlooked in their search for more complicated solutions. The lesson: it's important to value the input of each member of a team, no matter their level of experience. Sometimes the best ideas come from people unencumbered by "too much" knowledge, people who can ask the simple questions that the so-called experts overlook.

Stage 4 Example: Getting bogged down

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Interfunctional teams formed to tackle a common problem often bog down in implementing good solutions for various reasons. Suppose a team gathers years worth of test results on a less costly shipping method, but varying conditions make it difficult to obtain

conclusive data. Even after it becomes obvious that the team will never pin down all of the method's pros and cons, it continues to churn out data. The team finally defines its main problem not as how to collect more information, but as how to face up to its fear of having to make a recommendation for implementation with less than conclusive data.

Some thoughts running through the team's heads might include:

- "My manager talks a good game about not killing ideas, but he challenges almost everything I say as soon as I've said it. I find myself choosing my words carefully every time we speak and getting ready to defend myself."
- "We have taken the problem as far as we can, but will senior management be happy with our results?"
- "How might we get senior management to share the risk with us?"
- "Good ideas and projects languish in this system because people fear they have to perfect their idea before they will share their project."
- "I don't want to be told I didn't do my homework."

Conclusions

Most people could share many more examples of inadequate organizational problem solving from their own experiences. These are actually examples of inadequate knowledge management. In every case, the people *have* the knowledge they need but they are unable to *use* the knowledge innovatively. In contrast to the process of Figures 2 and 5, these shortcomings are evidenced in many ways. We wait for problems to be identified for us rather than actively seek them out. Even when a problem has been identified for us, we fail to ask good fact finding questions. We fail to properly define problems or to open-mindedly create and evaluate options. We tackle the wrong problems, dealing instead with mere symptoms or with the first version of the problem that occurs to us. Team members argue over half-baked solutions, protecting turf instead of seeking common ground. In managing projects or solving problems, we argue over

trivial details. New ideas hit bottlenecks, and we fail to obtain commitment to implementing them. We ignore common sense and research findings about how to encourage commitment to solutions. We won't risk trying new solutions because we can't be guaranteed success.

The process of organizational creativity is a process of continually finding and defining important organizational problems, solving those problems, and implementing the solutions. This process is also called mainstreaming innovation and knowledge management. An effective organization goes beyond simply sharing knowledge. It also goes beyond reacting to change or viewing change as an external irritant. It continuously seeks out new information and deliberately improves its existing products and services, develops new products and services, and creates new customers. It turns crises into opportunities and continuously improves its internal processes and creates new processes to better deliver its products and services. In other words, the organization mainstreams the four stage innovation process, which proactively combines gaining **lenowledge** and using knowledge in different ways.

Innovation is not something you can turn on and off. To dramatically improve your performance, you must make it routine. And you must lead your organization in making innovation part of everybody's routine. Too few of us view innovation as important, and too few organizations mainstream innovation. In fact, many companies regard innovation as an irritant, something that gets in the way of the "real work" of turning out standard quantities of standard products and achieving the sales, cost and profit goals for this month, this quarter, this year. Their response to greater competition is to cut staff, reduce costs, lower service and, in some cases, lower quality. Too few respond creatively.

Many companies still organize themselves almost entirely around functional efficiency – an easier concept to understand, manage and reward. They encourage employees to achieve

narrow parochial goals with little awareness of broader company goals. They share information only on a "need to know" basis. They give fast-track promotions to employees who achieve hierarchical functional or departmental goals. Employees who perform best across functions (horizontally) to achieve overall company results often go unnoticed. Often organizations don't know how to assess and reward these team players, especially over the short term. In fact, their performance sometimes threatens managers whose own minds work vertically, whose thinking and problem solving works only within functional boundaries.

How many companies do you know that use innovation as a key performance appraisal criterion in rating managers and other employees? How many include innovation as a top corporate goal? How many have developed measures of their long-term adaptability? The number will likely be small. Yet innovation is hardly a mysterious thing. It can be achieved by any individual or organization. Innovative organizations create an environment that emphasizes the importance of innovation itself. They put in place processes to encourage creativity by hiring, training and rewarding people, departments and divisions for innovative performance.

Ongoing and Future Research

There is mounting evidence that this new mental model of innovative thinking and the requisite thinking skills suggested in this paper can be successfully learned and applied for bottom-line results, people satisfaction and motivation, and competitive edge. As these become habit, a genuine, permanent culture change emerges as a result. Introducing the new mental model is not easy. Most North American organizations are not set up for proactive, deliberate change making. Raising new problems and initiating deliberate changes due to environmental shifts in factors such as technology, customer tastes and foreign competition are often viewed as

irritants disrupting well-functioning established routines; yet the very essence of the process of innovation and adaptability for sustainable competitive edge is problem finding. How can we improve attitudes toward problem finding?

Field research has demonstrated how specific thinking skills, behaviors, and attitudes can be learned not only to improve problem finding but also to make the entire four-stage innovation process work successfully (Basadur, 1994; Basadur, Runco and Vega, 2000). However, it is not sufficient merely to train people. The top management of the organization must develop specific strategies to induce the practice of the training in daily work life. This includes structural interventions which might include changing appraisal and reward systems, and job and organizational designs. More research is needed to determine what kinds of activities are required from higher management to best help insure that trained attitudes, behaviors and thinking skills will become permanent in the organization. How can we best get higher managers to understand those activity and support variables once identified? What blend of reward systems, boss-subordinate interface behaviors, managerial behavior-modelling, and other extrinsic and intrinsic variables are important to be managed? A much better understanding of the factors that moderate short-term impact and long-term stickability of training in the four stage process is needed. Otherwise, valuable behaviors, attitudes and thinking skills will continue to be left in the classroom. Trainers of processes of innovative thinking and creative problem solving must see themselves more as organizational consultants. Their work begins long before the training begins and continues long after it ends. Their job is to help their managerial clients learn how to make the new *habits* about to be trained become permanent on the job and thus transform the daily attitudes, behaviors and thinking skills of the organization. How this culture changing work can be made more effective needs thorough research and documentation. The attached references provide some of this research and point out some additional research directions to pursue.

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