USING STYLES OF INNOVATION FOR STRATEGY AND GROWTH

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The Hershey criteria (see reference at the end of this abstract), used for assessing organizational effectiveness in the innovation area, involve the study and assessment of relationships, power and power distribution, information flow, as well as structure and behavior within an organizational system. In addition to the management structural concerns in these areas, there is a strong people side to the successful implementation of any changes or innovation program. This is especially important in the light of the major cyclicality in corporate interest in innovation and the people aspects of downsizings that separate the interest in growth and innovation.

In the early to mid 1980's there was a surge in innovation effort and programs within the chemical industry taking many forms, including acquisition of new businesses, internal venturing, and various internal processes for funding "new" ideas, both technical and commercial. These programs were primarily focused within the research and development departments of companies and were designed around an "inside-out focus", presuming that new internal ideas would eventually find a customer and commercial home through later involvement of sales and marketing. Needless to say, these programs, while extensive and costly, were very inefficient in their productivity of profitable new businesses. As the decade progressed, many of these new business and product ventures were sold off and the originating organizations returned to their core businesses. In this process, however, many entrepreneurial people left or were downsized, leaving a major gap in internal talent for use later. The introduction of tools and processes such as Lean Manufacturing and Six Sigma only further emphasized the mental process of control and lack of deviation.

As this pendulum has returned to the innovation side, corporations are revisiting what it takes to produce new product and business concepts and new terms such as the Fuzzy Front End are being used within academia, conferences, and organizations to describe the idea generation process and framework that precedes the entry into a Stage Gate or other organizational project/prioritization process. There are some differences and learnings from the first time around that are being used and implemented as part of innovation efforts such as the early involvement of marketing, customers, and potential customers, and quantitative tools such as QFD. We also now recognize the importance of assessment and implementation speed, partnerships, joint ventures, and in-licensing as key aspects of innovation efforts.

The one thing that hasn't changed is that people innovate—not groups or corporations. They innovate within these structures and individual innovation can be accelerated and multiplied through others, but the spark of an idea or a new business opportunity still originates, at the beginning, through the mind of a single individual. This means that it is absolutely essential that the individual aspects of innovative thinking be a

serious concern for any organization trying to “innovate”. We have many well understood assessment tools to assist us in this regard, but we seldom use them in any pro-active way. We are proposing here that innovation leaders and individual heavily involved in these efforts and programs become more familiar with these tools and pro-actively use them to improve their programs’ effectiveness. The extent and depth of the use of these tools will vary with the size, goals, and resources of the organization, but to ignore their use entirely is to miss a major opportunity to improve the efficiency and productivity of an innovation effort. None of these tools is new—it’s only that we have used them in a very limited way in the past.

The first of these tools is the very familiar Myers-Briggs MBTI™ psychological assessment (which also exists in other forms such as 16Types™, etc). This assessment instrument has been used for decades to assist individuals in understanding their relationship styles with co-workers, superiors, and subordinates. It has also been used to improve the effectiveness of team meetings through the mutual understanding of the characteristics that include:

1. Extroversion vs. introversion (E vs. I)
2. Sensing vs. Intuitive (S vs. iN—N used so as not to overlap with I above)
3. Thinking vs. Feeling (T vs. F)
4. Judging vs. Perceiving (J vs. P)

A “result” from a MBTI™ assessment will come back as a series of 4 letters, for example ESTJ or INFP. There is a continuum along these scales and it is possible for an individual to be borderline on one or more of these characteristics). This characterization also provides knowledge about the behavior of the individual to a stressful situation. These characteristics are not evenly distributed within the population and each characteristic has strengths and weaknesses depending upon the nature of the problem, new product concept, or business concept. When we are considering innovation teams, it is critical to understand the makeup of the team to minimize unnecessary stress while at the same time take advantage of the differences in perspectives. For more detailed information and training on these tools, see the references at the end of this paper.

A second assessment tool, not as well known, is the Kirton KAI™, measuring the style (not capability) of one’s problem solving. This assessment instrument is in the form of a total number from 32-160 with a two sigma industrial norm being around 90. Individuals with higher KAI™ numbers are described as “innovators” or “pioneers” while individuals with a smaller number are usually described as “adopters” or “builders”. This number is a sum of three sub-numbers, each measuring a different characteristic. The first of these is originality (O). A higher number in this area implies a desire and ability to generate a large quantity of ideas, frequently without filtering or evaluation. A lower number here implies a sorting process is being used by an individual to evaluate ideas before they are expressed. The second component is one’s Rule and Group Conformity (R). This reflects an individual’s desire for agendas, rules, procedures, and defined criteria during an ideation process. A low number implies a strong desire for these, while a higher number infers little concern and willingness to deviate from plans and criteria previously established or little desire for them in the first place. Last is Efficiency (E), a descriptor of whether an individual’s problem solving and ideation style is readily visible to others. A low number characterizes someone whose “train of thought” is obvious to others and their path to a new idea readily apparent. A higher number implies a thought process not obvious (and thus maybe not understandable) to others. It is normal for all

these sub-numbers to trend in the same direction, but exceptions to this for one particular characteristic are not unusual. It is possible for individuals to have similar Myers Briggs profiles and very different KAI™ profiles, thus providing some interesting dynamics in team problem solving situations.

Let's look at the overlap of some of these characteristics with the Hershey criteria already discussed. Relationships and interactions can be greatly affected by whether we are extroverted or introverted. Have we heard from everyone? Does one person or viewpoint dominate the discussion and plans? Is all input heard on objectives, process, data needed, etc? Is what we have heard near to what we already do or quite different? What ideas have we not heard that may have been internally filtered by individuals with both an adoptive KAI™ profile as well as being introverted (I) on the Myers Briggs profiles? When we think of power and power distribution, are we paying attention to tolerance for rule and group conformity? Are some participants tuning out because there is more concern for process than content? Are team leaders who may be high "S" on Myers Briggs and high "R" in KAI™ getting frustrated by disorder and their inability to see a deliverable at the end? Are high "N's" and high KAI™ folks unwittingly conspiring to cause the discussion to go to consideration of long term, no fully defined concepts, when there is a critical short term crisis at hand? What kind of information and how much information is needed? ("N's and "S's" will have very different views of this!)

How much we need to know about all of this and the extent to which we use this type of information is a function of what we, and the particular team of concern, are trying to accomplish. Is it a short term issue or a strategic plan for 5 years out? Are we looking at licensing or internal development?

To illustrate these differences, here is a description of an exercise run with 30 top executives from the chemical industry at a recent Commercial Development Management Association Meeting. Following the completion of the Kirton KAI™ assessment, the group was divided into four sub-groups according to their KAI™ profiles.

80-90	Strongly adoptive, building
90-100	Middle of the road between adaptive/building and pioneering/innovative
100-110	Pioneering/innovative
110-120	Strongly pioneering/innovative

Participants were not told their profiles and were given the following problem to address for a 20 minute period, followed by a short oral presentation:

"You are the manager of a large tea bag manufacturing plant and have just lost your primary (2/3 of your business) customer. What do you do?"

Though the output here is condensed to preserve space, here is a summary of the various groups' primary output:

KAI™ 80-90	Lay off the people, turn off all unnecessary utilities, idle the equipment, rent out facilities, wait for a new customer
90-100	Pro-actively look for another tea bag customer
100-110	Evaluate what else could be put in the bag that was made (coffee,

aromas, scents, etc.)
110-120 Look for new applications of the FABRIC (ground covers, etc.)

NONE of these are necessarily bad ideas, and ALL may be appropriate to do under certain conditions. However, if the problem solving team has only one dimension of problem solving outlook, the ideas on the table will be limited and the best ideas may never be presented. Supporting and encouraging these different styles of problem solving and relating is hard work for both managers and professionals. Having a breadth of viewpoints results in vibrant, stimulating discussions and can be supported by diversity in schools from which employees are hired, a breadth of consultants, and above all, strong management support and tolerance for differences in styles and ideas.

It's not just the people side of innovation that can support increased productivity, but technical tools as well. We have been taught for a very long time than the best ideal generation sessions are those which generate a lot of ideas (Quantity equals quality) because the ratio of "good" ideas to total ideas is somehow magically a fixed ratio, normally very small! This tends to generate a large number of ideas that must be sorted and further discussed and evaluated. This is an extension of Thomas Edison's famous mass trial and error process with the addition, by Alex Osborne and others since, of the separation of idea generation from idea evaluation, morphological matrices, and other supporting tools. Any process based upon this framework has the inherent limitation of sorting through a large number of ideas as well as the limitation of the experience and knowledge of the participants in the session. Random stimulation from pictures, music, and articles may assist in breaking thinking patterns, but do not product knowledge that is not within the brains of the participants in the first place. Waiting for some kind of ransom stimulation in the shower on during a walk may also produce ideas, but the efficiency of this process leaves much to be desired.

In the 1950's a brilliant young Russian patent examiner discovered a new way to solve problems that has a fundamentally different approach and that is to survey the patent literature (the record of inventions) to understand inventive principles. It turns out that there are only a limited number of inventive principles that inventors constantly reuse. This is not obvious to any one inventor as it is believed that the field of work is unique and a problem within that field cannot possibly be solved by someone outside the field. The genius of Genrich Altshuller was to recognize that the generalization of a particular patent's inventive principle allowed it to be used across many different areas of technology. He analyzed hundreds of thousands of the world's most inventive (top 5% in terms of breakthrough) patents and analyzed the inventive principles used in each, leading him to conclude that there were a limited number of inventive principles that were constantly re-used across numerous areas of science, technology, and business. This recognition provided the underpinnings for a problem solving and intellectual property analysis toolkit known as "TRIZ" (Russian algorithm for Theory of Solving Inventive Problems). This methodology is a quality and not quantity tool, suggesting that if the problem is defined properly, an analogous solution is already known, eliminating the need to generate a large number of ideas to find the "right" one. The challenge is to generalize one's problem to a sufficient degree to identify parallel solution principles already existing. A simple example of this principle is the discovery of algebra and other mathematical tools that allowed any type of a general equation to be solved by the use of one general formula (i.e. $x = -b +/- \sqrt{b^2-4ac}/2a$). Equations no longer needed to be solved by trial and error (I.e. brainstorming). The original

TRIZ inventive principles and its contradiction table are readily available from the references and resources listed at the end of this paper.

A practical industrial example of this concept of an inventive pattern is to compare the patent literature (1945) relating to the industrial processing of peppers for stem removal (peppers placed in a pressure chamber, pressure raised, stress crack created, air fills pepper at elevated pressure, pressure suddenly reduced and stem is removed). At home this is done with a small knife, but is a bit more challenging when hundreds or thousand of peppers must be de-stemmed. This same inventive principle, storing energy and suddenly releasing it, is in principle no different than the principle of an electrical capacitor, technology patented and used for removing shells from sunflower seeds, removing protective packaging, and producing sugar powder from sugar crystals. In 1972, a patent was issued for producing diamond dust (from diamond chunks) for machine tool grinding via the same principle. (Pump high pressure air into a diamond chunk and then suddenly release the pressure to produce dust). This is basically the same principle used in the design of an electrical capacitor. Two questions to think about: (1) would an engineer with a diamond mining company even think to look at the agricultural patent literature, and (2) if he/she did, would their management support their going to an agricultural equipment show to look at equipment and talk with vendors? We see the same thing in the recent change in aircraft manufacturing from complicated and injury causing lifts and hoists for aircraft seat elevation to large jets to simple hay loaders used since the 1600's.

TRIZ involves the abstraction of a problem, looking at parallel universes with similar problems (getting rid of industry and company jargon a prime requirement here!), stating the ideal final result desired, evaluating and resolving contradictions that may be prevent an ideal state from being achieved (Altshuller compiled a easy to use contradiction matrix used to resolve conflicting design and operational contradictions), searching for resources in and around the system that can be used or converted (Ex: materials, time, information, talents of people, fields, space, function). It also uses the concept of a nine box diagram to force an analysis of problem of concern (the middle box in a tic-tac-toe diagram) and at the same time look above and below at the sub- and super- systems not only for problem solving resources, but for integrative opportunities.

TRIZ is unique in its ability to assist both adoptive, low KAI™ individuals by providing stimulus and high KAI™ individuals by providing structure.

The TRIZ tool kit also provides other tools, beyond the scope of this short paper, such as lines and patterns of evolution, again derived from studies of the global patent literature trends, and a "reverse" version for failure prediction and analysis. More details can be found in the CEP reference below. Various TRIZ software products are also available to assist in its application and use after a user has achieved comfort and competence with the mental aspects of the process. This process can also be used to improve the quality of patent filings and assist in the ability to circumvent interfering intellectual property.

In conclusion, the combination of scientifically based tools for both problem solving and identifying problem solving and social styles can add dramatically to the efficiency and productivity of any innovation process.

Resources and References

Myers Briggs and 16Types information: www.capt.org and www.16types.com
Kirton KAI information: www.kaicentre.com
“Can Corporate Innovation Champions Survive?” Hipple, et.al., Chemical Innovation, 11/2001
“Back to the Future: Putting Innovation Efforts on Solid Grounds”, Hipple, Leadership in Action, 3-4/2002
“What’s Your Problem Solving Style?” Hipple, Chemical Engineering Progress, 8/2004

General TRIZ information: www.innovation-triz.com, www.aitriz.org, and www.triz-journal.com
Specific readings:
”Solve Problems Inventively”, Hipple, Chemical Engineering Progress, 3 part series, 4-6/05
“How TRIZ will Affect the Future of Forecasting and Problem Solving”, Hipple, Futures Research Quarterly, World Future Society, Spring 2003
“And Suddenly the Inventor Appeared”, Altshuller, 1996
“Hands on Systematic Innovation”, Mann, 2002
“Simplified TRIZ”, Rantenen and Domb, 2002
“Hershey Corporate Lifecycle Assessment”, Basal Books. 2005

Trademarks