
Resources for NASA Managers

by Dr. William L. Lawbaugh

Book Reviews

Serious Creativity by Edward deBono. New York: HarperBusiness, 1992.

“Using the Power of Lateral Thinking to Create New Ideas” is the subtitle of this “step-by-step approach to creativity on demand.” As such, it is based on Dr. deBono’s earlier works, *Lateral Thinking* (roughly defined as a paradigm shift, or exploring multiple approaches in problem solving) and *Six Thinking Hats* (intuition—red, cognition—white, desire—yellow, inhibition—black, logic—blue and creativity—green hat).

DeBono makes six main points in this 338-page paperback. Point one: Creative thinking is vital in this age of cost consciousness, downsizing, continuous improvement and quality awareness. The old method of searching for and removing the cause of the problem does not always work. Creative solutions are in order.

Point two: Just because we can recognize creative solutions as logical only in hindsight, logic is not enough. Nor is a “crazy” solution, such as release from inhibition or the group dynamics of brainstorming (point three). Rather, creative thinking is serious, and, with the proper tools and techniques, can be executed systematically, without waiting for inspiration or genius (point four). The primary “lateral thinking tools” deBono discusses are challenge, alternatives and provocation.

Creative challenging is inquisitive, asking “Why?” and searching for viable alternatives. DeBono blames the current morass in U.S. industry on the old saw, “If it ain’t broke, don’t fix it.” Rather than merely problem-solving, managers ought to be questioning, challenging the status quo. They should also beware of “lock-in” or other people’s requirements. For example, the standard QWERTY keyboard was invented for Underwood typewriters, to slow down the sequence of common letters so the keys would not stick together as often. Managers can break free of complacency (“We’ve always done it this way”) and rut-thinking (either/or polarities) by lateral thinking—seeking fresh ideas, alternative routes, challenging old assumptions.

Provocation is a more difficult concept, variously defined as temporary madness and as “po,” a term deBono says he created in 1968. “Po” is extracted from sup(po)se, (po)ssible, hy(po)thesis, (po)etry, (p)rov(o)cation, or (p)rovocation (o)peration. Provocations can “arise” or they can be induced by asking “What if?” or “Suppose . . .” For example, deBono says he imagined: “Po, the police have six eyes” for *New York* magazine in 1971 in response to the city’s crime problem. From that po came the suggestion that neighbors could serve as the eyes (and ears) of the police, evolving into today’s “Neighborhood Watch” programs, he says.

This sounds a lot like brainstorming, which deBono deplors, or free association or merely

use of the brain's right hemisphere. Po also resembles the poet T.S. Eliot's concept of "dissociation of sensibility," which he described nearly 70 years ago as the "willing suspension of disbelief."

DeBono's fifth and sixth main points deal with the implementation of serious creativity. "The successful organizations of the future," he asserts, "are those that have already begun to think differently." However, lateral thinking is not enough. It must operate hierarchically: "There is a need for someone senior to have responsibility as a 'process champion'; otherwise, not much will happen," he says. Such is the case with David Tanner, who set up DuPont's Center for Creativity, and Ron Barbaro, who gave Prudential the ideas for living (catastrophic) benefits and the reverse mortgage. Both men, incidentally, hired deBono to run inhouse lateral thinking seminars and workshops to train trainers, all services dutifully footnoted, with fax numbers, throughout the book. While serious creativity and lateral thinking are designed for individuals to create new ideas, deBono adds a section on the application of these techniques for large groups and organizations. The institutionalization of creativity may seem a contradiction in terms, but the use of lateral thinking has already proven useful in organizations that seek to reinvent or reengineer themselves.

Managing at the Speed of Change by Daryl R. Connor. New York: Villard Books, 1993.

Daryl Connor describes himself as "an entrepreneurial-based researcher...of a single

phenomenon—the human response to organizational change." Change is rapid today, and to manage at the speed of change requires "resilience," a blend of strength and flexibility.

Even the nature of change is changing, says Connor. It increases in volume, momentum and complexity. These are the "good old days," for in the future the world will appear far more fragmented, dizzying and disorganized than today. We will greet this new world with stress, future shock or resilience.

Connor identifies eight patterns believed to be most critical in the successful management of major organizational change:

1. Assimilate change at the speed of change.
2. Initiate certain changes, for timing is everything.
3. When the going gets tough, permit and accept the inevitable pain.
4. Be ready, able and willing to apply the skills of adapting to change.
5. Commit intellectually and emotionally to the cost and duration of change.
6. Realize how powerful corporate culture can be in resisting change.

The seventh pattern is "synergy" to which Connor devotes two full chapters. In self-destructive relationships, such as a messy divorce or bankruptcy, one plus one equals less than two, but in synergistic teamwork,

resilient people gain energy during change rather than feel depleted by it. Employees are empowered by synergy, rather than exploited or victimized; participative management becomes more powerful in dealing with change. Connor even recommends Edward deBono's concept of "lateral thinking," a shift from linear or logical thought to lateral or analogic-based thinking to meld divergent viewpoints.

Pattern eight is "resilience" again—personal, organizational and social—in the crisis (or opportunity) of change. The truly resilient managers view life as complex but full of opportunity; have a clear vision of what they want; show remarkable flexibility in response to uncertainty; develop structural approaches to the management of ambiguity; and they proactively engage change rather than defend against it.

Connor ends his book with a plea and a warning. As changes accelerate exponentially, resilient managers are needed more than ever. "By approaching change in a disciplined manner, we can be architects of our future." If not, we pay the price.

Leadership and the Computer by Mary E. Boone. Rocklin, CA: Prima Publishing, 1993.

"When properly applied, the computer can serve as one of the most powerful leadership tools ever invented," says Mary Boone. To prove it, she garnered research grants from four computer companies and went out to interview CEOs at Tootsie Roll, Mead, PanAm, Manville, Aetna, Mrs. Fields'

Cookies and half a dozen others, including Senator Gordon Humphrey (R-NH) and the CEO of The Cable Guide. Her conclusion: "Computers give executives the opportunity to empower or oppress."

Of course, Ms. Boone, a management consultant in Ridgefield, Ct., hopes that computers will be used to empower, liberate and enhance the skills of the work force. She describes, in a series of interviews, how computers can help executives to:

- Stay well-informed by tapping directly into internal and external databases, the electronic equivalent of Tom Peters' management by walking around.
- Communicate more effectively through electronic mail, improving access and even encouraging what Warren Bennis calls "backtalk" and dissent.
- Manage time better by not only speeding up responses but also working regardless of time and place, what Peter Drucker calls achieving control of what little time can be controlled.

Boone says computers can also help to shape or change culture, coach workers and enrich personal thinking through expert systems, modeling, calendars and bulletin boards. She does not mention forums or online discussion groups to gain fresh ideas and outside perspective, but she does mention a number of word processing tools (like spellcheckers, translators and thesaurus) to improve critical communication skills. She mentions but does not develop the

notions of programmed learning and computer-aided instruction.

Boone is best when she answers the excuses most managers give when asked to make use of computers. When they see how computers give them greater control of information they need, managers no longer say they are too old or set in their ways. Some can't even type, but Boone points out that many CEOs "hunt and peck" or play with the computer's mouse. As for the mindless aspects of computer hacking, Boone offers eight good reasons why doing it yourself is more efficient than being dependent on staff for every little thing.

When Mary Boone wrote *The Information Edge* with Dean Meyer in 1989, she discovered that most executives used only one tool of the computer, say spreadsheets or conferencing. In just five years she found them experiencing "the headiness, the freedom, and the boost to intellectual power that computer and communications tools can provide." When the computer is regarded as more than a mere administrative tool, it will take its place among and possibly replace other management tools such as meetings, reports, speeches and the telephone. Until then, the computer will be regarded by some as a very expensive calculator, typewriter or filing cabinet. Boone suggests it can enhance leadership in virtually any organization.

Working Without a Net by Morris R. Schechtman. Prentice Hall: Englewood Cliffs, NJ, 1994.

"How to Survive and Thrive in Today's High Risk Business World" is the subtitle of this timely book. The author says "we must learn to work with change, not deny it. And with our safety nets gone and our external props kicked away, we must learn to work together in new ways while we find sources of stability within ourselves."

The old work assumptions called for blind loyalty in exchange for job security, the result amounting to mediocre job performance and conflict avoidance. These assumptions are rapidly giving way to loyalty to quality and finding security in self instead of the workplace, resulting in peak performance and embracing change as a choice.

Morris Schechtman is, ironically, a consultant to the insurance industry, the paradigm of safety nets. Nevertheless, this former ghetto schoolteacher and trainer of street police in Aurora, Il., learned much about high risk work and writes eloquently about the management of change.

He makes a sharp distinction between caring for people and caretaking, the latter described as destructive to organizations and hostile towards employees. TQM requires workers to transform themselves, "from good soldiers to challenging employees." Self-esteem is necessary for change; if you feel good about yourself, you don't need a safety net. Peak performance is possible only when people feel passionate about their work. Yet, a worker's personal or home life can adversely affect or

enhance peak performance. And finally, personal values must blend with core, institutional values. If not, take a walk, he suggests.

Working without a net seems like jungle ethics, survival of the fittest, change for change's sake, foolhardiness. Schechtman believes we live in a high-risk culture, that stress is a positive, activating force (as opposed to distress), and that life is at its best when we grow, learn, change and make a positive impact on the lives of others.

Integration of personal and professional life, of personal and institutional values is a start. But what about managing the lives of others? Schechtman suggests the same kind of push and drive. After all, no coach ever told Michael Jordan to slack off, to do whatever he wanted because he's a nice guy. Nor would we obey speed limits or pay our taxes if we were not held accountable. "Conflict isn't negative," says the author. Nor is anger, as long as it's expressed in terms of personal disappointment. Both generate peak amounts of productive energy. As for loyalty, the author compares it to patriotism, which allows for constant challenge and confrontation at times.

In sum, *Working Without a Net* is a stimulating, creative work. The author includes a "Value Clarification Instrument," a 10-question quiz that underscores his points about inner security and management of others. Even if the reader flunks the quiz, Schechtman offers compelling reasons to clarify if not change one's core values about work in a high-risk culture.

The Human Element: Productivity, Self-Esteem and the Bottom Line by Will Schutz. San Francisco: Josey-Bass Publishers, 1994. *Reviewed by David LeSage, Chief, Executive and Management Development, NASA.*

If your boss seldom meets with you and other members of your project team, she possibly has low Inclusion needs. If, when you are given an assignment, you enjoy the freedom to organize the personnel and resources to get the job done as you see fit, you possibly have high Control needs. If your office colleague frequently shares his feelings as well as his thoughts about issues, he is probably high on Openness.

Inclusion, control and openness are the three fundamental interpersonal behaviors which help explain and predict most other interpersonal relations. That was one result of Will Schutz's original research in the early 1950s. At that time he was asked to identify compatibility factors for combat teams in large warships. He continued his career in the scientific field for another 20 years. The next milestone in his own personal development came when he was doing research with a psychotherapeutic group at the Massachusetts Mental Health Center. He recalls:

As a group member I was admonished to tell the truth, hear feedback from others about how they really felt about me, and open myself to the world of feelings...a frightening delight. Groups became a source of intellectual knowledge and of personal growth. I became fascinated by them, a fascination that continues to this day.

The next decade was spent developing his “human element” approach to life, where he integrated his scientific knowledge with a depth study of “feelings.” Understanding the three basic behaviors of Inclusion, Control and Openness increased with the discovery of parallel underlying feelings of Significance, Competence and Likability. As it exists today and detailed in his latest book, “The Human Element is a holistic, overarching model that presents an integrated approach to all the human issues in an organization.” The tenets of the Human Element model are:

- **TRUTH.** “Truth is the grand simplifier. Relationships are greatly simplified, energized and clarified when they exist in an atmosphere of truth.”
- **CHOICE.** “I choose my own life—my thoughts, feelings, sensations, memories, health, everything—or I choose not to know I have a choice.”
- **SIMPLICITY.** “The most profound solutions are simple. Simplest is best.”
- **LIMITLESSNESS.** “Human beings have no limits to their potential. Our only limits are limits of belief.”
- **HOLISM.** “All aspects of a person (thoughts, behavior, feelings and the body) are interrelated.”
- **COMPLETION.** “Effectiveness and joy are enhanced by the completion of unfinished experiences.”
- **DIMENSIONS.** “The basic dimensions of human functioning are inclusion, control and openness.”

- **SELF-ESTEEM.** “All behavior derives from self-esteem.”

Because of the centrality of self-esteem, much of Will Schutz’s human element is really a “well-tested theory and methods aimed at helping you increase your self-awareness, self-acceptance and self-esteem, and thus realize your full human potential, both individually and as a member of a group.” In a sense, this book is really about empowerment, self-realization and being all that we can be.

At the opposite extreme of self-esteem is what he calls “self-deception,” not being self-aware. Not being aware makes us susceptible to being dominated by our defense mechanisms and becoming “rigid,” inflexible, acting in ways we don’t understand, often not liking what we are doing, and frequently resulting in ineffective interpersonal relationships. In this sense, Schutz makes a very bold statement:

Teams do not fail because they disagree, or because they do not have common goals, or because their members’ approaches to solving problems differ, or because they do not include certain personality types. They don’t work because one or more people are rigid, and a person is rigid because his or her self-concept is threatened.

Will Schutz’s belief, and my experience in conducting Human Element workshops, is that as individuals gain self-awareness and self esteem, they become more open and honest with their coworkers. They redirect

the energy they once used for defensiveness, withholding and interpersonal struggles into productive work.

An example of this is what Schutz calls “concordant decision-making.” Described as “with the heart” and going beyond what we know as “consensus,” concordant decision-making is an extension of the Inclusion, Control and Openness behaviors. In concordant decision making, those who are Included are those who know the most about the content of the decision and those who are the most affected by it; every person on the decision-making team has equal Control or power, and everyone has a veto; and everyone is required to be Open and honest and express true feelings about the decision. To put this openness to the test, every individual must be able to utter a “yes” or “no.” A “yeah” or “OK” is a sign of some hesitancy, is considered a “no” and requires further discussion.

As the subtitle of this book indicates, *The Human Element* is about developing self-esteem through self-awareness. Self-esteem leads to more open communication with colleagues, which ultimately affects productivity and the bottom line.

To gain maximum benefit from the book, Schutz suggests you read it through once, quickly. Then start again, and take one small piece at a time. Respond completely and honestly to the “Pause for Reflection” sections. Then read through the whole book once again. “You will probably get much more from it this time,” Schutz says. I agree. Better still, come to one of the five-day workshops NASA makes available to you. Let either this book or the workshop be your next step in developing your own self-awareness, self-esteem and greater self realization. Hundreds of NASA managers and employees have already started the journey.

The Human Element Workshop

Will Schutz has designed a five-day workshop to enable participants to experience increased self-awareness and self-esteem as described in his most recent book. The workshop is interactive and experiential, but very well structured. Maximum benefit is gained when individuals attend with one, two or more coworkers. The topics covered include:

- The overarching concepts of Truth and Choice as problem-solving tools for understanding human behavior
- The interpersonal behaviors of Inclusion, Control and Openness
- The underlying interpersonal feelings of Significance, Competence and Likability
- The behaviors and feelings applied to the self: the Self-Concept and Self-Esteem
- Defense mechanisms
- Health and illness: the mind-body connection
- Team compatibility and work relations (this is where work teams benefit most)
- Concordant decision-making

Workshop methodologies include lecturettes, self-assessment instruments, guided imagery, feedback and non-verbal activities. The workshop is offered twice a year at Wallops for Agencywide participation, and as often as can be scheduled at a Center, so that more people from one workplace can attend. The workshop was originally introduced at NASA in 1983 as a follow-on to the Management Education Program and Senior Executive Program, it has since been available to the entire NASA work force, with emphasis on people attending with work colleagues, and attending voluntarily. For further information, call David LeSage at NASA HQ, Code FT (202)358-2183 or Ed Hoffman, NASA HQ, Code FT (202)358-2182.

Video Reviews

Explorer Satellite Program: Shared Experiences with Gerald Longanecker, Goddard Space Flight Center, September 1989.

In response to Soviet domination of the space race, the Explorer Program began on January 31, 1958 with the much-heralded launch of Explorer One. In the next three decades, more than 75 Explorer class missions would explore black holes, supernova and astronomical phenomena.

Gerald Longanecker, project manager on some half dozen Explorer missions, introduces this 30-minute film, produced by Manfred "Dutch" von Ehrenfried for Technical and Administrative Services Corp. (TADCORPS) with field production by Karen Igo and Goddard Television.

Project Manager Jerry Madden explains the first of three explorer projects, the International Sun-Earth Explorer (ISEE). From 1971 until launch in 1978, Madden worked with counterparts in the European Space Agency (ESA) to build three ISEE spacecraft carrying 20 distinct experiments. In dealing with Europeans, Madden found his Goddard team had to come early and stay late for meetings with ESA. Most items of business had to be agreed to before the actual meeting, and each side was expected to go over the meeting's action items, rewriting them for clarity if necessary. Parts problems and testing proved most challenging, but this Explorer project came in on time and on budget, "a total success."

The Active Magnetospheric Particle Tracer Explorers, begun in 1981 and launched in 1984, involved three nations, three spacecraft and three very different management styles. NASA Project Manager Gilbert Ousley describes working with counterparts from the Federal Republic of Germany (then West Germany) and the United Kingdom, the British space agency. Here the major change involved a shift from launch on a Delta rocket to the Space Shuttle, meaning a radically different flight path and orbit for AMPTE. Ousley found that resisting change is not as productive as using change to increase the science return of a spacecraft while sharing the pain of engineering. Like Jerry Madden, he found it helpful to meet privately with his European counterparts before a formal meeting, and respect one another's management methods without trying to standardize all procedures. As a result, AMPTE flew for five years, providing an abundance of data and research about the movement of particles in space.

Deputy Project Manager Don Margoles described the Extreme Ultraviolet Explorer (EUVE) mission, about to be launched then. EUVE was the first spacecraft to be serviced simply and changed out by the Space Shuttle under GSFC's Equipment Acquisition Plan (EAP) and the new Satellite Servicing Project. Under these arrangements, EUVE depended upon existing hardware as much as possible, a reusable bus and Government Furnished Equipment from other projects. EUVE involved NASA, industry and academia: Goddard, Fairchild and the Space Sciences Lab of the University of California at

Berkeley. The spacecraft was originally designed for the Space Shuttle and then capable of the ferry of a Delta launch. Margoles stresses flexibility as much as possible in meeting requirements and calls EUVE a “trailblazer for the future.”

Dr. John Townsend Jr., then Director of Goddard Space Flight Center, closes out this video with commentary on the Explorer Program. He shows how GSFC became a “smart buyer” by having Goddard people on top technically, although he noted the Center had trouble retaining some of their best people. However, the many Explorer projects were on the cutting edge of technology and versatile enough to put aside for crisis efforts or emergency programs. He added that the Explorer projects over the previous three decades proved most beneficial for inhouse instruction, becoming “a training ground for future project managers” in NASA and industry.

Award Fee Contracting with Murray Weingarten of Bendix Field Engineering Corporation, October 5, 1989.

Murray Weingarten is past chairman and president of Bendix, considered the pioneer for award fee contracting between NASA Goddard Space Flight Center and Bendix since the early 1960s. Joe Engle, his successor at Bendix, opens the 35-minute video with an overview of the company: 7,000 employees in 120 locations and 20 countries with \$450 million annual revenue from 200 contracts. Half of Bendix’s work is with NASA, and 80 percent of that work is under award fee contracts. Engle says at

that time, 1989, half of NASA employees were contractors and 88 percent of the NASA budget was spent in procurements.

Weingarten starts off by saying it is easy to measure performance in hardware, but not easy to measure “service.” The common Cost Plus Fixed Fee (CPFF) contract worked fine for the uncertain Mercury projects with its standard 5 percent pre-tax fee, but Services involved more subjectivity and disputes. In spite of rumblings from the Bendix legal staff, Weingarten proposed a Cost Plus Award Fee of 3 to 7 percent with GSFC. The government was given unilateral rights to award the fee, not subject to dispute from the contractor. Thus began “Award Fee Contracting in the Service Industry,” resulting in outstanding performance and win-win for both sides.

However, Weingarten warns, the Award Fee process can mean more work for both sides. The “performance evaluation system” for one contract took 10 workyears of effort in just one year. But, it was worth the extra effort because both sides were forced to communicate with each other. He recommends both sides establish mutual objectives every quarter or trimester at least.

“Where do we want to be in three months?” he asks. “You become partners if you know what you want to accomplish.” At each quarterly review, top management of both sides will want to measure the accomplishments or study the reasons for failure to meet the agreed-upon objectives fully.

Weingarten also warns against simmering complaints or disappointments. He urges both sides not to wait until the quarterly or trimester review to air problems or concerns. Contractors hate the “I gotcha” surprises and “bitch list” evaluation letters. Top industry management will want to keep government happy and focus on problem areas.

Under the old CPFF arrangement, people are too busy to talk with one another, evaluate and measure. But under the CPAF, Weingarten says, both sides are forced to talk and raise performance levels. It also has built-in motivation and incentives, he notes.

Management Issues in Manned Spaceflight with Aaron Cohen, Henry Pohl and Joseph P. Loftus, Jr. at NASA Johnson Space Center, December 7, 1989.

This video, also a part of a series in the NASA Program/Project Management Initiative (PPMI) collection, features three legendary managers from Johnson Space Center. Past Center Director Aaron Cohen leads the discussion of management issues at JSC, accompanied by Henry O. Pohl, Director of Engineering at JSC and narrator Joseph P. Loftus, Jr., Assistant Director of Plans at JSC.

“Keys for success” open and close this 55-minute discussion, followed by 25 minutes of questions and answers over NASA’s interactive video network system. All three agree with Cohen, who says there is no substitute for early hands-on experience, especially with hardware or analysis, for

prospective project managers. Later on, Cohen adds “good formal education” and a variety of personal qualities, such as patience, integrity, honesty and the ability to communicate clearly up, down and laterally.

As for major changes he has seen over the years at NASA, Cohen says it was clear in the Apollo era that performance came first, then schedule and cost. In the Shuttle era the order shifted to performance, cost and schedule, and while it is too early to tell (in 1989), the Space Station era may be characterized by cost, schedule and performance, in that order. Pohl added that it wasn’t an abundance of money in Apollo days, but “flexibility” that made the difference, less external oversight, second-guessing and control.

What about JSC’s organizational culture? Both agree that the Center’s matrix organization is open to interactive decision-making. Cohen calls it “participative management” and Pohl calls it “collegial.” In large, complex programs, no single person has all the answers so the project manager is attentive but decisive, with “51% of the vote” for a firm, timely decision on changes. The first change pitfall will be cost overruns, which could lead to schedule slips and performance problems. “Engineers do not like to deal with budgets,” Pohl observes.

What about the next five or ten years? asks Loftus. Cohen conceded that NASA was losing many seasoned Apollo veterans but he expressed hope in the college fresh-outs. Johnson will be challenged to maintain

technical excellence and train good people. Facilities and equipment (read: computers) will need constant upgrading. None of the panelists seemed to anticipate downsizing, reengineering or reinventing. Rather, Cohen says: "You can't afford failure," which is devastating and expensive. A final theme that runs through this fascinating video is

the notion of teamwork, with both NASA personnel and contractors.

Pohl concludes the 120-minute of tape with the assertion that success or failure does not depend on the type of organization in NASA or at the Centers, but rather "the will of the people involved to succeed."