Resources for NASA Managers

by Dr. William M. Lawbaugh

Book Reviews

Managing in a Time of Great Change
by Peter F. Drucker
Dalton: New York, 1995.

In 1946, Peter Drucker redefined employees as resources instead of expense or cost items in *Concept of a Corporation.* Post-war Japanese reformers adopted him as their business guru and guide, and *The Practice of Management* (1954) took Europe by storm. Due largely to his influence, institutions began to re-organize around the flow of things to the flow of money and now to the flow of information.

Like previous Drucker books such as *The Frontiers of Management* (1986) and *Managing for the Future* (1992), this book was "pre-tested" chapter by chapter in magazines such as *The Atlantic Monthly* and *Harvard Business Review.* It lacks flow and continuity, but the insights are certainly worth pondering.

For example, he says: "The current emphasis on re-engineering is from the flow of things to the flow of information. The computer is merely a tool in the process." Post-capitalist executives are knowledge-workers who must figure out what information is needed and, "most importantly, what they do not need."

Among his "five deadly business sins," Drucker includes "feeding problems and starving opportunities." He calls problem solving mere "damage containment" and says only opportunities will produce measured growth and tangible results. He has six rules for U.S. Presidents, including: "Concentrate, don't splinter yourself," but recent all-out efforts to achieve universal health care or gay rights in the military seem to have fizzled.

From his perch in academia (Claremont Graduate School), Drucker can speculate on "The End of Japan, Inc.?" and "really" reinventing government, but management, not political science, is his forte. He does admit, however, that two answers have been wrong this century in dealing with social need. The first answer was to let government solve social problems, but "society is becoming sicker rather than healthier." The second wrong answer was formulated in his 1942 book *The Future of Industrial Man,* that the corporation became a worker's "community" from cradle to grave. However, "entitlements" and "fringe benefits" are not his solution today. Rather, echoing his *Managing the NonProfit Organization,* written a half-century later, Drucker proposes: "It profits us to strengthen nonprofits" such as AA, parochial schools and private relief agencies to address our social ills most effectively.

Peter Drucker is on more solid ground writing about management. In team-building, he clearly prefers what could be called "basketball" where few players mold and work together quickly, such as at GM's Saturn Division. Detroit and most American industries were built on the sluggish, inflexible "baseball" team model, while Japan was more like "football" where the boss or coach still called all the plays.

As for the "Change" in the title, Drucker says, "For managers, the dynamics of knowledge impose one clear imperative: every organization has to build the management of change into its very structure." He suggest three ways to do this: continuous improvement of product, self or service; exploitation of successful knowledge (new products, selves or services); and organized, systematic innovation—every organization's necessary core competence.

Education and School are at the epicenter of Drucker's new information-based society for knowledge workers. Yet, he says, "Management, in most business schools, is still taught as a bundle of techniques," such as budgeting and planning. As important as there are, Drucker says, it is far more impor-

tant in this age to develop "competencies," like working under pressure, learning how to learn, knowing what to know, and being able to gather organize and present useful information. When Drucker says "we need to measure, not count," he means moving away from traditional cost accounting to looking at value, quality and investment. "The key is not 'cost' but 'cost-effectiveness.'"

In this competency-based education environment, the knowledge worker (a term coined by Drucker in his 1959 book *The Landmarks of Tomorrow*) requires "a habit of continuous learning." Thus, for Drucker at least, management is one of the liberal arts instead of a social science. It is not "experience-based" but rather "learning-based." Core competencies lead to "being able to do something others cannot do at all or find difficult to do even poorly," which should be enough to carry us to the end of his predicted social transformation in 2010 or 2020.

Multimedia for Decision Makers
by Jeff Burger
Reading, MA: Addison-Wesley, 1995.

Managers and executives often wonder how their communications can reach more people and become more effective. "Multimedia" is the suggested answer, but the decision maker needs to know how to integrate the various media (text, graphics, audio, video, interactivity) in the office and make it cost-effective. That's where Jeff Burger's new book comes in.

Multimedia for Decision Makers is an overview of multimedia applications for managers, not technicians. It is conceptual rather than technical, and it affords a basic grasp of the possibilities and benefits of using more than one medium in presentations, trade shows, direct marketing, information management, training and teleconferencing.

"Interactivity" is the key in space-age communications, according to Burger. It is often noted that we grasp 20 percent by hearing, 40 percent by seeing or reading, and a whopping 80 percent by doing. Interactive multimedia enhance our communications immensely, especially through the Internet and CD ROM technologies.

Just as the Internet was at first a Cold War effort to sustain bomb-proof communication, laser discs and CD-ROMs were first used in military training, says Burger, such as interactive learning for nuclear submarine management, in place of bulky service manuals. Electronic kiosks incorporating graphics, sound, modem transmission and vending are being developed in California for everything from bill payment and driver's license renewal to state lotteries. Space travel is made much more exciting (and educational?) through interactive multimedia simulators. Some call it "edutainment."

Edutainment could soon involve videos and music on demand, "smart" games, computer-assisted research, interactive fiction adventures and even home based shopping comparison, depending on passage and implementation of new telecommunication legislation. As Burger points out, "throughput is only as efficient as that of the smallest artery." In other words, one burst of interactive multimedia collapses when the fiber-optic cable feeds into a mere copper line on your street.

What Burger does not point out is that much of this "new" technology has been around for a long time, but there has been little or no consumer demand for it. Bell Labs, for example, introduced the Videophone in the era of the Kelvinator, but consumers preferred better food storage over showing up on the telephone. The first facsimile transmission was sent from Lyons to Paris in 1865, but no one seemed to need it until recently. The USPS has abandoned its plan for user-friendly postal kiosks. We still do not need or want the Videophone, apparently.

Nevertheless, Burger's books presents at least a dozen alternatives to the typical viewgraph presentation, all of them feasible and economical.

Silicon Snake Oil
by Clifford Stoll
New York: Doubleday, 1995

Subtitled "Second Thoughts on the Information Highway," this book fills a void: "there's damned little critical discussion of the implications of an online world." Is the Internet oversold? Do networks deliver on education? Progress? Is this the ultimate revenge of the nerds?

Clifford Stoll is a planetary astronomer by training who is offended by colorized and computer-enhanced images of outer space sent online by NASA, for example. He finds them fraudulent, "since infrared images have no color," he says. He also finds computers in the classroom "expensive and semi-reliable," providing only flat, black-and-white, one-dimensional info. They are, too him, as useless as television. Books (like his?) do a better job. "Learning is not easy," he declares, excoriating "edutainment" devices.

Multimedia? "Wrong, since there's only one medium employed: the computer."

Interactive? Nope, all the outcomes are, of course, preprogrammed. "The experience is about as interactive as a candy machine."

Eye-hand coordination, at least? A neighborhood game of soccer is far healthier, and a box of crayons and a big sheet of paper far more expressive.

Educational? Researchers and creative folks publish their best stuff in journals, and the gold online is hard to distinguish from all the dross. Besides, CNN will keep you better informed than the Internet.

A virtual community? Yes, but how impoverished without a church, a cafe, a theatre, a museum or even a corner bar. "And no birds sing," he adds. No children, no hearth, no warmth.

Great jobs? "Well, no. Computer skills no longer guarantee employment," he says. "Programming jobs are easily exported," like hardware manufacturing and software piracy.

Telecommuting? Talk about turning home with all its distractions, into a prison, he asserts. And tell that to your dentist or auto mechanic.

Email? Stoll finds faxes are cheaper, faster, better—and more reliable, secure and universal, and with no junk. Real (snail) mail is more personal and warm. Telephone, too. He's met dozens of teenage computer wizards who have never written a thank-you letter.

Clifford Stoll is not your average troglodyte, Luddite or computer dubunker. He was an Arpanet user long before we had an Info Highway, and his first book, *The Cuckoo's Egg*, is all about how he nabbed a German spy ring on the Internet, which he now calls "that great digital dumpster" of disconnected data.

The biggest loser in the online culture is the library as we know it—an organized set of books and periodicals. Yet, libraries are strapped because they have had to invest in computer systems and software that are soon obsolete. (Look at their earlier investments in punch-card and paper-tape readers, reel-to reel tapes, 78 rpm disks, 8 mm. movies, 8-track tapes, and new books on tape, CD-ROMs, ASCII files, FORTRAN, Basic, Word 2.3, etc.). Their hours are shorter but wisdom is diminished.

Stoll distinguishes between wisdom and data. Online you can find plenty of data (like drinking from a firehose), little usable information, less knowledge, and hardly any wisdom, since nearly nothing before 1980 is digitized. Besides, who would really prefer to read a book (or periodical) off an LCD or CRT instead of real paper?

The Leadership Challenge (2nd. edition)
by James M. Kouzes and Barry Z. Posner
San Francisco: Jossey-Bass, 1995.

Tom Peters, in the Foreword to the second edition of this thick (400-plus pages) new book, says: "Management is mostly about 'to do' lists (can't live without them!)" but "Leadership is about tapping the wellsprings of human motivation." The '90s version of that '60s word appears to be "empowerment."

Posner and Kouzes describe how their world has changed in the past seven years since the first edition. Power has shifted from a master-slave business hierarchy to a flattened client-server of empowered people. Like Peter Drucker they believe knowledge is the new currency, replacing land and capital. They see less loyalty and workforce commitment but also less job security and more self employment, by choice or not. They also see, surprisingly, a renewed search for meaning and suggest that leaders become "more like trusted friends in this increasingly cynical world." Paradoxically, the authors say: "We're all connected" in a global village, but also: "The world is disconnected" with more countries, more products and more services in a marketplace of smaller pieces. They ask: "How can a leader unite such a diverse and disparate constituency?"

Simple. Just apply the same "five fundamental practices of exemplary leadership" and the adjoining "ten commitments of leadership" found in the first edition, but with new lingo, fresh anecdotes and new "personal best" case studies. In brief, here are the practices and their dual commitment, upon which the entire book is based:

1. Challenge the status quo by embracing change and innovation, and by taking risks, but be willing to accept and learn from any resulting mistakes.

2. Inspire a shared vision. Dream of an ideal future but also set others on fire by communicating the vision clearly and vividly.

3. Enable others to act by building trust while giving power away.

4. Model the way by personal example that is consistent with shared values, and build team commitment with frequent small wins.

5. Encourage the "heart" of subordinates by celebrating team accomplishments and by recognizing individual contributions.

"Love—of their products, their services, their constituents, their clients and customers, and their work—may be the best-kept leadership secret of all," say the authors.

Actually, these five principles are the opposite of the way traditional management operates. Most bosses will expect employees to fall in line and make things run like clockwork, but Item One calls for defiance to the status quo, shaking up the organization. Traditional management may tend to focus on the short term if not present moment, but Item Two gazes well into the future. Item Three has the leader divest of power while traditional management may seek rather to consolidate it. Cool and aloof traditional management behind closed doors may try to rule by threat and fiat, but Item Four suggests leading by personal example. Item Five would be soundly denounced by control freaks as sentimental hogwash, but Posner and Kouzes' leader serves and supports instead of command and control. Tom Peters even goes out of his way to say that Jim Kouzes, "like Winston Churchill, cries easily; he cares."

However, the authors present 36 pages of theory and evidence of statistical methodology and scholarly footnotes to prove they are not sentimental old fools. Kouzes served in the Peace Corps and Posner sits on the local board of Big Brothers/Big Sisters. Together they also authored *Credibility: How Leaders Gain and Lose It, Why People Demand It* (1993). The subtitle of this book reads: "How to Keep Getting Extraordinary Things Done in the Organization."

Dive Right In, The Sharks Won't Bite
by Jane Wesman
Dearborn: Financial Publishing, 1995.

Although Jane Wesman's new book is subtitled "An Entrepreneurial Woman's Guide to Success," it is chock full of good tips and advice for project managers of both genders. The first three chapters focus on getting started in a new business, but the other 13 chapters are filled with generous advice from a real pro.

Jane Wesman was a publicity director for New York publishers before she started her own public relations firm 15 years ago. From experience, she says the entrepreneur needs courage, determination and

energy to survive in a tough market. "Energy is key," she says, urging a low-fat but nutritious diet and rigorous exercise to "clear your head and think creatively." Being well groomed also instilled confidence.

For a woman, access to capital or start-up loans is the biggest problem. She started at home by lining up clients first and securing advances, but today she could have tried a small business "incubator," a suite of offices with common reception, telephone, fax and copier, usually connected to a university or local (county or state) government. She was wise enough to shop around for the right lawyer and accountant for "a good fit" before she retained them.

She spent a lot of time hiring just the right employees, too. Most new hires were cheerful and upbeat; none of them was hired just for the money because they would leave just as soon as a competitor offered more. Generous benefits and incentives were offered in lieu of more money.

To fight the "sharks" in the old boys' network, Wesman joined women's clubs and organizations as networking venues. She returned every phone call, and she never held grudges; people appreciated her thoughtfulness and often recommended her firm to others. She offers the reader 18 tips in the final chapter, her favorite, ending with "Be gentle with yourself . . . Think about what makes you special and what brings joy into your life."

Perhaps her best advice is her first "sharkproof strategy for success." Keep a journal, she says. Record your feelings and impressions. The private journal becomes her lessons learned.

From a colleague at Harvard Business school she learned and kept "the notebook system." Buy one of those marble notebooks, like grade school kids use, the one you cannot tear pages from due to the thread binding. List all the things you need to do on the right hand page, and put meeting notes, reminders and phone numbers on the left hand page. Like the journal, this becomes a valuable record for retrieval and reflection.

The Road Ahead
by Bill Gates
New York: Putnams, 1995.

"Human history becomes more and more a race between education and catastrophe," wrote H.G. Wells in 1920. Seventy-five years later, Bill Gates of Microsoft, arguably the wealthiest man in the world, holes up in his summer cabin to bang out a draft of a book on his PC in order to begin a dialogue on the information superhighway, highway or road. He's not sure.

If he were sure, we should all go out and buy his book and invest in the stocks and commodities he deems hot. No need to. *The Road Ahead* is surprisingly simplistic, if not a bit self-serving. Nevertheless, when a guy like Bill Gates or E. F. Hutton speaks, we should no doubt give a listen.

No single theme holds this book together. It is part biography, part polemic and in large part pure speculation. He denounces the appropriateness of the term "information highway" in the Foreword, but uses it uncritically anyway throughout the book.

In essence, Bill Gates agrees with H.G. Wells—education is the best, perhaps the only solution to the bumps and potholes as we ride the information highway. Education will reduce our fears of emerging technologies and will enable us to navigate better the road ahead.

Education to Gates, however, does not mean formal schooling. To him it means tinkering, serendipity, cramming. His biodata is revealing. His best friend (and later business partner) was three years older and able to explain to inquisitive Little Billy how gasoline was made. Later, the teenage hackers with pocket protectors read *Popular Electronics* and got hooked on the Altair (a Star Trek destination) 8800 minicomputer and wrote a language (Basic) for it—the rest is history. At Harvard, Gates cut most of his classes and just crammed for the final exams. The rest of the time was spent developing software and then Microsoft. He dropped out of college at age 19.

Nevertheless, "education" has more hits in Gates' book than any other topic. His main purpose in writing the book is to educate, as a travel guide to the road ahead. If he were the businessman in Mike Nichols' film "The Graduate," his one-word bit of advice to Benjamin (Dustin Hoffman) would not be "Plastics" but rather "Information."

Down the road ahead, Gates sees convergence of television, the computer, cable and telephone into an "interactive media server" for home entertainment and telecommuting business. Out on the road he will carry the "wallet PC" that not only dispenses "digital money" but also sends and receives faxes, email, stock reports and games. It connects to Global Positioning System (GPS) satellites.

Conveyance of media depends, of course, on telecommunications reform, and wireless technology subsumes the Internet somehow. The CD-ROM, however, is praised for its here-and-now potential. He unabashedly plays the "Encarta" encyclopedia disk (brought to you by Microsoft), but the real test will be the CD-ROM that comes with the book. Will "readers" discard the book and pop in the disk instead? After all, that little Road Ahead CD-ROM contains every word of the book *plus* an "interactive" tour of the highway in business, home and school, in brief video and briefer audio selections. There's even an "Ask Bill" application, showing an animated Bill Gates sputtering glittering generalities. A totally useless "web browser" connects you to sample a commercial online service like CompuServe IF you have a modem. If you don't have "Windows 95," forget it. If you have a Mac, forget even the CD-ROM.

In fact, most of *The Road Ahead* is forgettable. His "Implications for Business" are neither fresh nor original, his notions on "Friction-Free Capitalism" are pie in the sky, and the last chapter, "Critical Issues," covers issues that are not critical at all. His attempts to arrive at a pricing policy for intellectual property are as important as the government's attempt to tax the Internet.

Nevertheless, *The Road Ahead* is an easy read (or view, if you use the CD ROM) and mildly interesting (especially when he tells the history of Microsoft or the story of his new house), but the Nov. 29, 1995 *Newsweek* cover story and pictures are better edited and the October *National Geographic* much more informative.

Video Reviews

The Upper Atmosphere Research Satellite (UARS) Mission
with Charles Trevatan
Goddard Space Flight Center, 1992.

The Upper Atmosphere Research Satellite (UARS) Mission is described in this 45-minute video as "tremendously successful" by narrator Lee Blasso. It was delivered two months early, $30 million under budget, and all systems functional properly in orbit.

The PPMI Lessons Learned and Shared Experiences video features the last project manager, Charles Trevatan, who took over in 1991 from Peter Burke when he became Deputy Director of the Goddard Space Flight Center.

The September 12, 1991, launch marked the beginning of NASA's Mission to Planet Earth. The space observatory was to study the Earth's upper stratosphere and mesosphere for ozone depletion during an 18-month mission.

Trevatan said the good news was cost control in addition to performance and schedule, but especially "dedicated people and organizations." Deputy Project Manager John Donley agreed, noting "stability of people" in this 11-year project that began in 1980, especially the scientist investigators. Of the ten science proposals accepted in 1978, eight of them flew.

Dr. Carl Reber, Project Scientist, added that the most important aspect was mission philosophy: that this was a scientific mission with the end-product as science. A well-defined set of requirements assured success a decade later.

Trevatan noted that since this was a multimission spacecraft, the project showed cost savings up front.

Also, "we knew the interfaces right off," he said, referring to thermal, mechanical, etc.

Richard Baker, Deputy Project Manager for Resources, said the UARS had an adequate flow of funds throughout the lengthy project, partly stimulated by the passage of the Clean Air Act. With good control of contract modification and requirements, along with good interface integration schedules, "we were able to avoid downtime with a full pipeline."

Ellen Herring, Data Systems Manager, noted the difficulty in trying to coordinate 20 remote analysis computers in the U.S., France, Canada and England. However, the team focused early on data system activity and gave a three-day stress test for data delivery bottlenecks. She found the "training material too difficult to comprehend" and recommended "modular training" as users are phased in.

The "tremendously successful" project was not perfect. The ISAMS founder from Oxford University failed, due to bad lubricant in the bearings after a change in motor type and circuitry. Also, a motor clutch stuck on orbit after eight months. Trevatan calls this systems failure a "design flaw" rendering the motor commendable but not automatic.

This video was narrated by Len Blasso. Judy Grady Hamburg was producer, director and scriptwriter for Media Specialist Associates. Gene Guerny served as NASA Technical Monitor.

The Cosmic Background Explorer
with Roger Mattson
Produced by Technical and Administrative Services Corporation, TADCORPS, June 17, 1991.

"Lessons Learned in the COBE Project" was produced shortly after the highly successful launch and early scientific data collection which shed light on the so-called "Big Bang" theory of planetary development and background radiation. Within months, the COBE mission provided valuable data for numerous scientific papers and changed the textbooks in astrophysics.

Project Manager Roger Mattson introduces the informative video with three challenges. First, COBE was by far the largest Goddard Space Flight Center in-house project to date. Secondly, COBE involved instrumentation at a level of extremely high sophistication, and the engineering challenge was great. Thirdly, the pressure was on after the Challenger disaster to achieve excellence. The Shuttle accident also meant COBE would be launched from a ELV rather than the Shuttle, and that the original budget would have to be expanded.

COBE Project Scientist John Mather, who had conceived the COBE mission as early as 1974, notes that all scientific objectives were achieved or exceeded in measurement of a 15 billion-year-old phenomenon. COBE was launched nearly on time.

Deputy Project Manager Dennis McCarthy explains how redesign for the Delta meant smaller volume and weight for the spacecraft, and that in turn mean rebuilding some disciplines at GSFC such as systems engineering and better contamination control.

COBE Flight Assurance Manager Abigail Harper, who came on during the final year of the 10-year project, applauded the extensive reporting and documentation on the project. She advised that Performance Assurance is accomplished best by visual inspection on the floor as well as analysis of documentation.

Earle Young, COBE Instrument Manager, describes new procedures for contamination control and was among those who noted difficulty with the matrix organization, which is better for the institution than the project, and which responds technically, but not administratively, well.

Roger Mattson explains the solution: a Skunk Works operation for the three dozen engineers who had to redesign for a Delta launch in one big room. GSFC had no such room, so eight trailers were hitched together, later becoming home for about the same number of Integration and Testing specialists.

The Skunk Works factory later became the COBE "War Room" where each subsystem schedule, manager's name and action item was posted on the wall for all to see.

Observatory Manager Anthony Fragomeni notes that the Skunk Works concept led to better control of money for procurement orders. He said the large success of COBE was "team spirit" engendered by the synergy of young and old on the job.

John Wolfgang, COBE Integration and Testing Manager, said that despite a tight schedule and resources, it is so important to "do it right" and not cut corners on testing and analysis. Training and mentoring were considered vital as well.

In sum, Project Manager Roger Mattson points to three major lessons learned. First, establish ground rules up front, with rigorous WBS and SOWs. Second, communications systems, internal and external were extensive. An open door policy led to monthly reporting systems, an electronics status report weekly and daily telecon with program managers at headquarters to cut off surprises. Third, technical testing procedures on the ground led to few engineering problems to be solved on orbit.

Bendix Field Engineers provided technical assistance to this production for the NASA Program and Project Management Initiative.