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## Resources for NASA Managers

by William M. Lawbaugh

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### ■ What's New in the Program/Project Management Library Collection

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Following is a list of books that have most recently been added to the PPM Library Collection. All of the materials may be borrowed through interlibrary loan from your Center Library. Call Jeffrey Michaels at (202) 358-0172 for further information.

#### **Leadership Jazz**

by Max Depree

Call number: HD57.7.D47 1992

#### **Beyond Race and Gender**

by R. Roosevelt Thomas

Call number: HF5549.5 .M5 T46 1991

#### **Zapp! The Lightning of Empowerment**

by William C. Byham

Call number: HD58.8 .H362 1989

#### **The Age of Unreason**

by Charles Handy

Call number: HD58.8 .H362 1989

#### **The Goal**

by Eliyahu Goldratt

Call number: PR9510.9 .G64 G6 1986

#### **A Great Place to Work**

by Robert Levering

Call number: HP5549.2 .U5 L385 1988

#### **Enlightened Leadership**

by Ed Oakley

Call number: HD57.7 .023 1991

#### **A Whack on the Side of the Head**

by Roger von Oech

Call number: BF408 .V58 1983

#### **A Kick in the Seat of the Pants**

by Roger von Oech

Call number: BF408 .V579 1986

#### **Total Quality Training**

by Brian Thomas

Call number: HF5549.5 .T7 T46 1992

#### **The Wisdom of Teams**

by Jon Katzenbach

Call number: HD66 .K384 1993

#### **TQM Field Manual**

by James Saylor

Call number: HD62.15 .S29 1991

#### **Still More Games Trainers Play**

by Edward E. Scannell

Call number: HM133 .S314 1991

#### **100 Training Games**

by Gary Kroehnert

Call number: T65.3 .K76 1991

#### **Guide to Quality Control**

by Kaoru Ishikawa

Call number: TS156 .G82 1982

#### **Completeness: Quality for the 21st Century**

by Philip B. Crosby

Call number: HD62.15 .C76 1992

#### **Benchmarking: A Practitioner's Guide for Becoming and Staying Best of the Best**

by Gerald J. Balm

Call number: HD58.9 .B345 1992

#### **Continuous Improvement and Measurement for Total Quality**

by Dennis C. Kinlaw

Call number: HD62.15 .K56 1992

**Mining Group Gold**

by Thomas Kayser

Call number: HD66 .K39 1990

**Managing the Total Quality Transformation**

by Thomas Berry

Call number: HF5415.157 .B47 1991

**Are You Communicating?**

by Donald Walton

Call number: P90 .W24 1989

**Beyond the Hype: Rediscovering the Essence of Management**

by Robert Eccles

Call number: HD31 .E27 1992

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**■ Book Reviews**

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**Peak Performers:****The New Heroes of American Business**

by Charles Garfield (New York: William Morrow &amp; Co., 1986)

“To me, Apollo 11 represented a temporary end to a peculiar form of discrimination,” says the author of *Peak Performers*, “the discrimination against being the best you can be.”

Charles A. Garfield worked for Grumman Aerospace on Long Island in 1967 when “going to work there every morning was like signing up for one of the great adventures on Earth.” As a novice computer programmer, he helped design and build the Lunar Excursion Module for Apollo 11. There and then Garfield decided to study “missions that motivate” and find out more about the high-level achievement he saw and experienced in the Apollo program.

After Apollo, Garfield left his career in mathematics and pursued a Ph.D. in clinical psychology. Along the way he interned in the cancer ward of a California medical center, thinking these patients were the exact opposite of the peak performers he met at Grumman and NASA. Wrong.

The courage to stay alive he saw there convinced him that the “focus of control” for peak performers was not external but internal.

In 1979 he had a chance meeting in Milan, Italy, with Soviet-bloc physiologists, doctors and research psychologists who changed the whole nature of his study. There experts from East Germany, Bulgaria and the Soviet Union told Garfield about the “psychophysics” used by their Olympic athletes to access their hidden reserves and “actualize their human potential.” They explained how peak performance can be learned—deliberately, systematically and predictably. “My heart started to pound,” says Garfield.

After some relaxation techniques, Garfield engaged in visualization exercises, imagining himself lifting 365 pounds of barbells confidently. He then actually did it, with their encouragement and to his amazement. He experienced the same exhilaration he felt during Apollo.

Over the years as a clinical psychologist, Garfield isolated six factors that constitute peak performance in athletics, business, government and the arts.

1. **Missions that motivate.** As JFK did for Apollo, someone gives the call to action that pulls people together for a common achievement. Some call it “inspiration.”
2. **Results in real time.** Intangible rewards along the route to the goal of a mission, such as meaning, satisfaction or a sense of improvement.
3. **Self-management.** Self control and self mastery towards a clearly defined goal. Some call it “discipline.”
4. **Team building.** Empowering others after self-mastery. Some simply call it “teamwork,” a buzzword of the 1990s.

5. **Course correction.** Finding and navigating a critical path. Change is not only inevitable but anticipated by peak performers.

6. **Change management.** This involves lifelong learning, expectations of success, mental rehearsals and constant renewal.

These six factors are perhaps not the only attributes of peak performance, but they are the ones researched and confirmed by Garfield as he studied people at their best. He gives examples and anecdotes to describe each factor in each successive chapter.

In the end he says peak performers know who they are instinctively, and that the condition is dynamic, not static. He quotes psychologist Carl Rogers: "The good life is not any fixed state . . . nor contentment, nor nirvana, nor happiness," thus debunking a host of American dreams. Rather, "The good life is a *process*, not a state of being. It is a direction, not a destination." So, too, is the attitude of a peak performer.

*Peak Performers* was published in 1986. Since then much has happened in the world, especially in the former Soviet Union. We can chuckle when Garfield praises People's Express airline or quotes *Jane's Spaceflight*, for example: "The U.S. is developing a new breed of military astronauts, because generals fear that superpower skirmishing in space is 'almost inevitable' in the next 25 years."

Nevertheless, Garfield's book is still quite relevant and enjoys a renewed level of interest. It is light and clear enough as a beach read, but most readers get the idea that the author is in search of something magical and elusive. He's on to something, but whether he has captured it or put it in a bottle is doubtful. That he has tried, however, does seem very important.

### **The Seven Habits of Highly Effective People: Restoring Character Ethic**

by Stephen R. Covey  
(New York: Simon & Schuster, 1989)

Jim Fletcher says this book "suggests a discipline for our personal dealing with people which would be undoubtedly valuable if people stopped to think about it." Charles Garfield calls it "a wonderful contribution." He adds: "Dr. Covey has synthesized the habits of our highest achievers and presented them in a powerful way." Lavish praise for what has become the most widely read success book of the 1990s.

It all began when the Brigham Young University management professor took a sabbatical to Oahu, Hawaii. At the college library, "my eyes fell upon a single paragraph that powerfully influenced the rest of my life." The unquoted paragraph "basically contained the single idea that there is a gap or a space between stimulus and response, and that the key to both our growth and happiness is how we use that space." In other words, it doesn't matter what happens to us, good or bad—what really matters is how we react to the events in our lives. They either build us up or break us down.

The BYU professor notes that the first 150 years of "success literature," beginning with Ben Franklin's autobiography, centered on what he calls "Character Ethic." The past 50 years or so centered on "Personality Ethic" which Covey finds superficial, clearly manipulative, intimidating and even deceptive.

These later success books tried to change outward behavior and style, but Covey says the only real change is internal, "inside-out." He calls for a "principle-centered paradigm shift" (echoing the buzzword of the 1980s) from "get rich quick" schemes and "wealth without work" to self-evi-

dent principles derived from “natural laws” such as fairness, service, quality and integrity.

Yet, when Covey lists and describes the seven synthesized habits or regularized principles, they differ little if any from the Dale Carnegie–Earl Nightingale–Peter Drucker–Tom Peters–Charles Garfield success literature the author describes. Certainly the seven habits will not hurt anyone trying to succeed. The reader is not convinced, however, that these are the top seven, much less that only seven habits are needed to provide “a holistic, integrated, principle-centered approach for solving personal and professional problems.” Nevertheless, they are interesting and useful, and they include:

1. **Be Proactive.** “Between stimulus and response, man [and woman] has the freedom to choose,” says Covey. Proactive people do not blame others or make excuses, but rather choose deliberately and turn failures into learning opportunities. Eleanor Roosevelt once said: “No one can hurt you without your consent.”
2. **Begin with the End in Mind.** This is the book’s longest chapter, perhaps because it is the most derivative. Covey here asks every potential leader to write a personal family and work group mission statement and then affirm and visualize it. “One of the main things his research showed,” says Covey, referring to Charles Garfield, “was that almost all of the astronauts and other peak performers are visualizers. They see it; they feel it; they experience it before they actually do it. They begin with the end in mind.”
3. **Put First Things First.** In the previous chapter Covey quoted Drucker and Bennis: “Management is doing things right; leadership is doing the right things.” In this chapter, he advises: “Organize and execute around priorities, and discipline to say no or delegate adroitly.”
4. **Think Win/Win.** This involves a shift in thinking from a paradigm of competition (I win, you lose) to one of cooperation where “agreements or solutions are mutually beneficial, mutually satisfying.” Covey is speaking of cooperation in the workplace, leaving All-American Competition for the marketplace.
5. **Seek First to Understand, Then to Be Understood.** Although Covey does not attribute this habit, it derives from the “Prayer of Peace” of Francis of Assisi. Covey calls it “empathic listening,” from the term empathy. Since oral communication is only 10 percent by words, 30 percent by sounds and 60 percent by body language, this empathic listening calls for listening with your ears, your eyes and your heart or soul. Then you really connect.
6. **Synergize.** Another ’80s buzzword, like “paradigm” or “empower”. As described, synergism is the third alternative of two opposing views—not the dichotomous either/or stance, but both/and, or as Covey would have it, win/win. His business associates, through synergistic free association and brainstorming, came up with their mission statement: “Our mission is to empower people and organizations to significantly increase their performance capability,” which throughout the book is abbreviated as P.C.
7. **Sharpen the Saw.** Principles of balanced self-renewal. Here Covey tries to synthesize the six habits into a seventh but actually produces the best chapter of the book. His marvelous Four Dimensions of Renewal can stand alone: physical (invigorating exercise), spiritual (meditation as a source of power), mental (read a classic a week, keep a journal) and social/emotional (in service to others for true happiness).

This chapter should be read first, especially by those who are interested in TQM. Over all, *The Seven Habits of Highly Effective People* is nicely

written but hardly original. The documentation is poor, and some lists and charts are bewildering. (There's even an 800 number where you can call for even more charts, plus a catalog from the Covey Leadership Center and a list of upcoming Covey seminars, retreats and newsletters.) Some readers swear by this book; others look at it as just another success book. A lot of people are still buying it, hoping to become better leaders and managers.

### **Readings in Systems Engineering**

Ed. by Francis T. Hoban and  
William M. Lawbaugh  
NASA SP-6102 Washington, 1993

The core of this collection of 17 widely divergent approaches to systems engineering consists of specially commissioned papers from the NASA Alumni League. Owen Morris, Chuck Mathews, John Hodge, John Naugle, Kranz and Kraft, Yardley and Wensley, and Bob Aller are all represented here, along with people who made their mark on systems engineering in government and industry.

The collection begins with the classic formulation of systems engineering given in 1969 by Robert A. Frosh. His common sense approach sets the tone for the next dozen or so analyses and slants on a difficult subject. Not just successful tools and techniques are described and discussed, but failures as well, in particular Skylab 1 and the 1978 Seasat mission. The book ends with a jovial reaction to this discipline as it was being introduced in one of the NASA Centers 25 years ago.

*Readings in Systems Engineering* is 218 pages, but readable and clearly presented. Designed primarily for the next generation of systems engineers, the book shows the richness of diversity in an increasingly important emerging management discipline.

### **NASA Systems Engineering Handbook**

By Robert Shisko and  
Robert G. Chamberlain, et al.  
PPMI Publication—Draft September 1992

“This handbook was written to bring the fundamental concepts and techniques of systems engineering to NASA personnel in a way that recognizes the nature of NASA systems and the NASA environment,” the authors say. That’s no easy task, but the 120-page handbook is amply illustrated and well written.

As the authors indicate, the content as well as the style of the *NASA Systems Engineering Handbook* shows a teaching orientation. That’s because the book covers many of the topics taught in NASA’s Project Management and Program Control courses.

The handbook consists of four main sections and three helpful appendices. Part one includes definitions and descriptions of systems engineering, while the second section takes the NASA Project Cycle from Phase A through Phase F, plus funding and product development. The material on the project cycle is drawn from the work of the Inter-Center Systems Engineering Working Group, which met periodically in 1991.

The third and lengthiest section covers “Management Issues in Systems Engineering,” including the Systems Engineer Management Plan (SEMP) the WBS, scheduling, resource planning, risk management, baseline management, reviews and reports. Section four is called “Systems Analysis and Modeling Issues.” It includes the Trade Study Process, cost modeling, effectiveness measures and handling uncertainty.

The appendices consist of the inevitable acronym list, a unit called “Use of the Metric System” with a handy conversion table and, best of all, a set of

eight systems engineering templates and examples, including three techniques of functional analysis.

Currently the handbook is being tested out in NASA's Program/Project Management Initiative and is under review from experts in the field. The *NASA Systems Engineering Handbook* is not a substitute for a Center handbook, but the two are, or should be, complementary. No footnotes are used to clutter the narrative; sidebars are used instead. Two foldout charts in the second section are referred to in the discussion of the NASA Project Cycle.

### **The NASA Mission Design Process**

An Engineering Guide to the Conceptual Design, Mission Analysis, and Definition Phases  
NASA Engineering Management Council  
December 1992

Shortly after the NASA Engineering Management Council (EMC) was formed in 1991, the need emerged for a clear, compact definition of the mission design process. This slight, 64-page document is described as a "reference compendium of proven approaches to be used by those knowledgeable and experienced in NASA projects and aerospace technology."

It is a handy document, consisting of six sections, including a detailed glossary in the introduction, a compact list of acronyms at the end, and several detailed charts and tables to display the flow of design activities.

"Implementing and Managing the Study Process" shows how a study team is formed and offers guidelines of the necessary, thorough study effort. The authors suggest "6-10 percent of the development costs" be allocated to mission design. They say cost problems during Phase C/D will be minimized, but if less is spent, "larger margins and contingencies must be maintained" until proper definition of requirements and systems.

The biggest section is devoted to "Mission Design Activities" and covers the basic activities and tools from requirements to technical performance measurement for familiar and new technologies. In discussing cost, schedule, performance and risk, the authors make distinctions between robustness (the ability of a system to absorb changes) and flexibility (design features that permit workarounds in problems on orbit). They emphasize the obvious, but often forgotten: "Any schedule extensions will always result in a cost increase."

The subsequent sections cover Pre-Phase A (conceptual design) studies, Phase A (mission analysis) and Phase C/D (execution) but not launch nor mission operations, often described as Phase E and F. A brief closing section on "Conducting a Compressed Study" suggests that communications lines be shortened, decision-making streamlined, design meetings held daily and the list of activities be prioritized. They also advise "maximum utilization of existing designs and hardware" for a compressed study.

*The NASA Mission Design Process* is available from the EMC or from Dr. Michael G. Ryschkewitsch, Code 704, Goddard Space Flight Center.

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## Video Reviews

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### **International Ultraviolet Explorer**

Lessons Learned and Experiences Shared  
in NASA Project Management  
1992: 30 min.

On January 26, 1978, a three-stage Delta rocket carried what the narrator, Carter Dove, calls "the world's most productive astronomical satellite" into a low elliptical orbit. IUE was one of the first general-purpose research facilities launched by NASA.

Dr. Albert Boggess, Project Scientist, attributes much of the success to good communications among scientists, engineers and managers on the project. Project Manager Gerry Longanecker explained how managers would alternate meetings between the U.S. and Europe while Britain built the four onboard cameras and ESA supplied the solar arrays. Weekly conference calls were placed at a prescribed time to England.

Charles Freschsel, IUE Operations Manager, points to the “complete and unambiguous requirements” and “thorough testing” as key ingredients, while Kenneth Sizemore, Spacecraft Manager, describes IUE’s unique onboard computer for attitude control. He says that fixed-price contracts were used for off-the-shelf items while cost-plus was better for the gyros, which needed substantial development.

The big management challenges were Delta weight restrictions and delays from the British telescope manufacturers. A dedicated engineer resolved IUE’s hydrazine temperature problems early in the project. Tradeoffs and workarounds saved the day for IUE.

This half-hour video was produced under the auspices of PPMI Program Manager Edward Hoffman and is available from the NASA Headquarters Library.

### **The International Sun Earth Explorer-3 Mission**

Lessons Learned and Experiences Shared  
in NASA Project Management  
March 1991: 30min.

In 1978, ISEE-3 was launched on a Delta rocket from Cape Canaveral Air Force Station on a 930,000-mile mission to study the effect of solar wind on Earth’s magnetosphere. Its flexible design and contingencies gave ISEE-3 a much longer life than the expected three years.

Project Manager Jerry Madden is an advocate for MBWA, management by walking around or wandering about. “You’ve got to know the base of the pyramid,” you can miss an engineer or two, but these technicians “make it work.”

Deputy Project Manager Dr. Stephen Paddock explains the teamwork that brought ISEE-3 in on schedule and under budget. John Hraster wore two hats as Systems Manager and Mission Operations Manager, while Experiment Manager Martin Davis describes the flexibility needed to coordinate 12 instruments from Goddard Space Flight Center, other NASA Centers, the European Space Agency, industry and academia. Spacecraft Manager Don Miller, the rookie on the team, tells how the cost-plus award fee contract took more time but was suitable for the integration and testing of subsystems manufactured inhouse.

Jerry Madden has lots of advice for younger project managers. First of all, delegate authority and give others plenty of resources but “never tell them how to do it.” Also, no surprises or shocks for Headquarters: inform them, warn them in advance of any potential problems, and invite them to open, major meetings. An unexpected request for much more money for your projects means “you hurt some other project . . . someone else has to pay for your mistakes.”

Like the IUE video, the ISEE-3 ends with a list of about a dozen “lessons.” The narrator, Carter Dove, indicates that a subsequent PPMI video will feature the follow-on project, ICE, the International Cometary Explorer, which evolved from this one. The PPMI Librarian at NASA Headquarters Library can provide this and other PPMI video productions through Center librarians.