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ASK

"Reviews are for the reviewed and not for the reviewer. The review is a failure if the reviewed learn nothing from it."

Jerry Madden, Rule #37 from
One Hundred Rules for NASA Project Managers

APPL   The NASA ACADEMY OF PROGRAM AND PROJECT LEADERSHIP

Contents

No Dog and Pony Shows, Thank You
by Todd Post

Not everyone looks forward to reviews. Dog and pony shows I've heard them called. Exercises in putting together Power Point charts. Other less tasteful descriptions abound, but I won't bother to summarize these. This is a tasteful magazine after all. In this issue, we've assembled a number of articles on the subject of reviews, particularly as they occur in the NASA project world (although we cover the subject from other perspectives too).

Veteran NASA Project Manager Marty Davis, in his article *Tangled Up in Reviews*, writes, "Many people regard reviews as something onerous, but if we can tailor them so that they're not as bad as they have to be, it can be a great benefit to a project manager." Great benefits to the project manager is what you'll find in Marty's story as he describes not only tailoring a single review but the entire lifecycle of reviews in his project.

In Jo Gunderson's story, *Calling Down the Fire on Yourself,* she describes a young NASA Project Manager who does just that because, as he tells her, "I needed to know if there was anything that I had overlooked." How he brings fire down on himself at his project review will inspire other young Project Managers, seasoned managers, and anyone else who reads this powerful story.

Leave Your Ego at the Door, by Jenny Baer-Reidhart and Ray Morgan, uses reviews to highlight the creative collaboration that existed between NASA and one of its industry partners. The protagonist of this story is a company who took advantage of NASA's expert advice during reviews and accomplished amazing feats as a result. The story also examines how disasters might well have been avoided by two other NASA partners had they been as open minded as the first company during their reviews.

In Roy Malone's story, *Standing Offer,* a NASA Project Manager describes how he used a crack review team to help him pass a critical certification inspection while he was a Combat Systems Officer in the Navy. Malone invited the reviewers to come back several times so that they would be able to focus in detail on the many areas of the program that would be scrutinized during the certification inspection.

These are just a sampling of some of the articles you'll find in this issue of *ASK*.

We believe this issue offers ample evidence that talented Project Managers know how to use reviews to the great benefit of their projects. A talented Project Manager will typically figure out a way to turn any onerous task into a useful learning exercise. These Project Managers demonstrate that the real value of reviews is that they provide a chance to learn something. No dog and pony shows here.

ABOUT THE AUTHOR

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Understanding Who WE Are

by Dr. Edward Hoffman

ABOUT THE AUTHOR

Dr. Edward Hoffman is Director of the NASA Academy of Program and Project Leadership. He is responsible for the development of program and project leaders and teams within NASA. Dr. Hoffman develops training curricula, consulting services, research projects and special studies in program and project management. . You can contact him at **ehoffman@hq.nasa.gov**

The path to greatness is along with others.
> Baltasar Gracian, *Oracular Manual*

Some things at NASA were simpler years ago. In project terms, the "team"meant the NASA civil service team. Now the NASA project team is sometimes only a few civil service members, supplemented by a far larger contractor workforce. In fact, under the era of smaller is better, the project team includes multiple industry players, international partners, several NASA centers and university-led missions. You really have to keep a scorecard to know all the players.

This evolution has caught all of us by surprise. Just the other night,I was talking with a NASA project management class about the things we must do to increase the likelihood of mission success. Then the realization came booming down, every one in the classroom was a NASA civil servant (along with several participants from other government agencies),which is typically only about 10% of a project team. Sadly, the other people who make up the team were not there.

Perhaps you think this is simply a training problem. Alas, based on my experience, it's just as knotty of an issue in other parts of the program world.

Our Agency policy and guidelines document for the management of programs and projects (7120.5a) was written to improve the management of our programs. However, the document addresses only that part of the workforce who are NASA-badged. How much impact can it have on a project when 90% of the team is not the intended audience?

To me it is clear that the time has come to consider redefining who the WE are on a project team. Let the WE be consistent with what we all know that it connotes. Perhaps the agents of change who have promoted the present environment can assist us by rethinking the stupid policies and regulations that make partnering so difficult. (How many of you have noticed the number of rules that make working across organizational lines so frustrating?)

Reading through the stories in this issue, I am comforted by the fact that there are outstanding project leaders and team members within NASA who are successfully dealing with the de facto WE of a project team. Clearly, in these examples the project leader has embraced the role of partnering and sought common sense and creative ways to work together effectively. The starting point seems to be acknowledging the new nature of working with others – understanding who WE are – and then moving from there to form a great team.

Stories as Agents for Change

by Dr. Alexander Laufer

Stories are Just for Children

In 1971, when I started my career as an engineer, I would have laughed if somebody had told me that I would compose three professional books, and lead a professional magazine for NASA – all focusing on stories.

As a young engineer my primary tools were mathematical models for designing structures. When I pursued my master's degree I shifted to operations research models. Following my Ph.D., I went back to industry and developed and implemented comprehensive computerized tools aimed at controlling project time and cost. When I decided to join academia, in 1983, I added to my professional arsenal statistical tools.

My research results throughout the 80s gradually brought me to change my research methodology. I abandoned impersonal tools and focused on firsthand data, primarily direct observations of behavior, case studies, and personal interviews. As a researcher working closely with practitioners during those years, I learned to reverse the question I used to ask when I first joined academia: "Why don't practitioners use what researchers know?" I began to ask, "Why don't researchers use what practitioners know?" Moreover, I learned firsthand that competent practitioners usually know more than they can tell.

My main research efforts, therefore, were devoted to identifying the most competent practitioners; uncovering, formulating, and articulating their "tacit" knowledge. I did this by proposing a theoretical interpretation of actual project practices. This interpretation was then presented to my co-researchers -- the competent managers -- for their judgment, to see how well it fit with their personal experience. However, throughout these years it never even occurred to me to use stories for generating or disseminating knowledge. I believed that stories were only for children and I had a good personal reason for this.

While my wife took most of the burden of upbringing our four children, bedtime stories were left for me. Between 1980 and 1995, for almost every night, I told my children a bedtime story, and since it turned out that they preferred my own fictional stories, I became eventually quite good at composing children's stories. My children and I were eagerly waiting for the bedtime ritual, which always brought a new story and a new surprise for them and for me. These fictional stories became our small-cherished secret. However, when each of my children reached the age of 10, the ritual stopped. They preferred their own books to Daddy's stories. This sharp shift in their interest only enhanced my confidence that stories are just for children.

ABOUT THE AUTHOR

Dr. Alexander Laufer is the Editor-in-Chief of ASK Magazine and a member of the Advisory Board of the NASA Academy of Program and Project Leadership. He is also a visiting professor of the Civil Engineering Department at the University of Maryland at College Park and a Professor at the Faculty of Civil Engineering at Technion-Israel Institute of Technology. You can contact him at **allaufer@eng.umd.edu.**

Stories as Agents for Change (cont'd.)

Using Stories to Change   Your Eyeglasses

In 1991, when I felt I was ready to test my research results I took it upon myself to find a suitable, real-life "laboratory." Believing that consultation is the only feasible way to test research results and to collect rich and unfiltered feedback firsthand, I began looking for an appropriate organization. Procter & Gamble (P&G) met all my demands: a very progressive organization, which had to cope with high uncertainty and accelerated speed in its project delivery, and was known to hire high quality people.

My charter was quite broad -- to use my research products in order to improve project management at P&G. My sponsor, Gordon Denker, who encouraged me to "consult by wandering around", was the key to my ability to function both as a consultant and a researcher. Though he set down some general guidelines, I was basically given a free hand in proposing my assignments. This was a dream come true, but it demanded great effort -- I had to market myself throughout the organization, generate my own customers, and satisfy their immediate business needs. P&G was expecting that my "action research" role would in no way affect my commitment and service to them as a consultant.

I initiated a wide range of activities: training, review of procedures, development of tools, and many "learning-from-experience" discussions conducted in small groups. My main effort, however, focused on working directly with project teams of ongoing projects.

The feedback was excellent, yet I was not fully satisfied. First, the pace of implementation did not seem fast enough. Second, the project management approach I was introducing called for *adding on* some new project management principles and tools, as well as *letting go* of some old ones. The *letting go* was not embraced so easily, particularly by the less experienced project managers.

During my third visit to Cincinnati, I realized that the conventional mode of consulting was insufficient for the quick, wide, and lasting assimilation that was essential for valid research implementation feedback.

My answer to this problem was storytelling. Why? Because I realized that my role was similar to that of an optometrist -- trying to convince people that in order to change the way they viewed the world, they would have to change their eyeglasses. I also realized that people's minds are changed more through observation than through argument. I therefore thought that the telling of real-life stories by credible and successful managers, colleagues from their own company, would serve as an efficient substitute for observation.

> " I learned firsthand that competent practitioners usually know more than they can tell. "

The idea that successful and busy project managers should set aside the time to tell and write stories was not adopted easily. First I had to overcome the prevailing feeling that stories are meant for children and not for managers. Even including the word story, in the title of a booklet we produced as a pilot, was deemed inappropriate. Then I had to overcome the disbelief of the managers in their own writing ability, and to convince them that the effort was worthwhile. But once we started, there was no way back. Almost everyone who saw the booklet became enthusiastic immediately and wanted to contribute his/her own success story.

The results of my effort at P&G exceeded my wildest expectations. At the conclusion of a workshop where project managers presented and discussed their stories, Gordon Denker commented: "I would never have believed that such a profound change in language, focus of attention, and way of thinking could have taken place within a two-year period."

The final product, the book of stories, was composed of 70 stories written by 28 project managers, and it is still in use at P&G. Since I launched my first storybook project in 1991,I have learned that stories have many other unique attributes that render them so powerful in capturing and disseminating knowledge. More on these unique attributes in the next issues of ASK.

PS: By the way, what should I make of the fact that my grown up children still read fictional stories? It seems that stories are good for all ages, but my fictional stories just for children.

" [the] project management approach I was introducing called for *adding on* some new project management principles and tools, as well as *letting go* of some old ones."

Tangled Up in Reviews

by Marty Davis

ABOUT THE AUTHOR

Marty Davis is the Program Manager of the Geostationary Operational Environmental Satellite (GOES) at the NASA Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. Mr. Davis is the recipient of many honors, including Goddard's highest award, the Award of Merit, in 1989 and NASA's highest award, the Distinguished Service Medal, in 1995. In addition, he received the NASA Outstanding Leadership Medal in 1991 and the NASA Exceptional Service Medal in 1979.

Start Dreaming

Let me tell you about a dream I have. This is one of those dreams with a capital D. It's not the kind of dream in which you wake up feeling refreshed and well rested; rather, this is the kind of dream that keeps you up at night, wondering how to get it out of your head and into other people's.

A little background first. As we all know, here at NASA requirements keep coming. Not surprisingly, they seldom go away. Reviews, for instance. Over the years we have seen many additional reviews laid on us. There are at least a dozen reviews in the life of a project. While I don't mind doing a review—if I feel like I'm getting value out of it—when these things are thrown on helter skelter and there's never a look at combining or refining them, then each new review feels like just another requirement, another hoop to jump through, which is frustrating because you've got to spend time and effort preparing for it.

So this got me to thinking, there must be a better way to do reviews.

What I wanted was something quite simple, to combine as many of the reviews as possible. The External/Independent Readiness Review…The Independent Annual Review…The Pre-Ship Review…The Red Team Review… There is so much redundancy in all these, not to mention the many other reviews I won't bother to enumerate, there's got to be a way to streamline the process.

I wanted a review team made up of some internal people and some external people, and to bring this team in as part of the total review process. Use these same people throughout the entire lifecycle of reviews, from the very first design reviews to the last ones just before launch. If you brought this team in as part of the total review process, things could get checked off when they needed to be reviewed and you wouldn't have to revisit them unless it was absolutely critical. You would also have the advantage of the same external people reviewing you earlier in the program.

Apprehensive at first, I shared this dream with a Goddard colleague. Guess what—he had the same dream. Maybe then there are others, we said to each other.

We both understood that if we were going to do anything significantly different in our own projects, there had to be changes across the board; so we met with our boss to try and get buy-in from him.

What we were proposing was really just straight out of 7120.5 A, the established framework for managing programs and projects within NASA. Within this we are allowed to do a certain amount of tailoring. Most people are reluctant to because it's not so easy to get approval. Quite honestly, I was prepared to push for it on my project whether I could sell it to the Center or not.

The Other D-Word

There is a saying, "the devil is in the details," and as it turns out that's where the fighting often occurs too. Many of my colleagues agreed the status quo needed to be changed, but when I began spelling out how I wanted to do it, I could see I was going to have to fight for my way.

Some of our management at Goddard thought I was too involved in specifying what the composition of the review team should be. Indeed, I did specify the composition, but getting good people was the whole point as far as I was concerned. I was assigned an internal co-chair and recommended an external co-chair, and I told the internal co-chair that he could have 7 members including himself, and I said the same to the external co-chair. I also said to them neither of you can duplicate the same technical specialties. If one of them had a thermal person, the other could not. If all this sounds imperious, well, I've been at NASA going on close to four decades and when you've been here that long, you learn that to get what you want sometimes you have to get into the details.

Another thing that raised their hackles was that I wanted to bring outsiders into the review process right from the start. To my mind, internal reviews have only limited value. With internal reviews, you do a presentation, you answer questions, they give you requests for actions, and then they go away and you sit down and try to answer them. You mail them to somebody and they tell you whether they are unacceptable. What I wanted was something more like how External Reviews are conducted, where you give a half to a full day of presentation and then the review team identifies where they want to meet one-on-one. You're being reviewed to a greater depth in selective areas. Something in the presentation that piques their interest is identified as something to review in more detail.

While all this was being vetted by management, I did something else that gave people pause. I decided to go ahead and incorporate this approach into my reviews right away. I saw no point in waiting, as we still had several more reviews ahead and there are benefits, I believe, beginning at any point in the project. I put together the review team and we tried it out. My feeling was, let someone stand up and stop me.

We held the first review using this model in February. The charter for this integrated independent review team (IIRT) was to find anything that could go wrong. The review lasted for two days, one day of presentation, one day of one-on-one, and then a caucus with the review team.

I think it worked. How do I know? One way is I ask myself, Do I feel like they actually penetrated some areas with a reasonable degree of detail, and do I feel like I've

"What I wanted was something quite simple, to combine as many of the reviews as possible."

"… I've been at NASA going on close to four decades and when you've been here that long, you learn that to get what you want sometimes you have to get into the details."

Tangled Up in Reviews (cont'd.)

> "Many people regard reviews as something onerous, but if we can tailor them so that they're not as bad as they have to be, it can be a great benefit to a project manager."

truly been reviewed? In this case, the answer is yes and yes. They identified areas of potential concerns and had thorough one-on-one discussions with our engineers. We had the opportunity to sit down and discuss the items, close them, and the ones we couldn't close at the review we got a Request For Action (RFA).

To me this is the way a review should go. We left with just 5 RFAs because we worked the rest of them off in real time with the technical experts on our side and the technical specialists on the review team side. One-on-one discussions allowed us to convince the reviewers that we knew what we were talking about. That's what the reviewers want, to have confidence that you approached this problem carefully and you have a process for solving it.

On the Horizon

I plan to use my tailored approach throughout the life of GOES N-Q. My boss has been very encouraging and a strong advocate for this at HQ. The Systems Management Office (SMO) here has taken the concept and tried to get buy-in from other centers. SMO has also gone to the Chief Engineer's Office at HQ and gotten them to agree in the next rewrite of 7120.5 that a process like this should be recognized.

Many people regard reviews as something onerous, but if we can tailor them so that they're not as bad as they have to be, it can be a great benefit to a project manager. A crack review team can help you identify problems in your project, and that may make the difference between mission failure and mission success. Plus, isn't it comforting to have a review team, this team of experts, come in and try to penetrate areas in your project and tell you that you are doing things right?

Lessons

+ Ensure that project reviews are for the one being reviewed and not for the reviewer.

+ Reviews should encourage joint problem solving rather than just reporting. To do this, ensure that the review process is viewed as feedback from independent and supportive experts.

Tangled Up in Reviews (cont'd.)
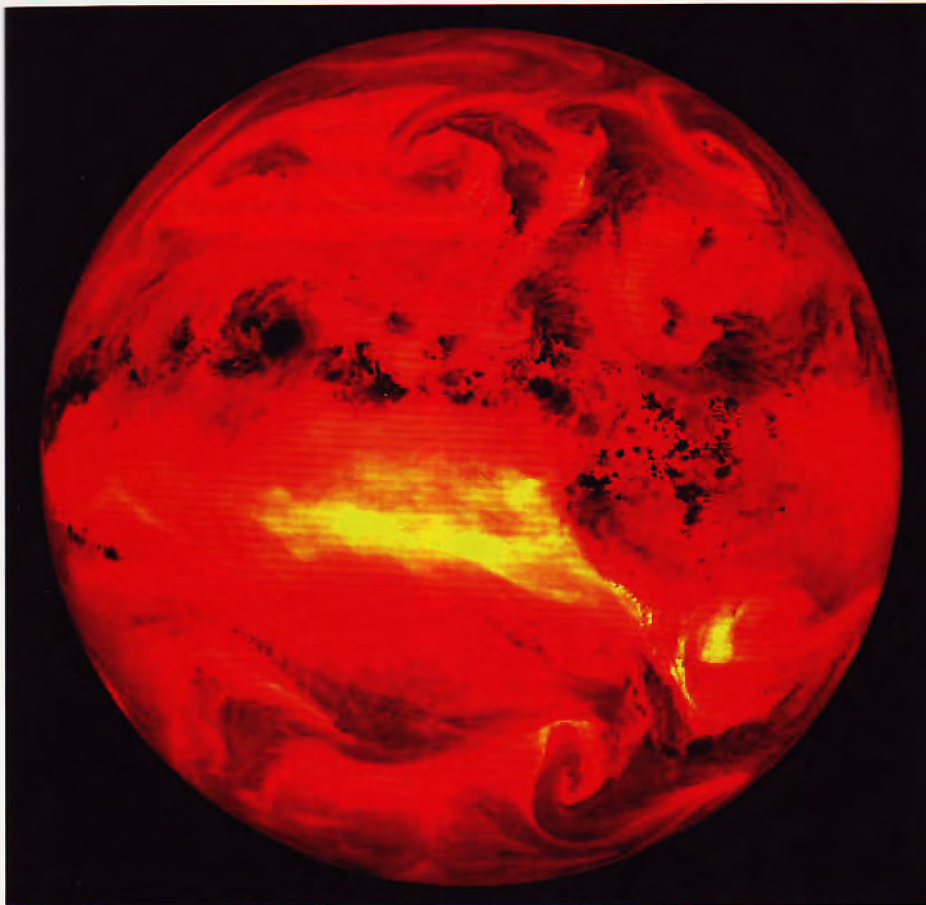
Earth: Water vapor-controlled radiation losses are revealed by 6.7 micron imagery (picture from GOES satellite).

? Question

Let's indulge our dreams for a little while. How would you change the review process on your own projects if you were suddenly given the opportunity to do so any way you wish?

You Don't Have to Crash to Have Impact
by Sylvia Cox

ABOUT THE AUTHOR

Sylvia Cox works in the Space Projects Division at NASA Ames Research Center. Currently, she is involved in evaluating and coordinating new business opportunities for the Division. Sylvia was the Mission Manager of Lunar Prospector, which successfully completed its extended mission to the Moon in July 1999. Prior to Lunar Prospector, she supported the Space Infrared Telescope Facility Project (SIRTF) and the Stratospheric Observatory for Infrared Astronomy (SOFIA).

As Deputy Mission Manager on Lunar Prospector (LP), I had periods where the cost constraints and the inherent difficulties of space hardware development made me wonder if we were going to get this project off the ground.

The Concept Definition Phase was rocky. It was the first competitively selected Discovery project, and so the process for gaining approval to move into development needed to be defined. In addition, the Contractor team was slow to coalesce into an efficient team. The core management team consisted of two NASA team members (Mission Manager and Deputy Mission Manager) and two contractor team members (Principal Investigator (PI) and Project Manager). As the team prepared for the independent review that would allow us to move into development, several major design /development/test issues remained undecided. To further complicate matters, the first demonstration launch of the proposed Lockheed Launch Vehicle had failed.

Three weeks before that independent review, the contractor, thankfully with the PI's strong concurrence, replaced the Project Manager. The first thing the new Project Manager, Tom Dougherty, did after joining the team was bring everyone together and address the immediate task of getting through this review. "We need to approach this review as an opportunity and not see ourselves as being on trial," he said. "We should use the expertise of the review committee to provide us input on potential trades and solutions for development. We want to have them help us with our problems."

It seemed to me an incredibly startling thing to say. Startling for it was so different than the crisis mentality that afflicted the project before his coming on board. In addition, it was so different from the apprehension with which I had seen reviews treated on other projects. We all knew that several areas of design would not be completed by the date of the review. We expected to be raked over the coals for this by the reviewers. I personally was extremely concerned about the team's performance in this review, but Tom's positive attitude and motivational management style instilled in us a confidence we hadn't known as a team until then.

As it turned out, Tom also had a powerful affect on the review committee. Despite their concerns, his genuine openness and collaborative approach convinced them that we were committed to delivering on this mission. Based on the independent review team's recommendation, LP moved into development in a few months. Not long after that, our invigorated team had a point design to work with and had begun long lead item procurements and finalizing the detailed design.

Attitude Was Only Half of It

But it was more than just a change in attitude that took place when Tom took over as the project manager. Under Tom, the emphasis of the entire project was on informed, timely decision making based primarily on a system of frequent reviews, and on systematic and simple monitoring systems.

NASA's Lunar Prospector is readied for launch as its gantry-like service tower is rolled back at Cape Canaveral Air Station Launch Complex 46.

"Three weeks before that independent review, the contractor, thankfully with the PI's strong concurrence, replaced the Project Manager."

The project was very constrained in cost and schedule. Given a little over two years to complete all phases of design and development, the LP team had to deliver five new science instruments, a spacecraft, and a launch vehicle in time for launch. To meet these objectives required a management team that was not only compact but also clearly focused.

Our four-person management team evolved into a cooperative decision-making body

You Don't Have to Crash to Have Impact (cont'd.)

"Everyone on the team had to be available to immediately work problems and resolve issues that came up in [meetings]."

"The success of the mission is perhaps the biggest demonstration of the results of the changes that were made."

that dealt with problems quickly and confidently. This was critical in taking advantage of the many practices Tom put in place. The most significant of these involved the use of weekly subsystem reviews. One day a week was set aside for these reviews. Everyone on the team had to be available to immediately work problems and resolve issues that came up in them. The team all kept working on their assigned tasks, but if, and when, it was necessary, we were available to converge on a problem to solve it together, and we began working problems on the spot.

We also had a two-hour meeting once a week where the whole team received a status on project accomplishments, key issues and overall project process. In this meeting, we reviewed the status on all open action items. Cost and schedule concerns were openly and freely discussed, and Tom sought input from anyone who wanted to either comment or ask questions. These meetings also allowed us to coordinate other meetings or address specific problems with all the necessary parties right there in the room.

These team meetings served as a forum for open discussion of issues and paved the way for better communication and reporting with the NASA Program Office. Tom wanted a policy of complete openness between the government and within the entire LP team. All meetings were accessible; all written reports, including the contractor's internal status reports to their management, were available to the government.

Another important practice he put in place was allowing subsystems to go through individual Preliminary Design Reviews and Critical Design Reviews and to move ahead if there were no apparent implications to the rest of the system. This allowed portions of the project to move ahead if they were ready to proceed, and helped to control cost and minimize potential schedule slips.

To assess the progress of each subsystem and major task, Tom established metrics for measuring performance that set minimum monthly milestones. This was not a full performance measurement system, but a method of monitoring progress without the burden often associated with these systems. If milestones began to fall behind, the management team knew it immediately from the Monday subsystem review.

In addition to this, each week employee charge numbers were evaluated to determine which organizations were charging to the project and to provide a sanity check regarding the appropriateness and reasonableness of the charges. Were there tasks ongoing in those shops or groups? Were those skills really being used at that time? Once established this was not all that time consuming, as unexpected charges were easy to spot and check.

In an organization of any significant size, controlling charge numbers is critical to controlling costs. In large companies sometimes, there may be a temptation on the part of some support organizations to generate a fixed level of income on a weekly basis from every charge number they can identify. Such issues were dealt with on the same day, and parties were required to support specific charges for that week or remove them.

Mission Accomplished

A new Project Manager can have a major impact on the dynamics of the mission. In the case of LP, the change of one key individual in the management team completely transformed the dynamics in the group. The change in the LP team dynamics with the change in Project Manager was nothing short of miraculous. Energy and motivation were revitalized. The outlook of the entire team, both NASA and contractor, was different from the day he got there.

The success of the mission is perhaps the biggest demonstration of the results of the changes that were made. LP was launched successfully from the Cape in January 1998. The one-year primary mission was completed in January of 1999 and the six-month extended mission ended with the deorbit of LP into the area of the lunar South Pole at the end of July 1999.

My LP experience was an extremely valuable one for me in a whole variety of ways. I learned that a single change in the management team could turn a project that is struggling into a fully functioning, successful team.

Lessons

+ Openness and transparency between government and contractor engenders a spirit of teamwork and can have a transforming effect on a lackluster team's performance.

+ Simple and frequent review meetings allow quick responsiveness. Not everyone must participate, but they must be available. It can be done quickly and allow for quick feedback and continuous monitoring of cost and progress.

+ There is no need to delay a segment of a project due to another segment. Allow subsystems to proceed according to their readiness.

? Question

In this story we see that building trustful relationships between government and a contractor can be a win-win situation. But what are the difficulties in accomplishing this? Please share with us your own examples of cultivating a trustful relationship between government and contractors.

Check Your Ego At The Door, Please
by Jenny Baer-Riedhart & Ray Morgan

ABOUT THE AUTHOR

Jenny Baer-Riedhart is the Deputy for the Public Affairs, Commercialization and Education (PACE) Office at the NASA Dryden Flight Research Center. Before that she was the Program Manager for the ERAST Program in charge of technology flight testing for Unpiloted Aerial Vehicles. She has worked her entire career at Dryden, starting out in propulsion engineering on the first computer-controlled jet engine for the F-111 project.

A New Way of Doing Business

The Environmental Research Aircraft and Sensor (ERAST) Project was a new way of doing business for NASA. New in that it was not a typical contractual relationship between NASA and the companies involved. ERAST was a Joint Sponsored Research Alliance (JSRA) to develop Unmanned Aerial Vehicle (UAV) technology. NASA had been involved in JSRAs before, but they were all university-led; this was the first industry-led JSRA.

The alliance consisted of four companies who were partnering with NASA. Each brought a unique focus to developing a UAV, and had already at least partially developed high-altitude UAVs that were potentially suitable for NASA's stratospheric science missions. NASA hoped to leverage these aircraft and their technologies to demonstrate the viability of UAVs for atmospheric science, and to provide a "kick-start" for a commercial UAV industry in the U.S. Demonstrating useful missions with these unproven, developmental aircraft upped the ante for everyone. For all practical purposes, if you crashed one time it would be impossible to recover, and in two cases experience bore this out.

Because this was a different way of doing business, we had to tailor almost everything about the project, and that included how we did the reviews. In a typical contractual arrangement, you wouldn't rely on the contractor standing up to say, "We're okay to go on," while NASA just nods its head and says okay, but basically that's what we did. The companies could invite NASA to their reviews, or they could say get lost. However, the stakes were high enough that no one company's ego was going to shut out NASA entirely. The approach we agreed on was for NASA to provide oversight and control of range safety, but the companies were free to accept NASA's advice or ignore it in so far as mission success.

One problem these small UAV companies tended to have was they would attack each task as if they were the first ones to try and solve that problem. As a consequence, the industry as a whole was plagued with stupid mistakes, and duplication of problems that had been encountered and solved 50 to 60 years before. The alliance was intended to help open the doors a bit, creating some "cross-pollination" between the companies and NASA, so that not everyone had to make all the same mistakes for themselves.

The way the reviews were conducted, NASA would bring in people who had experience in a particular area of aircraft development and testing, even though they might have no prior background in UAVs, specifically. The point was that NASA had within its ranks a wealth of experience and know-how in developing and testing unique

air vehicles, particularly at high altitudes (some of the review team had taken the X-15 to over 300,000 feet in the 1960s — we were aiming at a fraction of that altitude). Even though they were not familiar with these particular types of light wing structures, these were still experts in physics and engineering, and the atmosphere we were operating in was the same. Many times they provided the most value by simply asking questions.
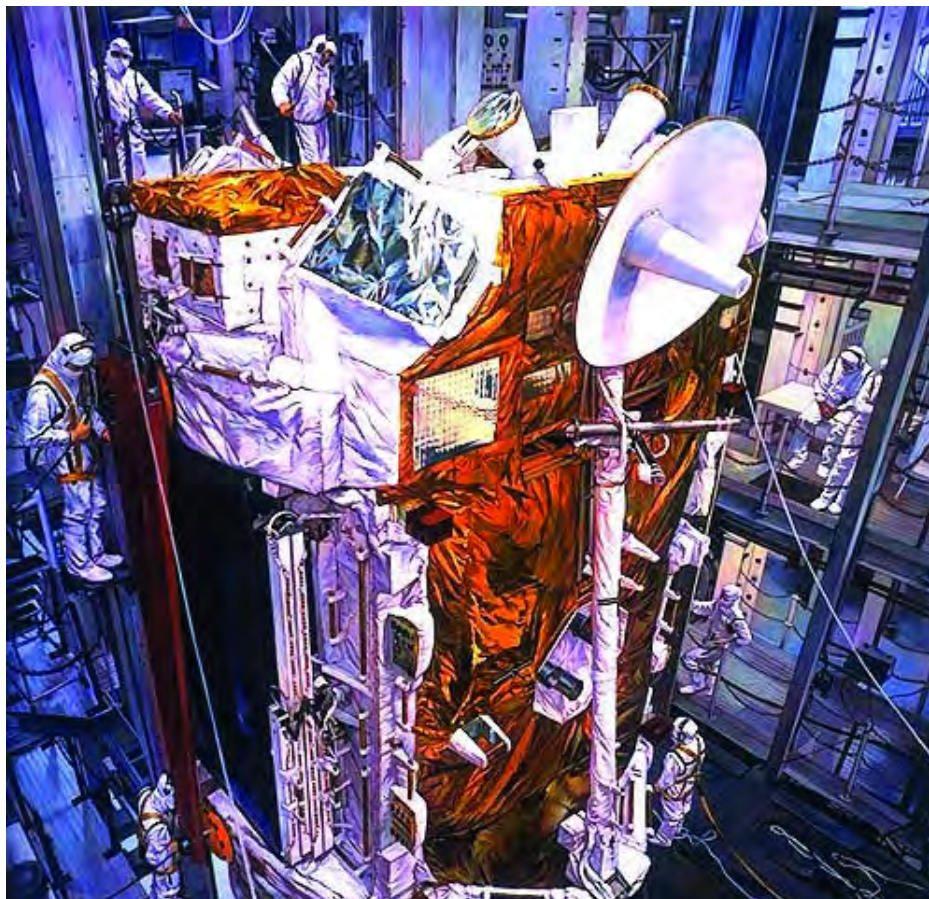

"Preparing GRO," oil by Nathan Greene depicts the Gamma Ray Conservatory being hoisted to a test cell in the Vertical Processing Facility at the Kennedy Space Center.

ABOUT THE AUTHOR

>> **Ray Morgan** has recently retired as Vice President of AeroVironment, Inc., where he established the Design Development Center in 1980, the division of AeroVironment that develops and produces its aircraft, serving as Director until April 2000. Mr. Morgan has overseen more than 75 projects and the development of over 50 unique vehicles, including over 35 Unmanned Aerial Vehicle's (UAV's) in his tenure at AeroVironment Inc. AeroVironment has been globally recognized as a pioneer in solar powered and electric aircraft, and has placed 5 of its vehicles in the Smithsonian Museums.

Check Your Ego At The Door, Please (cont'd.)

Listen and You Will Learn

One company in the alliance, A, achieved far more success with its solar powered UAV, Pathfinder, than the other companies did with their UAVs. The best example of why is probably how A allowed NASA to participate in its reviews. In the reviews it was clear that A was willing to embrace NASA as a partner. Unlike the other companies, A had been developing UAVs for over 12 years, and had seen all the ways to crash them, and recognized from experience that learning from others was perhaps the only way to avoid repeating their mistakes. The other alliance members had relatively little experience in developing UAVs or aircraft with complex control systems, and probably didn't have as much appreciation for processes and learning from the past.

A was NOT one of the two companies who crashed. However, it could have been.

In the first prototype of their UAV, built in the early 80's, A relied on single thread systems across every major component of the UAV. This means there was only one of any given component, and if that one component failed then the whole UAV would likely fail. As A began focusing on system optimization, and from practical experience with other UAVs, it recognized the need for redundant control systems throughout. However, it lacked the experience that NASA possessed with redundant flight control systems.

NASA provided A with valuable advice about how best to implement redundant systems in its critical components, particularly with sensors, when the system must automatically determine which sensors are working properly and which are not. A didn't have a lot of experience with triple redundant sensors, but NASA did. In some ways, while NASA did not know much about UAV technology, it did have a lot to teach the companies about basic airplane technology.

NASA also brought to the table its vast experience in risk management. This was something A had never formally done before, but was old hat to the NASA Dryden Flight Research people. Assigning a quantitative measure to subjective judgment of risk is a difficult concept, but must be done to conduct flight tests safely. Heretofore, it was joked that UAV manufacturers put "more holes in the desert than Arnold Palmer". But for these large, expensive, one-of-a-kind UAVs with NASA logos and public scrutiny, crashing could not be taken lightly, and death or injury was out of the question.

The outcome: well, A's UAV did not crash. But that is only part of it. One and a half years into the Alliance, Pathfinder set a world high-altitude record for a solar powered UAV. Two years later it beat its own record in two, back-to-back flights of first 67,500

> "[The] stakes were high enough that no one company's ego was going to shut out NASA entirely."

feet, then 70,000 feet plus. In 1998,A again returned to the air with another version of the same UAV, an enhanced aircraft, which set the current solar record of 80,000 feet. By the time you read this, A may have beat that record again by flying to 100,000 feet with the Helios solar aircraft, higher than any non-rocket propelled aircraft has flown in level flight.

Don't Listen and P ay the Price
The companies who were not as open about accepting NASA's advice fared worse in this alliance. One of these companies we will call X. On paper X was a superb company. Employee for employee, every one of them was a genius in his or her own right. Still, despite their superior IQs and their brilliance, they crashed their UAV. Twice, actually.

The unfortunate thing is that their crashes might well have been avoided had they been willing to listen to what NASA had told them. When X crashed its UAV, the precipitating cause was the failure of a single thread component that was known to have poor reliability, yet was key to the flight control system functioning. NASA (and A) spotted this and warned them of the catastrophic consequences of not replacing this with a redundant system. Unlike A, X ignored the advice. When this component failed during a flight test, the UAV predictably flew out of control. With no backup means of recovery short of an act of God,the UAV was doomed to crash,and so it did. Twice, as we said.

Had X been open to what NASA's experts pointed out during the reviews, they might well have kept from crashing. Generally, their attitude towards NASA was not to discuss their problems, not to give up any information,and that reviews were something they had to get through rather than something they might learn from.

Company Y, another in this alliance, also crashed their UAV. They too rejected NASA's advice on developing a redundant system for a critical component. In this case, their UAV had two data links. To conduct one particular operation during flight, they had to switch from the regular data link to the back up data link. Every time they switched between the data links, the data coming down disappeared for about 6 seconds. When a critical component failed, the pilot on the ground noticed no data was coming down and switched from the regular link to the backup. After 6 seconds he was still not receiving data. Here again NASA pointed out that using a redundant system would safeguard against a catastrophic turn of events should the critical component in question fail. It was too late by the time the pilot realized the lost data was not merely the result of the switch between the regular data link and the backup. At

"In the reviews it was clear that A was willing to embrace NASA as a partner."

"Generally, their attitude towards NASA was not to discuss their problems, not to give up any information, and that reviews were something they had to get through rather than something they might learn from."

Check Your Ego At The Door, Please (cont'd.)

this point the UAV was pointed straight down and could not be recovered.

No one can claim that the success or the failures were solely due to the reviews. However, the story clearly supports the notion that a review can be a source of vital learning and that arrogance is the number one enemy of learning.

Lessons

+ A review can be a source of vital learning.

+ With the right attitude, a contractor can use the government as an asset, that is, the government can help the contractor.

+ Cooperation between the government (NASA) and a contractor is essential for the success of a project. When coupled with the right mechanisms of planning and control, this cooperation can make for the best use of taxpayer money.

Calling Down the Fire on Yourself
by Jo Gunderson

While I was the Deputy Director of the Systems and Cost Analysis Division in the Office of the Chief Financial Officer, I often got requests to support reviews. Since our organization largely did reviews for a living, participating in non-advocate reviews was normally a "given" for major missions. On smaller missions such requests were usually meant to show that the project had a member of the Comptroller's staff on the review team, thus implying that all was well and that a seal of approval was somehow being conveyed.

One spring, I got a call from a Project Manager of an in-house spacecraft project, asking that I personally support his Confirmation Review. I didn't know the Project Manager and was not terribly familiar with his project. The project was substantially below the threshold of things that I normally touched, and I had several major reviews under way. I offered to recommend Center-level resources, or failing that, to identify a staff member who might be able to provide the support. The Project Manager was less than enthusiastic about either alternative and asked that I re-examine my calendar and get back to him.

When my plate was too full with the larger programs, I often suggested that other agency analysts and estimators help fill in on the smaller programs. Failing that, one of our staff normally got called in and "provided the opportunity to excel" in support of the smaller program. I polled our staff to see who might be available. The Project Manager called again. So far no one had stepped forward. The Project Manager called a few more times. I pointedly suggested to the staff that finding the time to support the review would be a "very good thing." When the Project Manager called again, I was just plain worn down and finally agreed to do the review myself.

I arrived at the appointed hour, fully prepared to be under-whelmed for several days. There was an enormous table set up for the review team and I thought that the size of the team might be a little large, given the relatively modest size of the project. Moving further into the room, I could see the nametags placed on the table. I nearly choked after realizing that I was seated between several engineers with NASA–wide reputations. Major players from various NASA Centers populated the entire review team. In addition, the team included names that I recognized (but had not met) from other agencies. The heavy guns had all been called out. I renewed some acquaintances and collected business cards as I did a little recruiting for other review teams that I needed to assemble.

The project team seemed to be very young. As we began, I wondered how they might fare with such a seasoned and salty review team. The review, however, proceeded relatively smoothly. The review team asked tough, pointed questions. The crusty

ABOUT THE AUTHOR

Johanna (Jo) Gunderson has been with NASA for twenty-one years and is currently on detail with the NASA Academy of Program and Project Leadership. Prior to this detail, she held positions in both the cost estimating and budget organizations of the Office of the Comptroller, serving as Deputy Division Director in the now defunct Systems and Cost Analysis Division.

"I nearly choked after realizing that I was seated between several engineers with NASA–wide reputations."

Calling Down the Fire on Yourself (cont'd.)

"The Light Ship," oil by Attila Hejja depicts the first night launch of the Space Shuttle Challenger in 1983.

"In ten years of reviewing programs, I had never encountered a project that was as complete at that point in its lifecycle."

review board pushed the project hard, but the in-house project team had dotted every "i" and crossed every "t." They provided answers immediately, produced detailed drawings, and in the end very few actions were assigned.

In ten years of reviewing programs, I had never encountered a project that was as complete at that point in its lifecycle. All design space was closed. Performance trends were available for all critical elements. All project documentation was signed, and TBDs (To Be Determined) were notably absent in plans that would not be implemented for months.

Although the review team made a few recommendations, it was clear that all members were favorably disposed. The recommendations were primarily for "confidence building" or of the "lessons learned" nature. Needless to say, the Project was confirmed to proceed and subsequently proved to be a total success.

While working on an Agency-level task several years later, I got to know the Project

Manager well enough to ask why he had been so single minded about having me sit on that review board. His reply illustrated why he had been successful on all of his projects.

"It was simple," he said. "I had to have the review. It was a very challenging project. I needed to know if there was anything that I had overlooked and to do that, I needed to call down the fire on myself. So I worked to recruit the best of the best for the review team. I asked around and your name kept coming up as a really tough reviewer."

Lesson

+ As a Project Manager, you are often required to do things that seem to be of limited value to the project. If you are to succeed, you need to look for ways to realize value from even those things that are "done to you." By assembling an absolutely terrifying review board, the project manager assured that the project would benefit, rather than just settling for "checking the box." Today's term for that approach is using "Reviews as a Resource."

? Question

Bringing down the fire on oneself is obviously one way to find out if you've crossed all the t's and dotted all the i's, but is this a practice that could also backfire for you? Describe that kind of scenario and note the causes that would create it?

Standing Offer

by Roy Malone

ABOUT THE AUTHOR

Roy Malone serves as the Director of the Logistics Services Department at Marshall Space Flight Center (MSFC). He has been selected by NASA to attend a Harvard Business School Management Development Course as part of the NASA Fellowship Program. Roy will be starting the 11-week course in September. This is his second story in ASK. His first, *Reforming a Mindset*, appeared in Issue 2.

It was by far the most difficult inspection in the Navy, and by far the one that had the most consequence on my career as a Combat Systems Officer (CSO).

The Navy will not allow you to have the capability to carry and deploy special weapons on your ship unless you have a "perfect" program in place to take care and safeguard them. The inspection is called the Nuclear Weapons Assessment Inspection, and it is a big, big deal if you are a CSO. You absolutely must pass. Failing to pass this inspection can seriously stunt your career, and may well cost you your job.

The name of the ship was the USS Caron, and, as the CSO, I was responsible for the weapons systems. We had other inspections, a lot of other inspections, and we were working under the added pressure of an accelerated deployment timeline. Normally you get a year from when the ship comes out of the yard before it goes to sea to get all your certifications in place. We only had nine months because we were gearing up for deployment in support of what would eventually become Desert Storm.

Because the certification exam is so rigorous, the Navy has created a pre-certification review team to help ships and their CSOs get ready for the inspection. A Nuclear Weapons Assist Team (NWAT) comes aboard and does a preliminary review of the program. NWAT consists of 2 or 3 senior chief petty officers, very high level, knowledgeable guys who have been doing this all their careers. They've seen all the different programs on other ships and know what to look for, know what the problems are, know what you should improve, and they can really go in and help you in areas you're weak in. If you were to pick an expert, these guys are the experts.

NWAT's job is to help you identify your shortcomings so you can prepare for the final certification inspection. Actually, there are two final-ons. The first is the Technical Assist Visit (TAV) in which another Navy review team looks at your program and gives you a list of discrepancies. The people who do the TAV are the same ones who do the second final-on, the inspection for certification. NWAT is not involved in the certification inspection; they just help you to get ready for it, and they are worth their weight in gold.

In most cases, the NWAT team comes aboard, conducts their assist visits, identifies discrepancies and then leaves. In my case, I had them come back a bunch of times. This is not something I instigated as if the opportunity wasn't available. During the assist visit, they offered to come back if desired and help us with any of our issues. So I called.

On each successive visit, they helped us find additional things we needed to improve on. We worked it so that on each visit, they focused on a particular area of the pro-

gram and scrutinized it in detail with us. What it allowed my team to do in a series of 10-15 visits was to hone my program so that it was as close to perfect as possible. Most ships don't take advantage of having them come back for other visits. I don't know why that is. Maybe some feel it's an embarrassment to acknowledge your program has shortcomings. I never took any criticism from my captain for inviting them to come back several times. The stakes are too high. My feeling was it's better to pass the inspection with pride than fail because of it.

In the follow up visits, the NWAT guys came on board and sometimes spent the whole day with us. During their visits they looked at all of our processes. A good example is our training program. They looked at who had been trained, who was the trainer, what kind of training it was, who had certified the trainer...then they looked into our other processes and made sure they met standard requirements...they'd run drills to see how people performed if anything was broken, or in the event of an accident to a special weapon; you have to know exactly what to do, whom to call, how to respond...then they do a security alert in which your security is breached, and the many scenarios that go with that.

It was an exhaustive analysis. Each time they would find things for us to hone and improve on. We'd fix those and the next time they'd look at something else and find more things. This was exactly what we wanted because it allowed us to hone that area.

Did they mind coming so many times? Are you kidding, they loved it. They wished more ships invited them back as many times as we did. This was a chance for them to roll up their sleeves and get into the nuts and bolts of the program, and that's what these guys lived for.

Finally, when the TAV team came for the pre-inspection, we did so well that the assist visit was turned into a certification visit and the ship was certified on the spot. We were the first ship in 10 years on the Norfolk waterfront to be certified during the assist visit.

When managing processes that deal with special weapons, your programs have to be ready. Like NASA operations, this is one of those areas where there is no room for error. That's why even if you think you don't have time, you make time for the NWAT guys or, in the case of NASA, experienced project managers who are willing to help. There were more experienced CSOs than me whose ships had trouble getting certified. They didn't take advantage of this resource that was available to them. I was successful in large part because I did.

> "Failing to pass this inspection can seriously stunt your career, and may well cost you your job."

Standing Offer (cont'd.)

"Mission to Mars," oil by Ren Wicks depicts a future mission to the red planet.

"My feeling was it's better to pass the inspection with pride than fail because of it."
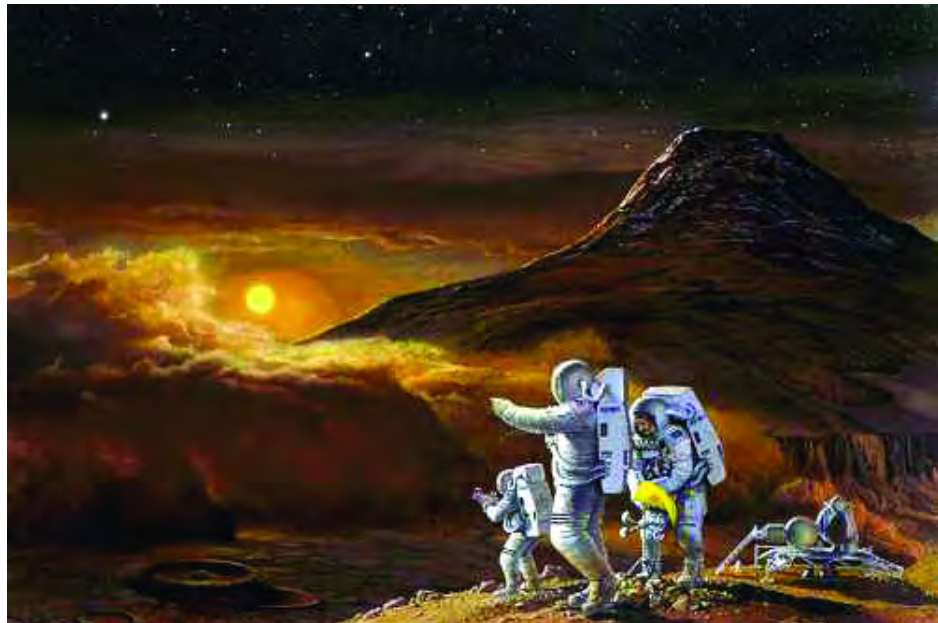
? Question

Could your organization have an office that functions as a Project Management "Assist Team" like NWAT did in this story?

Lessons

+ In preparing for a review, especially a major review, managers should take advantage of all resources available to them including the expertise of seasoned veterans.

+ Don't be so proud that you can't ask for help when a standing offer exists from someone qualified to give you help. Better to succeed with pride than fail because of it.

The Hour Glass and the Project Manager - Part 1
by W. Scott Cameron

Over the last eight years I have had the privilege of mentoring over 20 Project Managers (PMs). Since then, I have found myself thinking of the PM's job in terms of an hourglass. The PM's success is often determined by his or her ability to manage the passage of sand between the top and bottom of the hourglass. The top of the hourglass is the hierarchy, and the bottom the project team. Because both top and bottom are crucial to the success of a project, I spend a significant portion of any mentoring session focusing on ways to manage the passage of sand from top to bottom and bottom to top. In Part 1 of this story, I will focus on managing the project team. Part 2, next issue, will be about managing the hierarchy.

Since much is written and taught about how to manage project teams and projects (i.e. how to make schedules, estimates, etc.),I won't dwell on the basic knowledge that all PMs must have. When I mentor experienced PMs and technical engineers, the critical strategic question we try to answer is how to improve the odds that their projects will be successful. The most successful method we have found to improve project performance is to conduct anywhere between 1-5 peer reviews throughout the life of a project.

As the PM and I plan for a peer review, these are some of the things we discuss:

Purpose of the peer revie w – To gain as much valuable input in the shortest amount of time to improve the chances for a successful project and avoid disasters and known (by others) problems.

Who to invite – Just peers, no hierarchy. The most successful peers reviews I have attended consisted of diverse groups of people: technical engineering, project managers, construction managers, purchasing managers, finance managers, research & development personnel,and contractors. Ten to twenty people are enough—anymore than that becomes unmanageable, as each person will bring his or her own agenda.

What protocol to use – Peer review protocol is relatively simple. It requires the project team and the PM to concisely communicate their technical and executional strategies. The floor is then opened to all the invited guests (peers) for comments, critique, and clarifying questions. Prework can be sent out to the peers to review prior to the meeting. Peers are required to be open, honest, and engage in the communication or not bother to attend the review.

ABOUT THE AUTHOR

W. Scott Cameron is Capital Systems Manager for the Food & Beverage Global Business Unit of Procter & Gamble. He has been managing capital projects and mentoring other capital management practitioners for the past 20 years at Procter & Gamble within its Beauty Care, Health Care, Food & Beverage, and Fabric & Home Care Businesses.

The Hour Glass and the Project Manager - Part 1 (cont'd.)

How long should it be – A maximum of 6-8 hours, including lunch and breaks. The PM usually runs the meeting and has to insure that all the "peers" are contributing ideas. There are a lot of topics to cover but the PM must go over them quickly to avoid one or more individuals grandstanding.

How to summarize the discussion – Take copious notes and display them on the wall during the meeting. In the last peer review I attended, there must have been 30-40 pages of flip chart paper capturing all the ideas/comments on a $50MM project. These were then typed and distributed to all the participants with a note to them and their boss thanking them for their contributions and for helping improve the success of the project.

What to expect of a peer revie w – Out of the 30-40 pages of notes on flip chart paper, there were only 5-10 "nuggets" that the project team went on to use and helped them to improve the technical, cost and schedule aspects of the project. Implementing these nuggets more than made up for the cost of the peer review.

As we have conducted more peer reviews, we've noted that the invited peers are beginning to take one or two "nuggets" they had not considered back to their projects and programs. They also are exposed to other talented individuals within the Company who they may have heard about but never had the opportunity to meet and network with. Thus, the peer review process is proving to be a very important tool in the PM tool kit to improve the success of a project.

Trading on Trust
by Terry Little

When I was a young project manager, my boss pulled me into his office to tell me I needed to convert our cost-reimbursable development contract to fixed price. Virtually every large cost-reimbursable contract in the department, he explained, was overrunning.

I had my reservations about his solution to the problem. There was significant risk remaining in the program, and I felt a cost-reimbursable contract was appropriate. While I understood we were going to overrun the cost target, I believed the overall cost would still be less than what was allocated for the program.

Shortly thereafter, I met with the contractor's program manager. I did what I was supposed to, saying that I thought it was best for the program to convert to a fixed price contract. I got along well with this program manager. He hesitated, but because he trusted my judgment, he agreed and we settled on a price and modified the contract to fixed price.

As it turned out, during development there were a number of technical problems and solving these resulted in a significant cost overrun to the contractor. Three years later, we were negotiating the production contract and we hit at an impasse. The contractor was asking for a lot more money than what we were willing to pay. During the negotiations, the same contracting officer I worked with before told me that he realized the price was high, but after what happened in development the company could not afford to lose its shirt again during production. Yet, he added, that "because he trusted me," he would settle on whatever price I came up with.

I went back to my contracting officer and told her that we'd settled at the contractor's proposed price. It was hardly surprising to me when she hit the ceiling. I explained I would accept full responsibility, and put it in writing that I thought the price was fair and reasonable.

In the end, the contractor realized a 17 percent profit on the fixed-price production contract, and on the third production buy the price came down substantially. My contracting officer received nothing but praise for her "hard nosed" negotiating style. What did I get? Nothing, but then I was a young project manager.

I did learn however to stand up and say, "No."

Editor's Note: Another article this issue, Marty Davis's Practice *Horse Trading,* offers a different perspective on coping with changes when operating in a fixed-price contract.

ABOUT THE AUTHOR

Terry Little is a civil servant with the Air Force, where he has been a program manager for five major defense acquisition efforts. He entered the Air Force in 1967 and served on active duty until 1975.

Horse Trading

Marty Davis

ABOUT THE AUTHOR

Marty Davis is the Program Manager of the Geostationary Operational Environmental Satellite (GOES) at the NASA Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. Mr. Davis is the recipient of many honors, including Goddard's highest award, the Award of Merit, in 1989 and NASA's highest award, the Distinguished Service Medal, in 1995. In addition, he received the NASA Outstanding Leadership Medal in 1991 and the NASA Exceptional Service Medal in 1979.

Background

Successful commercial contractors (e.g., Boeing, Lockheed Martin, Space Systems/Loral) build lots of very good commercial communication systems satellites, and that happens to be the class of satellite we're using in the Geostationary Operational Environmental Satellite (GOES) Program. These contractors typically warranty their satellites to customers for 10, 12, 15 years. With that kind of reliability, you've got to figure they must be doing something right.

Commercial contractors don't do everything according to the NASA way, but I felt if we could accept some of their commercial ways—and at first I didn't know exactly what that meant—I thought we could probably save money, and that was something I could sell to NASA management.

I asked two of our regular contractors to tell us what doing business in the commercial world is like. They talked about fixed-price contracts, and how this was the way to go to hold down your overall costs. But with a fixed price contract, I asked, how do you get what you want (or need) without modifying the contract? Because inevitably you will find something you want that is not in the contract. This is not something intentionally left out or something you knew you would want at a later time. With today's technology, where there is a great deal of uncertainty, things change all the time during a project. Priorities shift, new needs arise. Also, as you learn more about commercial practices you may want some things changed. That's when they told me about horse trading.

In a horse trade, one party says to the other, you give us this and we'll give you that. I have to emphasize that this sort of thing only works if mutual trust has already been established between the two parties. Both parties keep a folder of things they want. When the folder begins to feel full, one approaches the other to see if it's ready to trade. If they had to do a formal proposal for each one of these trades, it would tie up a lot of people with writing, negotiating, etc. This all takes time, which very often we don't have. Moreover, additional time may amount to significant indirect costs. You use the horse trading so as not to undercut the financial rewards of the fixed price contract.

Procedure

1. Everyone on the project is conscious that this is a tool to get the job done, so everyone is keeping an eye out for high priority changes.

2. The Project Manager oversees a folder of all desired changes. He approaches the contractor with what he wants, and prepares a configuration change request (CCR) as the mechanism for defining the change.

3. Usually they discuss the changes first. Many key people are often out at the contractor's site to do this too. Key people are the Observatory Manager (COTR), Contracting Officer, Financial Analyst, and Systems Manager. They might set aside an hour or two there, or it is something that can be done over the phone.

4. Once the negotiating team puts together the package they take it to the Configuration Control Board. Any changes to the contract require signature by NASA and by the contractor. The contractor has a Configuration Control Board, and the trade has to pass its board, too.

5. A formal agreement is drawn up that defines the changes in detail. The contracting officer identifies it as a done deal. The changes are then incorporated into the contract.

Example

We need a new Interface Control Document (ICD) for the ground support equipment from our instruments. The original contract does not stipulate that such a document will be provided, but we learned that it's necessary. There are 6 or 8 things we're getting as part of the horse trade, and the ICD is just one. Some trades have 6 things bundled, some 12 to 15. Boeing, our contractor on GOES-N, gets an equivalent value bundle. In this case, one involves a proto-flight solar array panel that has to be fully qualified under qualification temperature. We agree to allow a test panel to be qualified. We feel it will still give us a good measure of the qualification of the technique and the materials they're using. This will reduce the time and effort involved for Boeing, which saves them money.

Editor's Note: Another article in this issue, Terry Little's feature *Trading on Trust*, offers a different perspective on coping with changes when operating in a fixed-price contract.

Data Memos
by Jeff Bauer

ABOUT THE AUTHOR

Jeff Bauer is currently a Deputy Project Manager on the Hyper-X project at the NASA Dryden Flight Research Center. He has served on the NASA Headquarters' lead team to plan the first flight of an aircraft on another planet (Mars), and led NASA Dryden's efforts to support the Mars Aircraft Project, developing the flight test infrastructure. He recently served on an agency-wide team to assess the Agency's implementation of the Faster, Better, Cheaper principles.

Background

When I came on board the Environmental Research Aircraft and Sensor (ERAST) Project first as Chief Engineer and later as Deputy Project Manager, there was a lot to keep track of: four flight projects and numerous technology development initiatives. One company, AV, had developed a system for documenting their project activities that proved especially effective in communicating project status. AV's activities were unique in that they were developing a solar powered aircraft for atmospheric research that would take the vehicle to altitudes above 80,000 feet. My background was in flight research, not solar power, and certainly not with a vehicle of such a unique design as the Pathfinder.

What allowed me to stay abreast of their progress was their system of using project data memos. "What's a data memo?" Essentially, it can be anything worth documenting that might prove useful to someone on the project team. Even notes jotted on scraps of paper proved worthy of making it into the file. "Something is better than nothing," was the philosophy that led to this practice, and I would have to agree. Great efforts were made to make it easy for anyone to generate a data memo. Aside from the title block there was no format required.

Data memos are meant for those who are on the project team, and are intended to communicate to the entire team what is going on. I found them an excellent means of sharing information and providing everyone with access to the information in a timely manner, as well as serving as reference points later in the project. I know for myself there were several occasions where I was able to get insight into what other people were doing and how this impacted different disciplines, especially the flight operations. The data memos allowed me to ask intelligent questions and they served to educate me on systems and technology that I was not familiar with.

Moreover, data memos allowed us to nip what we perceived as potential problems earlier in the design than we might have found otherwise, for example, at a design review. By reviewing the data memos, changes could be implemented early enough that they did not substantially impact cost or schedule. Overall, this kind of practice engenders openness, teamwork, and trust between team members.

Procedure

1. I am working on a document, e.g. Power Requirements for the flight termination system. These are the requirements, and the document becomes how I want the requirements to be met.

2. Once I have completed the document, I send it to the individual who maintains the database. This person (the record keeper) assigns a number to it and sends it out to the distribution list, which is essentially everyone involved in the project. People can decide for themselves if they want to keep it or not or archive it themselves.

3. The record keeper is also charged with logging the data memo by number and subject. Thus, if someone on the project received a data memo, deleted it, and then decides at a later date that it's important and wants it back he can get it off the server.

4. As the project evolves and as you gain more knowledge about particular subjects, you will often go back and add information to the original data memo. If you decide to add to or comment on a data memo, you send your new data memo back to the record keeper, who distributes it and logs it as a response to the original.

5. In general, if you needed access to a memo you didn't have, you could get the record keeper to look it up for you by providing information on the title, author, or date, etc. Often the best way to obtain an old memo was to ask the author for a copy. If I knew that a memo was written regarding the solar panels, I would call the engineer responsible for the panels, and ask him for the memo. He would generally give me the memo number and I would get a copy from the record keeper.

Data Memos (cont'd.)

In past projects we have used a technique using an acrylic base transfer adhesive (3M 969) and a 1" Mylar tape (3M 850) overlapping the seams of plastic coverings. When used by itself, and tension applied to the adhesive joint, it has been known to "creep." To solve this problem the Mylar tape is applied to keep the joint slow down, or eliminate the creeping process.

In recent trips out to the workshop, Ken Williams has introduced us to a silicon based transfer adhesive that works well with Tedlar or Mylar covering, and is much more reliable in more extreme temperature ranges. To see if this adhesive creeps the same way the current adhesive (3M 969) does, Ken and I devised a test setup shown on the attached sketch.

This setup was completed at around 2:30 PM on Wednesday 9/1/93, lines were drawn on the Tedlar along the tape joints so that the joints could be monitored. This setup was left to sit.

On Thursday 9/2/93 at 8:30 AM it was observed that acrylic adhesive/Mylar joint configuration #2 on the attachment had creeped and completely failed. The weight and one half of the clamped piece of Tedlar was found on the floor. Configuration #1 still looked the same as when it was setup.
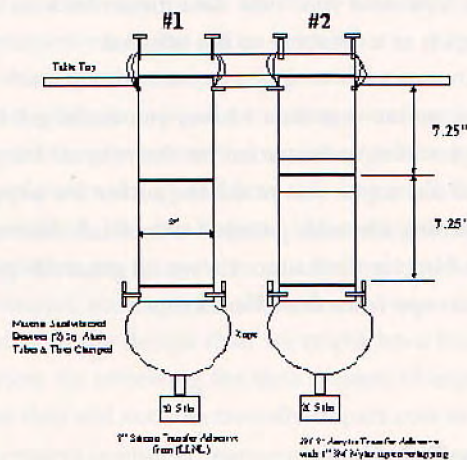
Conclusion: It has been decided that the silicon based adhesive transfer tape is much better than the acrylic based transfer tape. We will use this tape to help cover the airplane, but still use the 1" Mylar tape over the joints for extra safety, and aerodynamic reasons.

ASK Talks with Terry Little

It's fair to say that the best project managers march to the beat of a different drummer. In the case of Terry Little, not only does he march to a different drummer, but Little also writes his own music for the march and he choreographs his own steps.

At a 1999 forum of NASA project managers, Professor Owen Gadeken of the Defense Systems Management College, where Little is a frequent speaker, said that Little 'is regarded by many Air Force leaders as the best Project Manager' in the Air Force. At 55, Terry Little's most amazing feat might well be his longevity in the Air Force. He is known to be a nonconformist, even a renegade, and to some people, it's downright amazing he has thrived for as long as he has working for the government, let alone the DoD. Little has been challenging the status quo in the Air Force since 1967, and it is obviously a role he relishes. Few managers would continue to slash through red tape and turn bureaucrats on their heads for as long as Terry Little has if he didn't enjoy the challenge.

ASK Magazine is privileged to have Terry Little as a regular contributor to our publication. Before our first issue came out, we realized we needed someone from outside NASA, but still within government, who had the bonafidas within the management community and was willing to say unconventional things. There was no doubt about who that person had to be. Terry Little's articles appear in our Features section every issue.

ASK: Many managers are afraid to do unorthodox things. You're not. How do you get away with it?

Little: One of the things I've learned over time that makes me palatable to my system is that I take total responsibility when failures occur in my program. If somebody needs to be shot, I stand up and say shoot me, and I don't offer excuses. I take clear responsibility, even when there are things not clearly within my control. Our system adores that. So often, when things go awry, it's hard to find who's responsible. We have a tendency to want to blur accountability, to make it so that no one's really accountable, or everyone is, which is the same as no one.

ASK: Did you always manage this way?

Little: I don't know, perhaps you should ask the people I worked with. I don't feel any more or less confident. I don't know why that is. I think that says more about how I was at 35 than the way I am now.

ASK: How do you keep the intensity from burning out after 20 years?

Little: It's really a passion for what I do more so than an intensity. A passion for success, for the team succeeding, for doing remarkable things. As I've gotten older the

> "We have a tendency to want to blur accountability, to make it so that no one's really accountable, or everyone is, which is the same as no one."

ASK Talks with Terry Little (cont'd.)

"It's not the big victories or catastrophes that make leaders stand out, it's the every day things that happen."

passion has not diminished, but I've mellowed. What I see most lacking in younger managers is this passion.

ASK: You've brought along younger project managers. What sort of processes do you use in mentoring them?

Little: We talk about what they need to do to be more effective leaders. I give them my view of their strengths and weaknesses. Ultimately, I think the most effective leaders develop their styles by emulating others, as opposed to reading about it. When they see things that work and are consistent with what they can do, I tell them they should adopt those practices as part of their style. I encourage them to be observant about the mundane things that happen every day. In the end, it's not the big victories or catastrophes that make leaders stand out, it's the every day things that happen. All of us learn from big victories and catastrophes, but not a lot of us learn from the every day things that happen. What I try to do is encourage the people I mentor to think about the every day things they see. What insights did you gain from these experiences?

ASK: At a recent NASA forum, you said that the entire team has to buy into the objectives of a project. How do you get them to go beyond that and feel passionate about it?

Little: Let me tell you a story. When I first came to my program, my predecessor had been fired; even now I'm not sure of the exact reasons. I was given this job to get the project underway in four months. My predecessor had said it couldn't be done that quickly, that it would take at least a year. My very first meeting with the team was the first day after the Christmas holidays, and I told them we are going to get this project under way in four months, and I told them point blank it was up to them to figure out how. Everyone said no, no, we've been working on this for a couple of months already. We've looked at this from every possible angle, and there's no way we can get this underway in less than a year. I said I'd be back in two hours and expect to hear from you as a group what we're going to do to get this under way in four months. I came back two hours later, we were in this auditorium, and they had elected a spokesman. The spokesman stood up and said they'd gone over everything and looked at everything and there was no way we could do this in less than a year. And as I listened to them, I really couldn't help myself, and I started to cry. The tears ran down my face and I got a lump in my throat, and I said, "You're going to make me do this by myself, aren't you?" The spokesman looked around at his colleagues and said, "Give us another hour." When I came back, they had it all laid out.

ASK: Don't some people though get hostile when you impose what may seem to them like unreasonable demands?

Little: What you've got to do is provoke unconventional thinking. You create a situation where the status quo, the conventional approach,business-as-usual won't get you there. Until you're able to turn that light on in people's heads, you're not going to stimulate innovative, creative thinking. That's how you combat hostility. If they're being creative, they're too engaged in what they're doing to be hostile. In that project I just told you about, by moving the goal up to what seemed unachievable to them two things were also happening. One is they thought I knew it could be done. 'He obviously must think there's a way to do this, even though we haven't figured it out'—which was not true, by the way. The other thing was that it was such a dramatic difference from the manager they had before that nothing they knew within their core experience made sense to them anymore. 'He's given us this unreasonable problem, so I guess we're going to have to come up with an unreasonable solution,' and that's exactly what happened. It was a challenge to them, and they met it.

ASK: Isn't burnout inevitable over twenty years of passionate involvement in your work?

Little: Yes, of course. But I think when people get to that point, and ideally before they get ALL the way to that point, they need to be put in a kind of rehabilitation mode. And it needs to be okay. When you operate over a long period of time with passion, then burnout is inevitable, but you can rejuvenate yourself. You can come back to where you were if you can have a rest—a sabbatical, so to speak—and you have to know it's okay. You have to have someone above you who's willing to accommodate that kind of situation.

ASK: If it's inevitable, then I assume you were there. Can you describe your rehabilitation?

Little: This was about ten years ago, and I was exhausted and wanted to retire. I asked for and was given a different job for a period of time. This was something that didn't involve the success or failure of the program, something that I could bring my skills to bear on, but it wasn't something that I felt passionate about. It was okay just to do a good job. It took about a year to get back to the point that I was rejuvenated and ready to charge forth again. And I was okay.

ASK: Would you ever remove someone who seemed to be burning out or suffering a loss of passion for the project?

Little: I think someone who is exhausted and unwilling to admit it,unwilling to take action, is not doing the team a service. But when you've been a part of a project from the start so that it becomes your project and you own it, even if you're not as effective as maybe someone else would be, I think there's a moral obligation to allow that

> "What you've got to do is provoke unconventional thinking."

ASK Talks with Terry Little (cont'd.)

person to see it to closure. When it's yours and you own it, it's cruel to take it away and hand it off to someone who doesn't own it and doesn't have the investment in it that you have.

ASK: What do you enjoy most about being a manager?

Little: Generally speaking, it's been watching the team coalesce and begin to see themselves as something special, something different, something radical and powerful, something exciting to be part of. Knowing that I had a part in sparking the flame that caused this to happen is very special to me. Teams aren't self-sustaining, generally. They need to be nurtured, but what I've observed is that a winning team seems to keep winning, and that's no accident, because a team begins to develop its own power, its own sense of how to operate, its own confidence in its ability. Successful teams tend to operate with a certain kind of intimacy among members that over time creates really powerful results.

ASK: And how do you as the leader of this group help create that intimacy?

Little: I try to sit down with every person who works for me and talk to him or her in their workspace at least once every two months. It's not necessarily serious talk—although sometimes it is—sometimes it's about their family or a hobby that I know they're interested in. In the end, what remains is only the effect that we have on other people. Yes, projects get done—they're successful. But to me, I find less satisfaction in that than in the positive effect I've had on other people. I think we're moving away from the dogmatic view that project management is a science. It's an art that at its most fundamental level has to do with people.

"In the end, what remains is only the effect that we have on other people."

Jerry Mulenberg, a NASA project manager out of Ames Research Center, submitted the following book review. Thanks, Jerry, for keeping fellow Project Managers informed.

The Rebel Rules (www.rebelsrule.com) is a good read for both the budding and the experienced NASA project manager. It provides a fresh way to look at leadership and management with reassurance that it's ok to be different, and to try different things. The author, Chip Conley, describes the book as a "wake up call—a personal handbook to help transform you into a groundbreaking leader in whatever you do." In the foreword, Richard Branson, founder of the Virgin Group (which includes Virgin Airlines), applauds the author for outlining, "some of the common principles that define successful entrepreneurs and innovative companies." Branson's personal description of the rule that rebels live by is, "the more people say it can't be done, the more I want to do it." (Sounds like an NASA Project Manager!)

Conley introduces the book by stating that the litmus test of a rebel is, "whether they are courageous and authentic." His stated purpose for the book is, "to help you capitalize on your own natural talents by showing how other rebels have flourished using theirs," and by focusing on the things that you can control, "your own habits and aptitudes." Much of the book revolves around Conley's own experience and self-described rebellious leadership of his company, Joire de Vivre (Love of Life). It provides a refreshing way to look at leadership and management.

The book also applies directly to project management. The four talents that Conley claims define a rebel—*vision, passion, instinct,* and *agility*—are also some of the most desired characteristics in a NASA project manager. It is easy to imagine that by simply replacing the word Rebel in the title with the words Project Manager, you could re-title the book, Project Manger Rules! In response to an email question about his thoughts on applying the definition of rebel to project managers, Conley replied, "...there's no doubt that vision, passion, instinct, and agility are essential for anyone looking for successful, sustainable results... issues like creative team-building and defining success based upon results and relationships [are] ... important."

The book provides ways to measure your rebel-ness against Conley's four traits of ground breaking rebel leaders: 1) communicating your *vision,* 2) creating *passion,* 3) building *instinct,* and 4) promoting *agility.* There are several easy to use management and leadership graphics developed by the author, and frequent sidebars with specific how-to tidbits (How to Make Sure You're not a Jerk, How to Create Change, etc.). It also contains many lists and questionnaires to determine if you are already, or want to become, a Rebel. There is a short quiz to evaluate if you are a true Rebel, a Budding

Rebel, or an Anti-Rebel, and a list of Thirty-Two Traits of Successful Rebels helps you see how well you fit the characteristics of a real rebel. The book also talks at length about the leader's role in creating an organization's core values, and contains a useful inventory of values. Although there are parallels to Guy Kawasaki's, *Rules for Revolutionaries* (1999), Conley focuses more on the details of how to become a rebel, if you are not one already.

As a how-to book, *The Rebel Rules* provides much food for thought about management styles for project managers, as well as for leading a business in unique (and successful) ways. Story telling is a major theme used in the book, and is sprinkled throughout with "Rebel Hall of Fame" stories about well-known (and not so well known) successful rebel business leaders. There is an extensive Bibliography for further reading, with over 90 references to the subjects covered in the book.

Jerry has been reading other books on project management lately.

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Feedback from our readers:

I laughed when I read W. Scott Cameron's article "What Did You Do at Work Today?" because our meetings are exactly the same with the laptops and all. I really liked this article because I could relate to it. What Mr. Cameron said applies big time! Another point I would like to make is that you can draw lessons not only from NASA experience, but from individuals from the outside like Mr. Cameron.

Juan Roman
Project Formulation Manager
NASA/Goddard Space Flight Center

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You can close the LOOP

ASK Magazine is always glad to share useful knowledge provided by our readers. If you've got a book review or some other information that you think will be helpful to project and program managers, the Loop section is your vehicle for making that information public. We invite all readers to contribute.

Loop (cont'd.)

ASK is planting the seeds for cultural changes within NASA and government. Publications like this help people to see and to understand that an environment in which knowledge sharing is valued is in everyone's interest.

Mike Burk

Department of Transportation

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I read the Terry Little article in Issue 3, The Big Briefing, about fuzzing up the message and it's great. I hope he writes more. The content of his message is one of the big issues of our time. There is much more to be said: for example, all of us whose career would be sacrificed if we were to speak plainly and honestly are probably in the wrong careers.

John Lehman

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John Brunson is currently assigned to the Systems Management Office with the Marshall Space Flight Center. His career in the space industry began in 1980 as a technician working on the first Space Shuttle.

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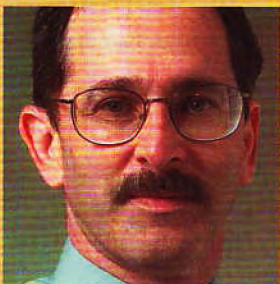
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