APPL

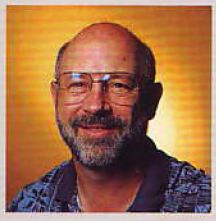
The NASA Academy
of Program and Project Leadership

ASK Magazine

Academy Sharing Knowledge
The NASA source for project management

Issue 6 January 2002

By practitioners for practitioners

"Thinking well is wise;
Planning well is wiser;
Doing well is wisest
and best of all."

Persian proverb

Academy Sharing Knowledge
The NASA source for project management

ASK Magazine

TABLE OF CONTENTS

ASK Magazine By practitioners for practitioners

Issue 6

TABLE OF CONTENTS

Academy Sharing Knowledge
The NASA source for project management

A S K Magazine

IN THIS ISSUE

Looking Back, Looking Forward

by Todd Post

Hard to believe we've done six issues already. Our charter was to come out bi-monthly, and only 9-11 slowed down our production schedule. You see there, not even a terrorist attack can stop ASK. Big kudos to our design team led by Joey and John only blocks away from the World Trade Center who quickly brought us back online.

It's been a great year for all of us on the ASK staff, but especially for me. I want to thank everyone who has contributed time and energy to the project, most of all to the storytellers in and out of NASA. You've been terrific, and so have our readers, every one of you.

At ASK our creed is 'For Practitioners by Practitioners,' and this issue, I believe, goes a long way towards reinforcing that. At ASK we respect practitioners in all fields and know in our hearts that the good ones share universal characteristics such as passion, curiosity, open mindedness, and a big heart to share what they know with those who don't. In this issue, we not only showcase stories by NASA project manager practitioners, we feature stories by practitioners from a variety of places we haven't visited before.

For instance, I hope you will look with special interest at Arnold Marder's story this issue about the world of metallurgy and materials science. Marder celebrates an exceptional practitioner in that field. While Marder's story is not about project management directly, we think you will recognize a number of similarities between the hero of the story and the best project managers.

Julie Pollitt in her story "Even Politics is Project Work" describes her recent transition from being a NASA project manager to serving on Capitol Hill as a Science and Technology Fellow for Congressman Tony Hall of Ohio. When Pollitt got to Congress she had no idea how useful her background as a project manager would be in writing legislation on military aerospace issues.

Since I've already reflected on where we've been this year, I might as well say a little something about where we're going. In upcoming issues we intend to present a great variety of perspectives for you. ASK agents are hot on the trail of some of the most intriguing and unique practitioners in their fields.

ASK 6 also includes two more stories on the Pathfinder solar-powered airplane project, precursor to the amazing Helios prototype that was so much in the news this summer when it flew to nearly 100,000 feet. Reading Ray Morgan's story

ABOUT THE AUTHOR

Todd Post is the editor of ASK Magazine and works for EduTech Ltd. in Silver Spring, Maryland. He recently had an article published in ***Knowledge Management*** on ASK Magazine and the use of story-telling as part of the Knowledge Sharing initiative at NASA.
You can contact Todd at **tpost@edutechltd.com** and tell him what you think about this issue of ASK.

A S K **Magazine** By practitioners for practitioners

Issue 6

IN THIS ISSUE

Looking Back, Looking Forward (cont'd)

"Hangar Bash" and Dougal Maclise's "The Only Thing You Need To Know" will give you a project manager's perspective both from industry and NASA. In the past three issues we've published other stories by members of the Pathfinder team. We've elected to do so because you voted for it. We heard from our readers that they were interested in learning more about a project from different perspectives. The Pathfinder case study is the start of our answer to that request. We also intend to present case studies of other projects over the next year.

I'm sure this next year at ASK is going to be as exciting as the one that just past. We've got plenty of stories lined up for you already. Keep telling us what interests you, and we'll make it happen. As Sherry Buschmann, the subject of our interview this issue, says, "Seriously, I believe communication counts for everything." Couldn't say it better myself. Don't be bashful. Tell us what you think.

Best wishes.
Todd Post

FROM THE DIRECTOR'S DESK

Saturday With Sinatra

by Dr. Edward Hoffman

Much of what I know about success and leadership comes from my early experiences working at Abada International, a small import/export company based in New York City, and its colorful owner Joe Abada. Joe did not perfect his leadership style using books or by parroting the latest highfalutin' theory; rather, he built the company from nothing to a success through common sense and hard work.

This was several years before my career at NASA, meaning I was a very young man at the time. Befitting my level of experience, the job position had no title. It was assumed that my work revolved around the requirements of the day and the needs of the business. Generally, assignments centered on maintenance of the building, preparing inventory for shipment and repairing damaged goods.

The work was straightforward and hard, requiring attention to detail and adaptability. For example, once a month I was expected to clean the roof. A New York City roof was not high on my list of preferred work activities. Aside from the general soot and dirt, invariably there was unrecognizable organic or inorganic matter that I would inspect from the end of a broom and often try to avoid. From my roof responsibilities, I learned the importance of intuitive leadership.

Joe would never dictate how to do an assignment, but he would clearly define the task and trust you to get it done. At the appropriate time he would nonchalantly walk around and start talking, promptly providing me with clear feedback on the work. He would always check the corners. I tended to do a poor job with the corners because, in my experience, the strangest looking creatures always decayed in the corners.

There was never any lack of clarity with Joe. Either it was good work or I would be given specific examples of my sub-performance. If the work were not up to standard (and standards were high), the work was done again until it was right. I learned the importance of cleaning the corners. Forget about trying to hide the dirt.

One of the things that endeared me to Joe and why I still appreciate his genius was what I learned from him on the Saturday shift. During the evening hours we listened to a radio show called "Saturday with Sinatra." Joe loved listening to Sinatra, and had no qualms about working to the sound of Ol' Blue Eyes. Until it ended, we stayed and worked with the music blasting in the background.

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.**

Saturday With Sinatra (cont'd)

Strangely, despite the long hours, it was fun. There was a pride in having the stamina to put in those hours, and the fun was on account of the music. Hard work and high standards are important, but so is taking care of yourself, and if that means improving the environment so that you enjoy being there, then turn up your radios and play what makes you happy.

LETTER FROM THE EDITOR-IN-CHIEF

Applying General Principles to Unique Situations

by Dr. Alexander Laufer

Good project managers understand that it is important to involve the customer in the project deeply. Involvement can mean a lot of things, but generally it requires the project manager to listen to and be responsive to the customer's needs.

Listening and responsiveness do not mean always accepting the customer's point of view. Let me share with you two examples in which customers were deeply involved in the projects, but the extent to which their initial demands were met differed considerably.

One project entailed the design and building of a facility for ecological research and was operated by a local university (the customer) at a site operated by the Department of Energy (DOE). The facility would house a veterinary-type clinic for observation, surgery and autopsy of small animals. As most of the researchers using the facility would have offices in other locations, the customer required only a single telephone line for the entire facility.

The DOE site manager decided that the facility must comply with DOE standards, and this included multiple phone lines, fiber optics, computer capability, and a fire notification system. These applied to all new facilities constructed no matter what their functions.

The customer was furious when informed of this because these requirements were going to add substantial cost to the project, and the customer had a limited budget. At that point the customer proposed doing away with all the communication lines to the facility, settling for a cellular phone. The DOE site manager still found this idea unacceptable; all facilities located on site must be on the site system.

It was a delicate situation for the DOE project manager, whose job was to provide oversight of the project and serve as the go-between for the customer and the DOE site manager. Despite the site manager's requirements, the project manager was convinced that the customer was right. Under these unique circumstances, the Project Manager believed the DOE standard was inappropriate. The site manager however was adamant about his requirements. Thus, the Project Manager decided to take the case to DOE headquarters and argue on behalf of the customer.

In this case, a waiver was granted. The facility was constructed with a single phone line, and the project was completed within budget.

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 in the Civil Engineering Department at the University of Maryland at College Park and Dean of Civil Engineering at Technion-Israel Institute of Technology. You can contact him at **allaufer@askmagazine.org.**

> "Despite the site manager's requirements, the project manager was convinced that the customer was right."

Applying General Principles to Unique Situations (cont'd)

In the second project, led by the same Project Manager, the mission was to design and build a new facility to test products for five different customers. The new facility was to provide environmental test chambers that could quickly raise and lower temperatures. Each customer had completely different temperature requirements for the products that were to be tested. This meant that the facility had to provide multiple ovens or additional environmental chambers to satisfy all the different requirements. The result was that the total estimated cost of the facility was much higher than the approved budget.

"While the Project Manager wanted to satisfy his customers, he realized that unless he found a way to get them to relax their requirements they would all wind up with nothing."

The Project Manager approached the customers separately and tried to get them to relax their requirements so that the project would be able to meet its budget. The customers listened to him, but were clear that they could not compromise on their requirements. While the Project Manager wanted to satisfy his customers, he realized that unless he found a way to get them to relax their requirements they would all wind up with nothing. Therefore, he decided to approach them one more time and to ask them to relax their requirements, but this time he approached them as a group.

Each customer was provided with the temperature ranges required by all the other four. They all were requested to adjust their requirements to the next closest set of requirements. At first, there was resistance to changing anything. Each customer felt that the requirements could not be changed. But once they realized that unless they collaborated, none of them would get anything, they worked together to streamline their requirements so the project could succeed. By combining requirements, they were able to reduce by half the number of ovens and environmental test chambers. In the case of special needs, small units would be purchased at a greatly reduced cost. Since fewer units were needed, the size of the facility was likewise reduced.

"Context is the key."

In both examples the project manager worked with the customers and met budget constraints. However, in the first case he was willing to confront authorities in order to meet the customer's requirements, while in the second case he confronted the customers and convinced them to modify their requirements. These two examples demonstrate that when it comes to meeting customer needs, context is the key.

Applying General Principles to Unique Situations (cont'd)

Lessons

- Is the customer always right? Generally yes, but sometimes in order to serve the customer properly you have to persuade the customer to see beyond what they think they need to what is in the best interests of the project. This is especially true when pursuing all goals means getting none of them.
- You should always involve customers in a project, but you should not adopt a one-size-fits-all approach for satisfying their needs. You must recognize that situations and customers are different, and therefore they demand a different response. Context is the key.
- When necessary, the project leader must fight for flexibility of standards to benefit the unique needs of a customer.

A S K Magazine By practitioners for practitioners

Issue 6 STORIES

ABOUT THE AUTHOR

Julie A. Pollitt is currently a Science and Technology Fellow in the U.S. Congress, working on military aerospace issues. Previously she was a project manager on a variety of programs at NASA's Ames Research Center, where she began her aerospace career in 1988. In future job assignments she hopes to blend her technical background, project management experience and her knowledge of the workings of Congress.

Even Politics is Project Work (Or the US Congress is Looking for a Few Good Project Managers)

by Julie A. Pollitt

Why put my career at NASA on hold for a year to become a Science and Technology Policy Fellow on Capitol Hill? The way I look at it, why not? What does working in the U.S. Congress have in common with working as a project manager in the world of aerospace? Surprisingly, a lot!

I had been working in the civil aerospace world for 12 years, at least half of them as a project manager, and all with NASA. I thought Congress would be an interesting change, a way to broaden my background. I wanted to understand the breadth of national aerospace policies, both civil and military, and from that perspective Congress is the center of the action. In addition, I wanted to see how decision-making in Congress affects what we work on at NASA and at other federal agencies. My ticket to Capitol Hill came by way of the American Society of Mechanical Engineers Federal Government Fellowship Program.[1]

Many people don't realize it, but nowadays almost every issue that comes up on the Hill has a science or technology component to it. Most congressional staff do not have a background in science or engineering. Thus, Science and Technology Policy Fellows are in high demand.

I went to work for Congressman Tony Hall of Dayton, Ohio because he was looking for someone specifically able to work on aerospace issues. Congressman Hall is regarded as a leader on the Hill in pushing for more Research and Development (R&D) in military aerospace. The majority of this science and technology work is done by the Air Force. From my point of view, it was a great opportunity to learn the aspects and issues of military aerospace.

I was responsible for three pieces of legislation for Congressman Hall. These pieces of legislation affect the U.S. Air Force and relate to access-to-space/reusable launch vehicles, aging aircraft, and the insufficient investment in defense aerospace science and technology. Being responsible means that I researched the issues, originated the legislative ideas, drafted the legislation, and sold it to key committees and other offices on the Hill, all within the broad

[1] The American Society of Mechanical Engineers joins approximately thirty other scientific and engineering societies in sending representatives to work in the U.S. Congress each year. These individual fellowship programs are then coordinated under the American Association for the Advancement of Science (AAAS).

Even Politics is Project Work (cont'd)

framework established by Representative Hall. I was given full staff responsibility for getting it passed. Passing legislation requires the staffers to work hand-in-hand with the congressman who sells it to his peers. Currently, all three pieces have been passed by the House of Representatives and are in conference negotiation between the House and Senate. This legislation will be part of the National Defense Authorization Bill for FY2002.

Julie Pollitt and Congressman Tony Hall of Ohio in Hall's office on Capitol Hill.

> "Many people don't realize it, but nowadays almost every issue that comes up on the Hill has a science or technology component to it."

Of the three, the *Air Force Science and Technology Act for the 21st Century*[2] was by far the most complex. It required me to draw from every aspect of my background as a NASA project manager. This piece of legislation addresses deficiencies within the Air Force's planning and budgeting processes. These processes decide their science and technology program top-line budget and investment portfolio.

[2] This legislation can be found at the following internet address: http://thomas.loc.gov/ by performing a search for Bill HR 2659 from the 107th Congress.

Even Politics is Project Work (cont'd)

Congressman Hall, partly because of his close relationship with the Wright-Patterson Air Force Base in Ohio, has been pushing the Air Force to invest more in research and development (R&D) for years. Of all the armed services, the Air Force is the only one whose R&D budget has dropped significantly in the past 10 years--46% since 1989. Perhaps even more alarming, the Air Force budget has potential gaps in future technologies, such as those to address emerging threats like terrorism. Congressman Hall wanted me to legislatively reinstate a long-term planning process that had been absent in the Air Force since the mid-1990's. I actually took it a step further. I looked at the entire planning and budgeting system of the Air Force.

"My project management training and experience was important at many points during the creation of successful legislation."

I was operating under the premise that if the Air Force is not investing in R&D, then there may be more than the absence of a specific long-term planning process creating barriers to R&D advocacy. There may be barriers throughout their entire planning and budgeting system. At the same time, I looked at the changes they had recently made to see how these might help the situation. Have they gone far enough? Is there something more that should happen? Should we wait a year or two and see if the changes are effective? Should we make them prove that the changes are effective to solve the problem? I was trying to think both about processes and results, the past and the future.

My project management training and experience was important at many points during the creation of successful legislation. Researching an issue is very similar to the project requirements phase. Once you understand the problem that needs to be solved, you then conceive a "conceptual design" of legislation to address the issue. You may even create a multi-year legislative plan to attack the issue. Further, you need to decide what monies may be required by the affected federal agency to implement the legislation. This must be budgeted for by Congress.

All decisions and legislation in Congress pass through a committee system. The committee which has jurisdiction over the issue decides what legislation passes or "dies in committee." Part of the legislative plan is to decide what information, money requests, or legislative language must be provided to the committee in time to influence their decision points. There is a sense of timing and deadlines, the same as with any critical project.

The first point where my background came into play was in understanding the Air Force science and technology investment issue. At NASA I learned how to

Even Politics is Project Work (cont'd)

perform complex budgets and plans. Having done so much strategic and project planning, I was able to pick up Air Force documents and easily understand what was going on. I spoke the same "language" as the Air Force budgeters and planners. Most legislative staff don't have this kind of background. It would have been difficult for them to understand where key decision points were, who was making them, who was absent from the decisions, and what planning and budgeting techniques were being applied. And furthermore, it would have been extremely difficult for them to take this information and understand how it translated into decisions about the science and technology program top-line budget and investment portfolio.

At NASA project managers are continually taught the key to the success of any project is the relationships that form within the team and with customers and shareholders. In this instance, the team consists of the Congressional offices or committees that work with our office. They have a vested interest in the successful outcome of the legislation. The customer and shareholders are the U.S. public and the special interest groups that stand to benefit. To an extent, the Air Force is also a shareholder. Relationships with all of these parties are critical to the passage of the legislation. I spent a significant amount of time building these relationships. This is one of the things you have to do to establish your credibility, and on Capitol Hill credibility is everything for success. It is a very "personal" environment, much more so than the world of science and engineering.

"Having done so much strategic and project planning, I was able to pick up Air Force documents and easily understand what was going on."

As a project manager you have to build a team and work with them to achieve a common goal. Building relationships is an important part of the work a project manager does at NASA, and certainly it's an important way you establish your credibility. But what's different at NASA is that we're all scientists and engineers, so there really are not significant communication barriers.

On the Hill I'm continually working to build social relationships as a way to mitigate the communication barriers surrounding scientific and technical issues. That's why I spend a significant amount of time going to receptions, two or three a week sometimes. I spend even more time just talking with other staff. The staff I talk with may come from completely different backgrounds. I can't discuss legislation with them as if they automatically understand the issues without first making sure they understand the basic terms. Once I understand their backgrounds, I can then explain the issues in their terms. Further, this "networking" is used to understand what issues are of importance to these staff or their bosses, i.e. the Congressmen. This also provides me with a framework for finding com-

Even Politics is Project Work (cont'd)

mon ground between our legislation and what issues they hope to solve. In return their support helps to pass the legislation.

> "On the Hill I'm continually working to build social relationships as a way to mitigate the communication barriers to scientific and technical issues."

To create legislation that intersects the best interests of both the U.S. public and the Air Force, I had to build relationships with the Air Force so that they would begin to trust me. That trust was important to obtaining an understanding of their agency and their processes. I did this by meeting with people, proving I was knowledgeable, demonstrating my credentials, and empathizing with them by letting them understand that I was from a Federal agency and understood the agony that some agencies go through based on the legislation that comes out of Congress. I let them know that regardless of whether I wanted this legislation or the Air Force wanted it, Congressman Hall was demanding it. Hence if it were a cooperative effort, then the final product would be something everyone could live with.

Building relationships went beyond just what I was doing with the Air Force or Capitol Hill staff. One of the things you do is look outside the Hill for people with the common interests of your congressman. Certain special interest groups very much want to see increases in science and technology spending at the Department of Defense. When you have the opportunity, you work hand-in-hand with these parties. One such group was the Coalition for National Security Research. This is a consortium that includes many universities. Universities have a lot of power on the Hill. Because they are high profile constituents in their districts, they can go to their congressional representative and say, "This is important."

Question

If nurturing interpersonal relationships is much of what you do as a project manager, how did you learn this skill?

Projects continually rely on reviews to assure that the end product meets its requirements, i.e. solves the problems it was supposed to. Before we submitted the legislation, it was thoroughly reviewed. I had three or four different Air Force organizations review it. I had different staff members in offices on the Hill whom I thought had some expertise review it. I gave copies to all the Armed Services Committee staff and took their input. I also sent it to some MIT professors who had been on an Air Force science and technology advisory board and found some of the same conclusions as I had. This may sound similar to all the reviews you have to go through on a project, but the difference in this case was that I had to initiate all of them. Formal reviews are not built into the congressional process. As a project manager I certainly understood the value of getting good reviewers to look at your product, especially from a variety of experts.

In some ways it's a very different environment here on the Hill than it is at NASA. Still, it is interesting to me to what extent preparing a new piece of legis-

Even Politics is Project Work (cont'd)

lation is also a project. Legislation has to be backed by a plan, it must have the support of a team, it has to meet the requirements of the customers and shareholders, it has to be thoroughly reviewed, and it has to be completed on schedule. When I set foot on Capitol Hill, I had no idea how much of what I had learned at NASA was going to help me succeed with my legislative job!

Lessons:

- All (white collar) work is project work.
- Project work is moving to center stage in our organizations. You cannot afford to be a 10 in operations and a 4 in project work.

ABOUT THE AUTHOR

Dougal Maclise has been a member of the management team on several projects at NASA's Ames Research Center during the last five years. He is currently the Team Manager of the Systems Engineering Team for the Integrated Vehicle Health Management (IVHM) Project. Before joining the IVHM team, he served as Engineering Manager for the Vertical Motion Simulator Modernization project and was Project Manager of the ARTIS payload project for the ERAST program.

The One Thing You Need to Know

by Dougal Maclise

A Mission Defined

At the flight readiness review the day before we were scheduled to fly, I had to stand up and say, "We need a flight to know if we're ready."

It was a sensor payload project. The payload, a digital camera and a computer, total weight 17 lbs., was flying aboard the Pathfinder solar-powered airplane, an Unmanned Aerial Vehicle (UAV).

Steve Wegener, who was in charge of sensor technology in the Environmental Research and Sensor Technology (ERAST) Program, had come to me about a year earlier and said he needed a project manager. Steve had a subset of projects under ERAST, and what he had in mind for mine was to take colored infrared images of the ground from the UAV and get "whatever" information we could from them. The "whatever" we would fill in later.

There was just one requirement: Take high-resolution images from the UAV and put them on the Internet in real time.

"One requirement?" I asked incredulously. To me this was impossible. I'd never had a project with only one requirement. Normally, they came in volumes.

Why do you accept a project? There are hundreds of reasons. Every project manager has his own. This one I took because it seemed liberating when compared to what I was used to as a project manager. What I heard Steve saying was this: "How you do it is up to you and your team."

I remember the reaction of the team. They were incredulous too. "Here it is--this is all we're doing," I said when we were all together at the first team meeting. Everyone's eyes were trained on that one sentence. I put it on a slide and pointed to it.

There were 15 of us in the room, it was completely quiet, and then someone asked, just like I had, "One requirement?"

Like Steve, I pretended to be matter-of-fact about it. "Yeah."

Most of the time the people generating requirements tend to work down to the design level. Early on in the project this costs a team expensive amounts of time and doesn't allow them much flexibility. When it is possible to formulate require-

The One Thing You Need to Know (cont'd)

Pathfinder aircraft litoff on altitude record setting flight of 71,500 feet over Hawaii.

ments early and they stay the same throughout the project, then it probably pays to formulate them early. But when projects are rife with uncertainty, especially technological uncertainty, formulating requirements too early in too much detail can be a major mistake.

"But when projects are rife with uncertainty, especially technological uncertainty, formulating requirements too early in too much detail can be a major mistake."

The One Thing You Need to Know (cont'd)

You cope with uncertainty by not giving yourself too many requirements up front. One requirement for me distilled the project down to what it was really all about, and such simplicity made it so much easier to stay focused and trained on the goal--despite the many difficulties we had.

It sounds simple, just one requirement, but trying to pull it off was anything but that. We had countless problems to overcome, and each time we solved one, we always seemed to find more. The reality is there was more than one requirement, many more, but these were the ones we gave ourselves.

" We had countless problems to overcome, and each time we solved one, we always seemed to find more. "

Trusting Your Team

As a Project Manager, you want to give your team as much flexibility as possible, but the problem is with a project like this where there is so much uncertainty, you surely are going to lose sleep wondering how much you should be on top of every little thing. This was a project whose true name should have been UNCERTAINTY because there was so much of it. One way we allowed ourselves to be flexible was to build a competent, robust team. I had a deep trust in and respect for everyone who was on my team, I had to because I took great pains in selecting them, and I let them do what they needed to get the job done.

The greatest challenge of the project was the data network from the plane to the Internet. First, I checked to see what radio links we could use from the plane to the ground. There were two modems available at 9600 baud, one for each payload. For an 18-megabyte image, it was going to take 4 1/2 hours to download. I probably had 6-8 hours of flight time. I could then only download 1 or 2 images per flight. That wouldn't work. We needed a much faster connection.

The plane also had a video link. Maybe we could use that somehow. Stan Ault from HyperSpectral Imaging, Inc. volunteered to take on that challenge. He had a concept for converting the digital image data into a sort of barcode that he could encode into a video signal that could be captured and de-converted on the ground. I told him I would gladly leave the details to him.

At the other end of the network, we would need a server that the public could connect to from the World Wide Web. Flight tests took place in Hawaii at the Pacific Missile Range Facility (PMRF) on the island of Kauai. PMRF had a strong firewall, and they weren't going to allow anyone from outside to get through, so we didn't have an option of putting a website on a computer there at the base.

The One Thing You Need to Know (cont'd)

I gave this problem to Don Sullivan to figure out. Don was an expert in networking and computer applications. Don researched the Internet connections and found they were extremely complicated and fragile, but he was able to deal with PMRF and got them to set up a connection for us through their firewall that we routed back to a server at Ames Research Center in California. The route was to go from Kauai to Maui via Honolulu and then to the mainland by an underwater cable. It was all quite complicated, and thank God Don was on top of this. It was one of those situations where keeping me blissfully ignorant was probably in the best interest of the project, simply because it was in the best interest of my health.

We also worried about the video link we were using; it was the only visual link that the flight crew had to the plane during most of the flight. For us to download an image the flight team had to switch that video transmitter over to our payload and take it off the video camera they were watching. During that time they had no visual way of monitoring the plane. It was sort of like asking the pilot to close his eyes for about 5 minutes.

> "Now and then the payload would hang and all we could do was tell the pilot to do the therapeutic reboot."

The next problem with this link was that we could not test it completely on the ground. When we ran a flight simulation, we found that there was reflection of the signal off the ground that created too much interference in the video signal to be able to capture the digital data out of the images. We figured that once the plane was in the air, this problem SHOULD be eliminated.

Then there was the "real time" issue. The requirement was to take high-resolution images from the unmanned plane and put them on the Internet in real time. The term seemed a bit nebulous to everyone. NASA has only a few web-operated payloads, and no one was quite sure what our benchmarks were. When I asked Steve Wegener, he said nothing more than "Do the best you can."

Do or Die

The day of the flight the morning sky broke clear and beautiful. We were committed to a full day of flying whether the payload worked or not, and I knew it would be a long day if things didn't go our way; it would be several hours wallowing in our failure. We had tried mimicking the system on the ground in several ways and could not do it. Apparently only a flight would prove the system and, by this time, we would only get one flight, one chance.

The One Thing You Need to Know (cont'd)

The day before the flight there was a fire under the streets of Honolulu and it burned up part of our Internet link. Fortunately, Don had it under control, but it was another close shave that I really didn't need to know about. When he told me, I said, "What happened to our plan about not telling me what I don't need to know?" I gladly stayed ignorant of a lot of things, but to be honest, I rarely felt anything remotely close to blissful.

One of the problems we could not solve up till the end involved some glitches with the software on the payload computer. The only solution we had for it was what we called a therapeutic reboot, basically the same thing you do on your home computer when a software application causes the system to crash: you turn off the machine.

On the runway, as the plane was being rolled out, we tried to take a picture and the system crashed. We rebooted, and prayed. Finally, just after take off, we managed to get a picture and were able to put it on the Internet in about 24 minutes. Everyone--and I mean everyone--breathed a sigh of relief, although I still kept my fingers crossed.

> "I thought the high drama was ended for the day, but that was a bit premature. "

The purpose of our mission was to look at the health of vegetation on Kauai. By the brightness of the infrared bands in the images we captured scientists could see how healthy the plant life was, and, while we were in the air, instruct us to fly over different areas and take more pictures. We learned from the scientists where to go to get a shot of a broken irrigation line, where they thought there was an outbreak of something, where there appeared to be an immature crop, and anything else they wanted to see.

Things seemed to be going fine once we were in the air. Still, my stomach was in knots. Now and then the payload would hang and all we could do was tell the pilot to do the therapeutic reboot. Once the pilot got used to flying without his video link, he seemed okay with this. We were flying at 30,000 - 40,000 feet mostly, much lower than the high altitudes Pathfinder had reached when it set the world altitude record. A 17 lb. payload doesn't sound like much, but the plane itself without the payload weighed a grand total of 500 lbs. It's like the mountain climbers say, 'Every ounce counts.'

We managed to get 16 pictures altogether. On the website we used to display them they showed up as dots on a map. You clicked on the dot and this brought up the picture. We were able to get the image up on the Internet in just under 20 minutes. Not bad. No one was complaining we were too slow.

The One Thing You Need to Know (cont'd)

As night fell it looked like the mission was over, and quite a success it appeared to be. I thought the high drama was ended for the day, but that was a bit premature. On the way back to PMRF the winds weren't dying down. The plane was operating on batteries now, and, the sun having long set, it couldn't stay up indefinitely. The plane actually had to approach the landing strip flying backwards. The pilot did one last swing out over the breakers and there was very little wing space between the water and the wing tip. In the last 50 feet the winds died down enough for him to turn the plane around and land it coming in forward. How close we'd come to losing the plane I don't think anyone cared to contemplate.

We were all wrung out emotionally from this long day. Everyone just wanted it to be over with. Yet there was one requirement still to be met--the celebration! Again, we had a clear objective and almost any plan to get there would suffice.

Lessons:

- On projects with a great deal of uncertainty it is best not to specify requirements too early in the life of the project and thus limit the team's ability to be flexible in addressing the uncertainties.
- A project manager must trust his team. As the overall team leader you must allow team members to take the lead on issues in which they clearly have an expertise you do not.

Question

In most projects, requirements are formulated very early and in great detail. Is this because most projects actually have to cope with low uncertainty, or because upper management does not tolerate high uncertainty (and therefore expects the project team to behave as if there is low uncertainty)?

ABOUT THE AUTHOR

Dr. Arnold Marder is the R.D. Stout Distinguished Professor of Materials Science and Engineering at Lehigh University. Prior to joining the faculty at Lehigh, he worked in industrial research for 25 years. Dr. Marder is active in the field of physical metallurgy, and he and his group conduct research in the area of high temperature coatings for corrosion protection.

A Good Fellow

by Arnold R. Marder

This year my friend Arlan Benscoter received one of the highest honors in the field of metallography. Arlan was awarded a fellowship by ASM International,* and he richly deserved it.

But what makes Arlan's selection so remarkable--and controversial too--is that he has no formal education or training in metallography. He is entirely self-schooled.

A letter of support from a former president of ASM speaks volumes for how much Arlan has accomplished, considering his background:

> Arlan Benscoter is a special case for a fellow nomination in that he does not have an advanced degree and has followed a career path quite different from university professor, industrial scientist, or manager. Nevertheless he has made outstanding contributions to the development of metallagraphic techniques, the teaching of metallography, and service to ASM.

Nowhere has Arlan's selection as a fellow been more controversial than in the Academy. Being a professor myself, I am not surprised. Having gone through a Ph.D. program, academics often feel like they have to look at things based on formal principles. Arlan's approach to metallography is one of practical experience, i.e. working with the microscope. A person can try to guess what has happened to a material based on first principles, but someone like Arlan who can look under the microscope and see what's going on, that is someone with a very special skill, and a college education doesn't necessarily provide you with it.

"Having gone through a Ph.D. program, academics often feel like they have to look at things based on formal principles."

This reaction to his fellowship is no different than what has been following Arlan his entire career. I have been witness to it from the beginning. I have worked with Arlan for 36 years, first at Bethlehem Steel, where I was a research engineer and he was a technician, and now at Lehigh University, where I am a professor in the Materials Science and Engineering Department and he works as a researcher, assisting students with their experiments under the microscope.

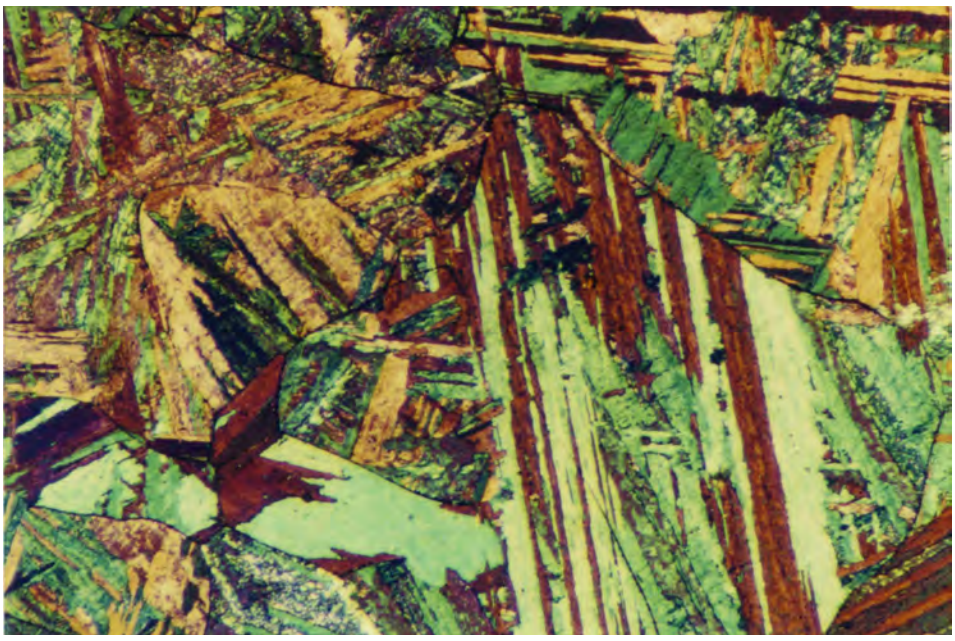
Arlan started at Bethlehem Steel a month before I did in 1965. I was fresh out of college, and he was fresh out of the Army. His talents were not developed at that point--but then neither were mine. Mostly, he was carrying specimens for the

* ASM originally stood for American Society of Metals, but since polymers and ceramics are now also recognized, it was decided to keep the acronym and dispense with the full name.

A Good Fellow (cont'd)

engineers at Bethlehem, and then he started to do some testing, and as a result of the testing he started to look into the microscope and use it to evaluate what he saw. That led him into metallography, which is the process of looking at metals in a light optical microscope.

At that time I was also a part-time graduate student, studying for a Ph.D., and as part of my dissertation Arlan was helping me evaluate some microstructures. On one particular alloy, he found some tiny cracks on the surface of the material that no one had ever paid much attention to before. These cracks were always passed off as artifacts. Arlan insisted that it was real cracking and had its ramifications on the fracture strength of the steel. I knew if we started examining this it was only going to extend my dissertation, and at that point I wanted to get on with my life. I was reluctant to indulge his curiosity, but he kept insisting that it was important, and eventually he got to me.



An example of the kind of art found under a microscope.
Artist: Arlen Benscoter.

Together we looked at the cracks, and it turned out that they were real. As you can probably imagine, there was a good deal of skepticism about our findings. Here were two people coming out of nowhere, one a mere Ph.D student and the

A Good Fellow (cont'd)

other somebody without even a college education. In particular, we were sharply criticized by Bethlehem's arch competitor at the time, US Steel. This led to what Arlan and I still refer to as "the shootout" between Bethlehem and US Steel. We invited one of US Steel's leading scientists to Bethlehem to perform an experiment with us. This scientist had claimed that what we were seeing were dust particles on the negative and weren't really cracks, but when we performed the experiment together, he saw we were right and agreed with us.

As a result of our work, people acknowledged that Arlan had done a good job, but as far as recognition like awards or citations were concerned, there was none. Bethlehem Steel gave him a promotion, and he started working his way up to be the key person in the metallography group at Bethlehem. In many ways, this has been the story of Arlan's career. People privately recognized his talents, but publicly few were willing to admit that someone could accomplish as much as he has without formal training. The amazing thing is he has never been discouraged by it.

Here is one little story to illustrate Arlan's special talent. ASM International gives awards every year for photographs displaying the art and science of metallography. There are ten categories. Out of those categories they take the Best in Show. The first person to win the award in 1970 came out of our group at Bethlehem Steel. Arlan helped him put together those photographs. When Arlan came to Lehigh, he started working with graduate students. One of our graduate students won Best in Show. Several years later another student of ours won the grand prize. Then the next year another of our students won Best in Show. This is an international competition. For any institution to win one grand prize is unusual, to win two is very unusual, but to win three--that is unprecedented. This competition is open to people who have been working in the field for 20 to 30 years. Competing against students? In his typical way, Arlan refused to put his name on any of the entries. Only the students' names were recognized as the winners.

> "Plenty of people have high standards, but Arlan just exudes love of his work."

In 1996, he was given an award by the university for teaching excellence. This was for the best teacher in the engineering college at Lehigh. The students that year felt that he was the best teacher they had ever had. What made this so unusual was that he does not have a position as a professor in the department. He's the first person ever to get the award that isn't a professor.

Some professors were upset that someone without a degree could be picked as the best teacher in the engineering college. Students don't seem to suffer the same skepticism that certain faculty members are plagued by when it comes to recog-

A Good Fellow (cont'd)

nizing Arlan's talents. Every year in their exit interviews, invariably, the students point to him as one of the best experiences they have had in their four years at Lehigh.

As much as anybody in our department, Arlan has been instrumental in improving our reputation in the Engineering College. Years ago, for instance, the department was down to only five students per year. One of the things we decided to do to improve things was to invite prospective students to open houses. It was Arlan's idea to take undergraduates and put them on all the instrumentation. The prospective students would go around to each of the demonstration rooms and see our students working on all the instrumentation that Arlan had taught them how to use. As a result, our enrollment increased significantly. Students saw this as evidence that Materials Science and Engineering is a hands-on department. Why do I give Arlan most of the credit? One year the Associate Dean said no more open houses. The next year's enrollment went down substantially.

> "Certainly he has taught me that an academic degree is not a prerequisite to being successful at metallography—or anything, for that matter."

When I left Bethlehem in 1986 and joined the faculty at Lehigh, I was bent on getting someone like Arlan to run the metallography lab. Who better to have than Arlan himself? I went around asking people to support him, and I lost a couple of pairs of trousers wearing my knees out trying to get everyone to contribute, but we got the money to support him and so then it was just a matter of getting him interested in the position.

Before Arlan came to Lehigh, it had an under-equipped microscopy lab. Having known Arlan for 21 years, I knew how he would react. Bethlehem had a pretty good set up that he had put together. Lehigh still had mostly one-eyepiece microscopes.

"You want me to work here, with this junk," he said after I showed him around.

Arlan and I had worked together at Bethlehem for a long time and I thought I knew him well. I was prepared for this, so I said, "What's the matter, aren't you up for a challenge?"

That was all I needed to say, apparently. He took the job. I doubt he's ever looked back on leaving Bethlehem with regret.

A month after he started working here, Sandy, his wife, said to me, "What did you do to my husband?"

A Good Fellow (cont'd)

Question

In your opinion, is project management closer to art/craft or science/technology?

I said, "What you mean? I'm just letting him do what he wants."

"I don't understand what's happened to him," she said. "He comes home smiling. He comes home whistling. I've never seen him so happy."

This is the real reason his students love him, I believe. Plenty of people have high standards, but Arlan just exudes love of his work. I see it; the students see it; everyone who is exposed to him sees it. He just doesn't think about the time he puts in because it's not like a job to him. This is his mission in life. It has nothing to do with collecting paychecks at the end of the month.

My friend Arlan Benscoter has taught me a great deal about humility. Certainly he has taught me that an academic degree is not a prerequisite to being successful at metallography--or anything, for that matter. While Arlan may not have the academic pedigree, there is no way you could ever say to him, "What do you know? You don't even have a degree!" People like Arlan are special not just because they love to learn, but because they learn in their own manner. And what that entails generally is learning by experience.

Lessons:

- Those who are successful at helping others learn need not necessarily be formally trained as teachers.
- Those who love their discipline work hard at it because it fuels their passion.

STORIES

WhenTo Say No

by David Collins

Early in my career, I was asked to finish instrumenting the Hubble Space Telescope as it traveled from California to Kennedy Space Center. I worked at Kennedy and was inheriting the job from a research lab at the Marshall Space Flight Center, and I would be getting $85,000.

Because of the size of the telescope, and the cost to transport by air, it was decided (by whom, I'm not sure) to move the telescope to Kennedy by boat. The folks at Marshall told me everything was fine, they've got it all set up for me, and all I needed to do was finish it up, just a little polish really, and we were golden.

The Hubble Telescope seen here in the environment it was designed for.

"Okay, but I'd still like to go over the system and the requirements and analyze them," I said.

I did an analysis, and what I found was a bear trap. I learned the system was running on something far less than a state-of-the-art computer, had skimpy instrumentation, and had some serious limitations. How serious are we talking? Well, every 90 minutes we had to shut down for 15 minutes. "This is the Agency's premiere mission," I said to myself, "and I'm supposed to instrument it to make sure it gets to Kennedy from California safely, and I'm losing 15 minutes of data

ABOUT THE AUTHOR

David Collins is currently on a detail assignment in the new X-Flight Division at NASA Headquarters. He has worked for NASA at Kennedy Space Center for over 19 years in a number of capacities including Researcher, Lead Designer, Chief of the Instrumentation Section, Project Manager, Deputy Associate Director for Technology Development, and most recently as KSC's Senior Systems Engineer. He has been a member of numerous teams influencing the changes both within KSC as well as the Agency, including two reorganization teams and the "Faster, Better, Cheaper" Team.

When To Say No (cont'd)

every 90 minutes." This didn't sound too good to me.

To make matters worse, the boat they selected to get it to Kennedy went by the nickname of the "Rusty Scow." Conditions inside the hold of the ship were far less than favorable for the transport of hardware as sensitive as this. The hold of course was where the telescope was going to be stored. I told my management I thought air transport was the way to go.

> "I was still a young project manager, and in the NASA that I came up in project managers were not supposed to turn down jobs."

I could just see it. Hubble gets to Kennedy and it doesn't work. They analyze the data and say you're missing 15 minutes of data every 90 minutes. What's going on? How can we tell what went wrong?

I didn't want to be responsible for losing data. I also didn't want anyone to think I was less than equal to a challenging project. I was still a young project manager, and in the NASA that I came up in project managers were not supposed to turn down jobs. Good project managers accept all jobs. All jobs are good jobs. Refuse a job and you jeopardize your future.

I had accepted many "bad" jobs in the past, but this one was over the top. How could I turn this job down and live to tell the tale? I'd better do some homework. How did the situation get this way? I put out feelers and learned that the lab had accepted the job with too little budget because Hubble had had some financial difficulties. They had been given $250,000, the vast majority of which had been used to purchase a research grade instrument for the job, and one which naturally they could use later at their lab. I learned that Marshall was responsible for Hubble in all phases of the program, but that responsibility would be transferred to KSC for its transportation from California to Florida when we accepted this job.

> "My issue was not the job or being responsible for Hubble; it was the constraints I was saddled with."

After thinking a while, it came to me. My issue was not the job or being responsible for Hubble; it was the constraints I was saddled with. The project was budgeted for $250,000, but I was not satisfied that this was an honest figure. I talked with colleagues, more experienced project managers whom I trusted. I talked to contractors. I got the best information I could get my hands on and sat down and did an estimate of what I believed it would take to do the job right. It came to $1.5 million. A little bit different than the $250,000, and a far cry from the $85,000 they were offering me.

So now I had a good estimate, some background information and a bit of a story as to how things had gotten this way. Now I needed an approach. Just because

When To Say No (cont'd)

the job was impossible didn't mean that I wouldn't end up with it. I needed management to feel some direct ownership in the outcome. I needed either the funding to do the job right or to have management turn it down. I finally came up with an approach.

I went to my Director's office and said, "Sir, you're about to be responsible for the Hubble Space Telescope, and I think there are a few things you need to know." I went through the scenario with him, I laid out the pros and the cons, what budget was needed to do it right, and at the end of it he picked up the phone and called Marshall. "You give us $1.5 million to do this or you can have it back."

End of story: Marshall took it back. Fine with me. Just by the way, the telescope never traveled by ship. An aircraft brought it to KSC.

There are a couple of lessons here. One is you can say no, but *do your homework*. When it is important to learn the pedigree of a project, especially when you are not satisfied with the information you are given, then don't be lazy. Get to the bottom of things. Had I not done my homework so that I could lay it all out before my Director, the results could have been drastically different. Imagine that the Hubble telescope got to Kennedy and didn't work. My career certainly would have been stunted.

Two, it can even be good for a project manager to have a reputation for not accepting every job. After this people started saying about me, "He won't accept a job unless he knows it can be done." As a result, people wanted to work for me. If I took a job, my team believed it was doable--a great starting point. I see a lot of jobs handed out where the team thinks, 'Dear God, this is not possible.' Not a good way to begin. It also helped because management thought, "He's going to give us the straight scoop. He's not going to hold back on us."

Contrary to what I originally thought, that saying no would end my career, in this case it probably helped me.

Lessons:

- Do your homework. It may save you at the least from an embarrassment and at worst from making a career-damaging mistake.
- Doing what you believe is right and maintaining your integrity can enhance your career, even if it means saying No to a project

"Had I not done my homework so that I could lay it all out before my Director, the results could have been drastically different."

Question

What did you believe were the consequences of turning down a project as a young project manager? Would you have said No?

A S K Magazine By practitioners for practitioners

Issue 6 SPECIAL FEATURE: THERE ARE NO MISTAKES. ONLY LESSONS

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 Vehicles (UAVs) 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.

Hangar Bash

by Ray Morgan

Nobody wishes for misfortune or accidents, but if you're not too proud, and you understand that plenty of great developments stem from a botched plan or someone's initial missteps, you begin to look for growth potential in accidents too.

On the Pathfinder solar-powered airplane project, we found that the application of procedures could allow a relatively fragile aircraft to operate safely in the stratosphere. In September of 1995, we set a world altitude record for solar aircraft of 50,500 feet at Edwards Air Force Base. However, we had assumed that when the airplane was in a hangar on the ground, it was inherently safe and we didn't need to worry about procedures for its safety. We were shocked out of this assumption fairly dramatically.

In October we were asked to display the Pathfinder at the Edwards air show, where it would be parked in a hangar near two classified aircraft, the B-2 and an F-117. Because these two aircraft were still classified and under armed guard, they were brought in at night after all the other aircraft had been placed in the hangar, and were removed in the same fashion.

Our crew chief told the attendant in charge during the day (when we brought the Pathfinder in) that our plane was much more fragile than these others and that he needed to be extra careful when moving it or moving the other planes around it. He particularly emphasized the Pathfinder's susceptibility to wind, because it was so large and light (100 feet in span, but weighing less than 500 lbs.). The hangar guardian seemed quite responsible and we had no reason to doubt he would do anything less than what we asked. All went well, until the show ended.

During the night some other Air Force guys came by to move the B-2 and the F-117 to a different hangar. The guy we talked with about our plane wasn't there and hadn't talked to these guys. They left the hangar doors open on 3 sides, and that night there was a windstorm that exceeded 30 knots (so strong it blew over the portable toilets). With all three doors open, the hangar became a giant wind tunnel, and the Pathfinder was blown across the hangar and wrapped around the F-117 next to it. In the collision, the spars of two mid-panels on the Pathfinder were broken and much of the solar array on these panels destroyed.

> "I have to admit - the next morning when I learned about the accident it crossed my mind that maybe we were finished. "

I have to admit - the next morning when I learned about the accident it crossed my mind that maybe we were finished. There's no way anybody could have known whether NASA would give us the funding we needed to rebuild. NASA sent a management team to conduct an investigation into the incident. When the report came in, it was just as we had already determined. No one was to blame

Hangar Bash (cont'd)

for this accident but us. These guys who left the hangar doors opened didn't know how fragile Pathfinder was.

There's no question that we should have had someone with our plane the whole time it was out of its home base. What was even more important was that we recognized that we needed procedures to protect the Pathfinder on the ground as much as in the air. Had we not been as successful a team as we were at that point by focusing on continuous learning and improvement of procedures, we would not have recovered.

Because we had already had some success on our test flights, and demonstrated our ability to learn from our mistakes, we were able to secure funding from NASA to rebuild the airplane. In so doing, we got to experiment with an improved structural design, building a plane that was more rugged, durable and stronger.

An unexpected benefit of the accident was that we learned a tremendous amount about our plane. It demonstrated the extraordinary risk of span-loaded aircraft in that the loads they are exposed to on the ground typically exceed those seen in flight.

For many projects, an accident like this could have been catastrophic. For us it laid the foundation for pushing even higher into the stratosphere. We built a much better plane, and we did so because we had a team that refused to be broken by adversity. We remained focused on learning from our mistakes. In fact, the accident probably made us stronger because it proved we could count on each other in the worst of times - as well as the best.

As Rudyard Kipling advised, we "face triumph and disaster, and treat those two imposters just the same." The Pathfinder team treated both triumph and disaster as chances to learn and make things better. We learned more about our airplane, our procedures, and ourselves... and, I think, made all three the better for the experience.

After the hangar crash, the Pathfinder was rebuilt and flew to 67,000 feet, then 71,000 feet, and finally 80,000 feet, paving the way for the Helios Prototype, which just this past summer set a record for all non-rocket-powered aircraft of 96,800 feet.

Lesson:

- Instead of blaming others when things go wrong, teams can rally together, and treat a "disaster" as a learning experience, and a chance for improvement. Sometimes a failure early on can enhance the probability of success in the long run.

> "We built a much better plane, and we did so because we had a team that refused to be broken by adversity."

Question

How does your team come together to pull through adversity on a project?

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.

Going And Coming

by W. Scott Cameron

Presently, I am in the process of adding and subtracting Project Management responsibilities to and from my current assignment, and I am developing strategies to execute these changes. As fate would have it, I recently stumbled across the 1994 publication by Dr. Alex Laufer entitled "In Quest of Project Excellence Through Stories," which I had been fortunate to provide a few of the stories in the book. I took some time to reread my stories and was somewhat taken aback by how appropriate they were to my current situation. I thought I'd share two with you since we are in a changing world and thus always find ourselves either "going or coming."

Going

I was being reassigned to a new project management position. Before leaving the project I was working on, I wanted to resolve as many outstanding issues as possible for the new Project Manager to begin work with a clean slate. Prior to beginning this transition, I sensed the project team did not fully understand the engineering process we were planning to begin or what everyone's roles would be in this process. To add to my concern, some people had just joined the project team and needed to be brought up-to-speed.

I had several options on how to proceed with my transition. One would have been simply to let the new Project Manager deal with the problem. Another would have been to meet with the Operations and Plant Managers to share my concerns about the project. Though this option would have been important for its own sake, it would have supplied little detail to the project team and new Project Manager. The option I finally decided on was to provide the new and veteran project team members with the right kind of information to do their jobs. Thus, I opted to implement a "training" kickoff meeting in lieu of the planned project kickoff meeting.

My assumptions about the team's understanding of the project turned out to be accurate. The action I took was the right response. By taking a day to train the entire project team and the new project manager on the future engineering requirements of the project, team members were better able to ascertain the total breadth of their roles as well as understand what stage the project had reached in the engineering process. More than eighty percent of the project team believed the project was further along than it really was. However, at the completion of the day of training, everyone understood additional work was required to meet the project's needs, and they were aligned on their responsibilities.

Going And Coming (cont'd)

In one-on-one discussions with project team members after this meeting, it became clear that a hundred percent of the people in attendance did not fully understand the engineering process, though none would have admitted to this if asked in a group setting. Thus, the training provided an essential learning forum. As a Project Manager, you must check your assumptions. Look for signs of uncertainty or misunderstanding because people don't always know what they don't know.

"Look for signs of uncertainty or misunderstanding because people don't always know what they don't know."

Lessons:

- You should not adhere religiously or blindly to the original plan; rather, based on a continuous diagnosis of the situation, adapt it -- sometimes radically -- to fit the situation.
- You should not consider planning assumptions to be facts. Rather, you should continually review their validity and be ready to quickly revise them.

Coming

Early in my project management career, I assumed project management responsibility for a multi-phased project from another Project Manager who resigned. The Project Manager I replaced had been new to his position; he considered this a simple project and was eager to try some innovative techniques for completing it. His execution strategy called for minimal engineering and construction effort, utilizing just a handful of manufacturing and engineering personnel to complete relocation of existing equipment at small engineering cost. Both the project team and upper management supported his plans.

Unfortunately, under this execution strategy, the first phase of the six-phase project was thirty percent over its original capital budget, did not meet its original start-up schedule, and did not meet the original target production goals until twelve months after start-up. The Project Manager I replaced resigned following the first relocation.

After reviewing the project status, I determined the project's original execution strategy did not have the proper business focus, nor was the original capital cost forecast sufficient to successfully complete the remaining five phases. The original strategy had failed to guarantee there would not be any business interruptions, it had focused on minimizing engineering costs instead of optimizing the overall capital costs, and did not take into account the business importance of each phase of the project.

Going And Coming (cont'd)

Rather than trying to make the best of the original plan, I developed a new execution strategy, which included a formal strategy for completing the remaining phases. This new strategy defined engineering/project teams for all remaining phases and treated each as a separate project with specific cost and schedule targets. The new plan enabled the project teams to focus their energies and, therefore, achieve the desired business results. Team members were able to successfully relocate the businesses without having to shortship or delay business initiatives with the trade during very crucial time periods.

> "[It] is imperative for the Project Manager to have the flexibility to revise, recalibrate, and convince management to alter the original plan."

As the Project Manager assuming responsibility for someone else's project, I learned how crucial it is to carefully develop an execution strategy capable of delivering the business need. If the execution strategy is unable to deliver this need, it is imperative for the Project Manager to have the flexibility to revise, recalibrate, and convince management to alter the original plan.

Lesson:

- There is time for fixing a plan and there is time for devising a new plan. Often it may seem easier to fix the plan rather than devise a new one, especially when upper management supports a "fix-mentality". However, to succeed as a Project Manager, you must be ready to stand by your convictions and confront upper management when you believe starting anew is called for.

Are You On This Team?

by Terry Little

One day, on an impulse, I asked the 80 or so folks working for me the following question in a staff meeting: "Say I was to line up everyone here by the degree to which each person was pulling his or her weight in supporting the overall team; where would you be in the line? First ten or so? Somewhere in the middle? At the end?"

After a short silence they began to pummel me with questions. The dominant one was, "Who measures the degree to which I'm pulling my weight?"

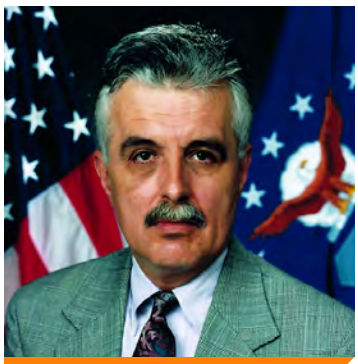
After thinking about this for a minute, I said, "Your peers decide."

Wow, did that reply generate a lot of angst. "My peers don't know what I do." "My peers don't think what I do is important." "My peers don't like me." "I work to please my boss, not my peers." "Others pull a lot more weight than I do because they are workaholics and I have other priorities." "I just arrived and it's unreasonable to expect that I know enough yet to carry my full weight." "I can't pull my full weight until I get more training."

My out-of-the-blue question had struck a very tender cord. Once I extricated myself from this cauldron, I reflected on what had happened and why. Clearly people were sensitive to how others perceived their job performance. I found it intriguing that folks seemed uneasy with the notion of having their peers judge their performance in the context of the team. Despite all the rhetoric and head nodding about the team's performance being more important than any one individual's performance, folks really hadn't bought into that. Most had not recognized that just believing in the concept of a team was not enough. Behaviors and attitudes had to change.

My people had not yet learned that individual endeavors are meaningless unless the team succeeds. They hadn't figured out that they cannot thrive if the team does not--that teams must have the allegiance of every member if they want to win championships.

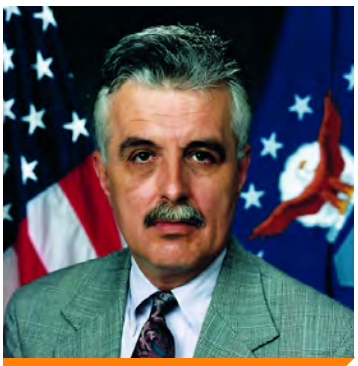
Wow, I thought. This team stuff is a lot tougher to make happen than I had thought. Saying it's so doesn't make it so.



ABOUT THE AUTHOR

Terry Little is in the civil service with the Department of 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.

"I found it intriguing that folks seemed uneasy with the notion of having their peers judge their performance in the context of the team."



ABOUT THE AUTHOR

Terry Little is in the civil service with the Department of 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.

Open Newsletters

by Terry Little

I suggest all project and program managers consider publishing a newsletter about their programs or projects for their team members. It doesn't need to be fancy. I do mine as an MS Word document. And it doesn't need to come out too often. You're not trying to compete with the local newspaper. I recommend once a month, but even quarterly would be better than nothing.

The main point of starting a newsletter is to communicate with your team about the project, but if all you are communicating is dry facts, you're not using this tool wisely. Programs usually have other means of sharing facts. Your newsletter should extend beyond the boundaries of the program. For instance, you can talk about what clients feel, what upper management feels. Most often it's just the program manager or the people at the top that are interacting with clients and upper management. By sharing this information with the team, you are breaking down silos and giving everyone a stronger sense that we are all working together. I would suggest you send the newsletter to your contractors too, as they are also part of the larger team.

To build trust, you must demonstrate your own trust in others. If you share your feelings about the project openly, eventually everyone will do the same. Moreover, trust is built when you make yourself vulnerable to others. People ask me why I do this. I tell them, "Because leaders lead by example."

Procedure

- Take one hour each month to sit at the computer and write an informal open newsletter to your team. Include your thoughts, feelings, fears, hopes and wishes.

Below are samples of a newsletter I publish for members of my team in the Joint Air-to-Surface Standoff Missile (JASSM) Program.

JASSM NEWSLETTER, 25 February 1999

Need for Better Inter-Team Coordination

During our last staff meeting I highlighted the fact that communication among the team needs improving. What I want to do to improve this situation is to start holding coordination meetings among the team leads twice weekly. For now I want Tim to chair the meetings, with Jim A. as the alternate. We will start the meetings on Tuesday morning @ 0800 and Friday afternoon @ 1400. Someone from the F-group may attend, but the meetings are really for the team leads. Each

team lead should be prepared to spend a few minutes telling everyone else the three top issues that their IPT is working on, and, for the Friday meeting, the upcoming events for next week. The meeting should last no more than an hour and the team leads should be responsible for communicating relevant information to the other team members. I expect full attendance (i.e., if a team lead is not available there should be an alternate).

Improvisation

I have found that one of the keys to innovation is to be willing to improvise. That is, if something seems at first glance to make sense to do, then the best thing to do is to try it and see if it works. If it works, great. If not, then try something else. Fear of making mistakes is paralyzing to progress. For virtually everything we do, making a mistake has no permanent consequences.

Requirements Creep

I recently learned that there is work underway to have a field-installable Test Instrumentation Kit (TIK). I have a simple question. Why? Maybe it's more convenient? Maybe it will make the operational testers happier? Maybe, maybe... Where is the requirement and who is going to pay? We have a requirements control process. So far as I know, this has never been vetted by that process. Everyone on the Government side had better get used to the fact that yours truly is going to deal very, very ruthlessly with requirements growth irrespective of where it comes from and how reasonable it may appear. We have neither money nor time to deal with growth in requirements now. Maybe later. *Not now*.

JASSM NEWSLETTER, 28 March 1999

Disappointment at Launch Delay

Like you, I was quite disappointed at the delay of our first launch. I am unclear on the exact reasons for the delay, but I presume that there were some good reasons for it. I am certain that we will soon be in a position to resume the launch. The occasion of the delay gives me an opportunity to reiterate a point that I have previously made and will continue to make. **Schedule is our most important priority; it will remain so from now until our launch date!** This does not, of course, mean that we do something stupid to achieve schedule. Recovering from an imprudent action could take up a lot more schedule than a little delay to lower the risk. Every development decision will have to consider a number of factors, including risk, cost, etc. However, among those factors, schedule must be the most prominent. I realize that this runs counter to the "do not fail" mentality

Open Newsletters (cont'd)

that is part of our acquisition culture. But not failing does not equal succeeding. There are a number of reasons why schedule is so important. The most obvious is that the users have been waiting a long time to get this capability when you consider the program history; their patience is not infinite. Second, the recent events in Yugoslavia have increased schedule pressure. The Air Force only has the CALCM as a standoff weapon and it has a somewhat limited capability compared to what we could offer. The user sees future "Yugoslavias" as being the most likely scenarios for future application of airpower. He wants JASSM yesterday! Third, we have made an absolute commitment to a 40-month development--six more months than Lockheed proposed. It was not easy to sell the system on that extension, but we did. Should it become apparent that we are not going to meet that new expectation we will begin to hear a hue and cry that JASSM is "just another typical government program". It will affect our user support and, ultimately, our ability to get money. No one should forget that the user does have some alternatives to JASSM if it appears that we are in major schedule trouble (e.g., SLAM, air-launched TOMAHAWK, hypersonic missiles, etc). These may not be better performance or cost alternatives than JASSM, but painting them as better schedule alternatives could easily do us in. Anyone who thinks that the manufacturers of potential JASSM alternatives won't try to exploit any major schedule problems we have simply doesn't understand the current environment. Remember the users' requirement is for a capability not a JASSM! Fourth, the Air Force's acquisition leadership has high confidence in our ability to execute. We cannot erode that confidence and expect to continue to enjoy the level of support that we have had. Finally, Lockheed's extremely attractive bids for production hinge critically on our meeting schedule. Should we slip our schedule to the point that either Lockheed will significantly raise those bids or that "the system" believes that Lockheed will significantly raise those bids (a much more likely outcome), we will have much bigger problems than we can handle.

Something To Be Proud Of

This Friday I learned that Mrs. D, over numerous objections, has issued an Air Force policy that past performance will be weighed at least equally to the highest ranking factor in every source selection the Air Force does. While there are many who can see how to do this if we were just buying fuel, spare parts, housekeeping services, etc, the major objections came from those arguing that this policy was impossible to implement on complex acquisitions. To those who raised these objections, Mrs. D had a one-word reply: JASSM. We can expect that many will begin calling us to help them figure out how to do this. We will, de facto, become the model for others to emulate. I am asking Jackie to put together a briefing on

evaluating past performance that we will offer to every Product/Logistics Center acquisition support office. Unlike what we have previously done in telling our story, this briefing will tell others how to do it rather than merely telling them what we did. We will talk about what we did only as an example. For reasons that I don't fully understand, many of the people in our system have to have everything laid out for them--they can't extrapolate from what we did to what they should do. Hopefully Jackie can help with this. In the meantime everyone in the Program Office should be rightly proud of our pivotal role in this new and long overdue policy. I consider it a great tribute. Incidentally, one of the recommendations from the Group I have been working on for the past few months is that this elevating of past performance should become policy DoD wide.

Requirements Creep

I have previously addressed my concerns about creeping requirements and the effect that they could have on our program. We have set up a Requirements Control Working Group (RCWG) to deal with this issue. Many see this as a user issue. However, the users we deal with have not been and are unlikely to be culprits in any creep. I am beginning to set my sights on others in our process as "creep culprits" in particular the test community, aircraft program offices and outside Government offices. I want to emphasize two points. First, I demand that everything that looks like or smells like requirements creep go to the RCWG. This is true regardless of whether that "something" reflects a creep in development requirements or requirements for the production system. We may choose to accept the requirements change, but it will be a collaborative, deliberate decision that considers all the ramifications of the change. Second, I hold each team lead accountable for identifying potential creeps in requirements in his or her area.

JASSM NEWSLETTER, 19 April 1999

On Being A Team

A few weeks ago I went home to Dallas to visit my Mother and Dad. Although I have not lived in Texas in more than 30 years it is for me, as it is for many native Texans, still home. As I made my way from the airport to my parents' house in heavy traffic my mind was as far away from work as it ever gets. While I was momentarily stalled on a freeway I noticed that the car in front of me had a Dallas Cowboys sticker on the back window. As I began to move again, I idly began to count Dallas Cowboys stickers on other cars as they passed me or I

Open Newsletters (cont'd)

passed them. By the time I got home I had counted a grand total of four. This was somewhat amazing to me, because I could remember a time when virtually every car in Dallas had such a sticker. I began to reflect on the reasons for this change and concluded that was noticing all the stickers in the Cowboys' "glory days"--America's Team, Super Bowl champs, etc. I was struck by how everyone on the sidelines seems to want to identify with a winner, but wants to disengage or criticize when the winning stops. Human nature, I guess.

What about the people on the team? It's the same human nature at work, but the results must be different. When there's a loss or a series of losses, it's natural for team members to want to assign blame, disclaim ownership, and criticize or redefine the intra-team relationships. Won't work. The team becomes dysfunctional. Being a part of a team demands that everyone on the team own every outcome in equal measure. Irrespective of whether the outcome is good or bad, everyone must share responsibility for it, or else leave the team. When the outcome is not what we would have liked, it's tough. But that's precisely the time when functioning as a team is most important. It does no good to belabor adversity or look in the rear view mirror. All we can affect is what's in front of us, not behind. What we accomplish in this program, I am convinced, hinges not on individual team members, but on how well we function as a team. We can't let our togetherness depend upon whether someone else has a window sticker.

INTERVIEW

ASK talks with Sherry Buschmann

Around Marshall Space Flight Center in Huntsville, Alabama, Sherry Buschmann likes to say she's "just one of the guys." She started working for NASA at Marshall in 1985, the same year she received her Bachelor's degree in electrical and computer engineering from the University of Alabama in Huntsville. At Marshall, Sherry has worked on the Advanced Space Transportation Program, the Astrionics Laboratory, the International Space Station design team, and the Solar X-Ray Imager, a solar imaging telescope that was launched aboard a weather satellite. In 2001, she earned a Masters of Science degree in Technology Management from M.I.T./Sloan, with a thesis on knowledge management.

Sherry says she looks up to those in NASA who are "risk takers," those who aren't "afraid to make decisions or try something no one else has done before." Considered by many inside the Agency to be one of NASA's future leaders, Sherry says she is ready to meet the challenges ahead with a sense of purpose as well as a sense of humor.

ASK: I remember reading in *Project Management Success Stories: Lessons of Project Leaders* how you once took aside someone who was driving a forklift carrying an expensive piece of hardware and explained to him what he was handling, what it was supposed to be used for, how it would affect his life. As a result, he treated the hardware like it was the most precious thing he'd ever touched. That story stuck with me. It seemed like something most project managers wouldn't do.

Buschmann: Some managers think they can just tell people what to do and they'll do it because a manager gave the order. That's one type of management style, but I've always felt like as a true leader it's important to explain to people why things are important to you, and if you ask for what you want instead of demanding it, you're a lot more likely to get it.

> "I have always placed a high premium on leadership, and leading is different than managing."

ASK: Is that what characterizes your management style?

Buschmann: Yes. I have always placed a high premium on leadership, and leading is different than managing. Not all leaders have to be managers. I've worked with people who've been just wonderful leaders, and they probably had no formal management authority whatsoever, but you could tell that they were the ones leading the group or leading the cause.

ASK talks with Sherry Buschmann (cont'd)

ASK: How does one recognize the *real* project leaders?

Buschmann: When there's a problem to solve or a decision to be made, people automatically look to that person because they know that they can rely on him or her, especially if there are difficult times ahead. These are leaders not for their own benefit, but for the benefit of the project or the team. They don't put themselves out there first.

ASK: Sometimes bad things happen to good projects. Adversity strikes. What is the role of a leader then?

Buschmann: First, you have to reassure the team that you haven't lost confidence in them. You've got to say as soon as possible, 'Okay, this happened, it's unfortunate but let's understand why it happened and how we're going to work through it.' You keep them focused on what's important, and that's solving the problem. A lot of times the people who get the most excited about the situation are actually quite removed from what's going on in the project. It's the leader's job to be out there making sure they are informed and know we have a plan to address the situation. You don't want your team to worry about their managers finding out about the problem from someone else. You want them focused on the solution.

"I don't think you can get anywhere by not being open with people."

ASK: What do you say to those managers two levels up?

Buschmann: Give us time to figure things out, mainly. Let us look at it and see what we can do, and whatever happens I'll make sure that you know everything.

ASK: Do you say it that calmly?

Buschmann: Well, someone has to be calm. However, calm is not a word usually used to describe me! Seriously, I believe that communication counts for everything. I don't think you can get anywhere by not being open with people.

ASK: How have you matured over the years as a project manager?

Buschmann: Early on I recognized that I had a hard time delegating. I now try to put myself in the position of someone else and say, how would it feel if I was tasked to do something and somebody was looking over my shoulder the whole time? I wouldn't like that. That's helped me be able to say to someone, "This is

the job that needs to be done. There are lots of ways to get it done. It's up to you to decide how to do it." I'm the kind of person whose nature it is to get into things up to my elbows. That's the way I've been my whole life. I've got to really watch myself on that.

> "I hope that my sense of humor never abandons me, that I don't get so serious I forget how to laugh. "

ASK: What can a project manager do to recognize things like this about him or herself?

Buschmann: On one project we did some exercises in understanding our personality types, like the Myers-Briggs test. We didn't know each other very well, and I thought this would be a good way for us to find out about people's strengths and weaknesses and the types of personalities we had working together. More than anything, it gave us an opportunity to talk about and learn what was important to each other.

ASK: How did you come up with the idea to do this?

Buschmann: Up until that particular program I had always been the kind of person who says, 'Give me the program and get out of my way.' This was an in-house project, which meant that we were responsible for the design, manufacture, and test with very little contractor involvement. We would be working very closely for the next several years on a challenging task with a tight budget and schedule. To accomplish our objectives, I needed to get the team to come to a consensus on issues quickly. I wanted us to develop a team environment built on trust and open communications. So how was I going to do that? I didn't really know the answer. We brought someone in who did some facilitating with some activities like this and we found out some interesting things about ourselves. It was a real eye opener.

ASK: In what ways was it eye opening for you personally?

Buschmann: I'll never forget that one of my traits was that I am impatient. The team thought it was a bad thing. I thought that was a good thing! I've always felt a sense of urgency, especially around things that I am passionate about. I thought, why would anyone want to be patient? I've never understood the expression, 'Patience is a virtue.' It brought home to me how I could feel something about myself and the team could feel something entirely different. No, I guess I'm not calm or patient.

ASK talks with Sherry Buschmann (cont'd)

ASK: How difficult has it been to change your tendencies?

Buschmann: Well, like I said about delegating, I have to work on it. It's not always easy, but I think that you can, if you know people's perceptions of you. My point is, you need to pay attention to that. There are some things about me that I'll never change. I hope that my sense of humor never abandons me, that I don't get so serious I forget how to laugh. My honesty, for instance--I'm rather straightforward to a fault. I don't really want that to change, maybe just soften a bit. I don't want to get so good at spinning something, or sugar-coating, that it leaves me unable to communicate the true essence of what I need to say. At the same time, I hope that with age comes grace, and maybe I'll become a little more graceful in my presentation of my thoughts and my ideas. There are other things I do want to change, like delegating responsibility and understanding that everyone does not share in my sense of urgency. When things are going smoothly, it's easy. It's when things start falling apart that I tend to fall back into old patterns.

ASK: I know you feel strongly about the importance of having a sense of humor. How does that help you as a project manager?

Buschmann: It's the only thing that keeps you sane sometimes. You can be near the end of a hardware test that has taken 14 days, 24 hours a day, and something can go wrong. Now what do you do? You can stamp your feet and rant and rave, but that doesn't make things any better. I'm not saying you should laugh at your mistakes, but if you can find something humorous to get you through the hard times, you're going to come out a lot healthier on the other end. If you can't laugh at yourself, things that you've said and mistakes you've made, I think you're going to have a hard time in life in general.

Conference Report: 2001 Masters Forum

by Todd Post

Born Under a Good Sign

The 2001 Master's Forum was held at the Doubletree Hotel in Tysons Corner, Virginia, and NASA project managers from every center were on hand. As they introduced themselves, we learned about the variety of work being done at the different centers, the years of experience most of these managers have, and sometimes what signs they were born under. For instance, Dr. Edward Hoffman, Director of the Academy of Program and Project Leadership (APPL) and chief sponsor of the Forum, is a Taurus. So were many others in the room. Could there be any connection between the success of this year's Forum and the preponderance of Tauruses who were present?

Say what you will about astrology, but the success of the Forum is no bull. Listen to what some people were saying.

Dennis Grounds, a Project Manager at Johnson Space Center (JSC), remarked: "It reinforced my observation that NASA has excellent people and excellent project managers."

John Hicks, a NASA project manager from the Dryden Flight Research Center, apparently thought the Masters Forum was being held in Hawaii, not Washington, DC.

ABOUT THE AUTHOR

Todd Post is the editor of ASK Magazine and works for EduTech Ltd. in Silver Spring, Maryland. He recently had an article published in ***Knowledge Management*** on ASK Magazine and the use of storytelling as part of the Knowledge Sharing initiative at NASA.
You can contact Todd at **tpost@edutechltd.com** and tell him what you think about this issue of ASK.

Conference Report: 2001 Masters Forum (cont'd)

Don Margolies, Project Manager at Goddard, wrote: "The synergy is terrific."

Jackie Green, a Project Manager at the Jet Propulsion Lab (JPL), said: "The presenters provided rich food for thought. I especially enjoy the small group and one-on-one discussions that the meeting allows. The small group/one-on-one discussions provided the opportunity for real digging into the details and analyzing each person's thoughts and solutions. They provided that time for reflection that is crucial for growth. The Forum also provided time and opportunity for mentoring. To learn of experiences of managers across NASA and other agencies is invaluable."

Craig Lawrence, a non-NASA participant from IDEO, wrote: "I had an incredible experience at the Forum. Thank you very much for allowing me to attend. As an outsider to NASA, I was very apprehensive about how I would be received, and whether or not I could contribute. Well, I was blown away by the kindness and openness of everyone involved. I thought the content was very relevant to me and to my work at IDEO. The issues you face at NASA are universal, and I think it is wise of you to address them in this format, and wise to include outsiders such as myself. The idea of storytelling is very powerful, and the stories were great. Even when they weren't applicable to me, they were still entertaining and interesting. I plan to suggest a similar event at IDEO."

> "The buzzword at this year's Forum was context."

Context is Key

The buzzword at this year's Forum was context. Chris Turner raised the subject during her keynote address the first night, asking participants, "Does being in a drab looking store make you want to shop there?" Turner's argument, that context "is about transforming stale corporate environments into learning spaces--it is believing in the capacity humans have for making imaginative breakthroughs--it is about creating learners and inquirers--it is about practicing improvisation," is discussed in more detail in her book, All Hat and No Cattle. Read a review by Michelle Collins in our last issue.

The first night, along with Turner's address, there was an hour-long presentation by four team members who worked on the Pathfinder solar-powered airplane as part of the Environmental Research and Sensor Project (ERAST). The ERAST program has since morphed to include new projects and new managers. Presently, the best-known ERAST project is the Helios solar-powered aircraft, which nearly scraped through the stratosphere this summer, approaching a height of 100,000 feet.

Conference Report: 2001 Masters Forum (cont'd)

Alex Laufer, ASK Magazine's Editor-in-Chief, leading a discussion.

> "What impressed me most about the presentation were the personal relationships of the team and how that helped them to maintain their focus."

Jenny Baer-Riedhart was the ERAST Program Manager in the mid 90s. She introduced the presentation, telling us how ERAST has evolved, and then handed off to Ray Morgan, formerly a Project Manager of Aero Vironment. Aero Vironment is the company which designed and flew the Pathfinder. Morgan then handed off to Jeff Bauer of Dryden Research and Flight Center, who handed off to Dougal Maclise of Ames Research Center. They all reiterated Baer-Riedhart's main point that it was the teamwork between NASA and the contractor, Aero Vironment, which made this alliance work and allowed the Pathfinder project to soar. Harking back to what Turner was saying, they made it clear that it was the context of openness and cooperation created by the Program and Project Managers that empowered everyone to stretch beyond the limits of what they thought they were capable of doing.

The Pathfinder presentation and Chris Turner's speech set a high standard on the first night. Next morning's presenters woke up ready to meet the challenge. The day began with a presentation by Alex Laufer, who talked about the need for two types of practices, standard 'best' practices and unique practices. See his column in this issue for more about this duality.

Conference Report: 2001 Masters Forum (cont'd)

In the first block of presentations by Project Managers, we heard from Charlie Stegemoeller of JSC and Marty Davis of Goddard, both of whose presentations originated as stories in previous issues of ASK. Sam Thurmon of JPL also spoke in this first block, and we hope soon to turn his talk into a story for an upcoming issue of ASK. Perhaps it is unfair to say so little about any of the individual presentations, but there is not enough room here to cover all of them adequately. If I may indulge myself about one, however, I would like to say a few words about Michael Hecht's because I think it offers some concise insights into the entire agenda.

ASK contributor this issue Julie Pollitt talks with Ames Project Manager Julie Schoenfeld during one of the breakout sessions.

Successful Projects Mean People Working Together

I found some of the most compelling moments at the Forum during Hecht's presentation about the Mars Environmental Compatibility Assessment (MECA) project he led out of JPL. What impressed me most about the presentation were the personal relationships of the team and how that helped them to maintain their focus. Hecht described being with his family and watching fireworks on Fourth of July 1997. While they were watching the fireworks, his eye was trained

on a tiny orange dot in the sky, Mars. This set the tone, and it was captivating from there till the end when we heard about the many personalities who made up the MECA team.

There was much more to Hecht's presentation than just profiles, but the point I heard him reiterating, and what I was hearing from all the Project Managers, is that projects are composed of people. They are all very talented, very dedicated people, yet what makes successful projects has a lot to do with the chemistry that is created between them. Not just anybody can shake them up and get the right fizz out of their collective efforts. It's the Project Manager's job to do that, and good Project Managers seem to know how to take this mixture of personalities and pour out something exceptional. In the hands of a less skilled Project Manager the same mix could turn out flat as old soda.

Something for Everyone

It was a Forum that seemed to include a little bit of everything. Participants not only included NASA project managers, but other government agencies were well represented also, and so was private industry. Most of the speakers were from inside NASA, but not everyone. Outside speakers included Hugh Woodward of the Project Management Institute, Terry Little of the US Air Force, and Scott Cameron of Proctor and Gamble. Other NASA presenters included David Collins, Michael Jansen, Julie Schonefeld, Michael Skidmore, and John Hicks.

Denise Lee, one of the Forum organizers, led the participants through a group learning activity on the second night, a competition that required small groups of the participants to work together as a team to negotiate their way through a maze; it was clever, recreational, and a nice change in tempo, and it sure looked like everyone was having fun. Few people left feeling disappointed, and that seems to be true of the Forum in general.

"This forum seemed to create a "warm" environment that really turned on people's willingness to talk and share "real life" experiences," said Program Manager Catherine Peddie of Glenn Research Center. That sentiment was echoed throughout the three days.

Comments from you and two book reviews

The following comments we received from Brian Matisak of NASA's Marshall Space Flight Center in Huntsville, Alabama.

I just finished this month's edition of ASK Magazine and wanted to let you know how much I enjoyed it. Every ASK issue seems to provide me with new perspectives and appreciations of life in the program/project trenches. I especially enjoyed Jerry Madden's interview. I've made a copy of the interview to keep close by me as a periodic "do's and don'ts" reference.

As an employee of our Agency's Microgravity Research Program Office here at Marshall Space Flight Center, one of our primary duties is to provide guidance to (along with budget) and advocacy for the various projects at the science discipline levels without "getting in the project's knickers," so to speak. Five science disciplines within the Microgravity Research Program equates to about 100 flight projects at various life cycle stages.

Gaining and maintaining a good handle on the project statuses by Center is definitely a chore and has required establishing open, honest relationships with the managers at the science discipline levels. Those relationships are critical for the success of our Microgravity Research Program, now more than ever in these trying budget times.

Thanks again.
Brian

.....

The following comments we received regarding Roy Malone's article in "Standing Offer" in ASK Volume 4.

Roy Malone's attitude towards the Nuclear Weapons Assist Team (NWAT) was absolutely correct. I have been the Nuclear Weapons Safety Officer and the Nuclear Weapons Surety Officer on Navy ships, and I have gone through the same inspection that he describes. Three follow-on points come to mind:

First, Roy was fortunate that his captain did not criticize him for asking NWAT to review the ship's special weapons programs and procedures. For many commanding officers (and perhaps some project managers) "help" from outside the lifelines is a word that only comes in quotation marks.

Comments from you and two book reviews (cont'd)

Second, even with a captain who detested having more NWAT visits than the Navy required, Roy would still have been wise to invite them aboard. Some fires are hotter than others. Sometimes short-term heat has to be risked to avoid a catastrophic blaze later.

Third, Mr. Malone's story underscores the importance of not having a climate of fear pervade a project. NWAT's gloves-off review benefited the department, the ship, and the Navy. It shouldn't require heroism to invite them aboard. The command--or project--climate must not be so intimidating that only a hero has the strength of character to do the right thing.

These are familiar truths, but Roy Malone's story made them seem fresh again.

Thomas DeKornfeld
Retired Naval Officer

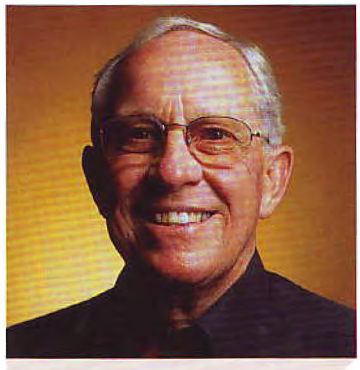
We also have two book reviews. Jerry Mulenberg reviews *The Tipping Point*, by Malcolm Gladwell, a book that was selected for participants at the 2001 Master's Forum, where Jerry picked up his copy. Read a report of the 2001 Master's Forum in this issue on p. 45. The other book review is by Denise Lee, a Knowledge Sharing Manager at EduTech Ltd, and a member of the APPL Knowledge Sharing Initiative team. Denise is reviewing *Working With Emotional Intelligence*. In ASK we feature book reviews every issue. Please let us know if you have a book you would like to see reviewed, or wish to review it yourself.

The Tipping Point: How Little Things Can Make a Big Difference, Malcolm Gladwell. (2000) Little, Brown and Co.
Reviewed by Jerry Mulenberg, Ames Research Center

Want to operate as a team rather than just a group of people? Want that team to really 'click'? Maybe you need someone on the team who knows a lot about many things relevant to the project, someone who 'connects' with the other team members, someone who 'sells' them on the importance of the project and their role, someone who makes the team *Tip*.

We've all experienced these people in our lives; they make everyone feel a part of something special and motivate people to want to pull their weight to help meet

Comments from you and two book reviews (cont'd)



Dr. Gerald Mulenburg is the Manager of the Aeronautics and Spaceflight Hardware Development Division at the NASA Ames Research Center in California. He has project management experience in airborne, spaceflight, and ground research projects with the Air Force, industry, and NASA. He also served as Executive Director of the California Math Science Task Force, and as Assistant Director of the Lawrence Hall of Science.

the team goal. *The Tipping Point* may be the first book to clearly describe the characteristics of these kinds of people, and it does it in an entertaining and thought provoking way using real examples.

As the author describes, "*The Tipping Point* is the biography of an idea, and the idea is very simple. ...The best way to understand the ...changes that mark everyday life is to think of them as epidemics. Ideas and products and messages and behaviors spread just like viruses do." He says he wants, "...to answer two simple questions. Why is it that some ideas or behaviors or products start epidemics and others don't? And what can we do to deliberately start and control positive epidemics of our own?...how does an idea or trend or a piece of news...travel through a population?" The answer he says is that, "...word of mouth is...still the most important form of human communication...[and] epidemics are...a function of how many people a message reaches."

The characteristics he uses to describe epidemics are 1) contagiousness, 2) little causes have big effects, and 3) change happens at one dramatic moment (the *Tipping Point*). He claims that epidemics tip when they are jolted out of their equilibrium, at the moment of critical mass, the threshold, the boiling point. The guidance for understanding how this happens is three rules of the Tipping Point: THE LAW OF THE FEW, the STICKINESS FACTOR, and the POWER OF CONTEXT. These are the means to make sense of epidemics.

THE LAW OF THE FEW: *Connectors, Mavens, and Salesmen.* The Law of the Few says that a critical factor in epidemics is the nature of the messenger..." there are exceptional people out there who are capable of starting epidemics--*Connectors, Mavens, Salesmen*--who play a critical role in word-of-mouth epidemics."

Connectors: "Sprinkled among every walk of life...are a handful of people with a truly extraordinary knack of making friends and acquaintances [who] know a lot of people...[and] occupy a very different world than you. Connectors are social glue."

Mavens: Maven means one who accumulates knowledge. "Mavens are really information brokers, sharing and trading what they know...[who] want to tell you about it too...to help."

Salesmen: Salesmen have "energy, enthusiasm, charm, and likeability." What sep-

Comments from you and two book reviews (cont'd)

arates a great salesman from the average is the number and quality of their answers to the objections commonly raised.

THE STICKINESS FACTOR: The Stickiness Factor says, "There is a simple way to package information that...can make it irresistible... making a contagious message...so memorable...that it can create change, that it can spur someone to action."

THE POWER OF CONTEXT: In their context, "Epidemics are sensitive to the conditions and circumstances of the times and places in which they occur. The Power of Context is an environmental argument...behavior is a function of social context...[and] what really matters is little things...human beings are a lot more sensitive to their environment than they may seem."

And so, the proverbial question: What does *The Tipping Point* have to do with NASA project management? Applying *The Tipping Point* ideas to NASA project management requires recognizing that Tipping Points occur by applying intelligent action to create change--i.e. developing a *group of people* assigned to a project into a project *team.* The author clearly states that, "When people are just a group, responsibility is diffused... an apparent problem doesn't really affect them as a problem." As each person accepts group-acknowledged responsibility for particular tasks and facts, they become part of the team and, "greater efficiency is inevitable." It's not just that you know someone in the group, you know them well enough to know their skills and abilities and what excites them. In a team, the author says,

"...When people know each other well, we store information with them, they become part of the joint memory system based on an understanding about who is the best person to remember what kinds of things...When new information arises, we know who should have responsibility for storing it...It's knowing someone well enough to know what they know, and knowing them well enough so that you can trust them to know things in their specialty.... the kind of intimacy and trust that exists in a family...We know implicitly where to go to find the answers to our questions."

Try *The Tipping Point*; if you like new ideas, you'll like this book.

Comments from you and two book reviews (cont'd)

Denise Lee is a Knowledge Sharing Manager with EduTech Ltd. and a key member of the NASA Knowledge Sharing Initiative. She has a B.A. in Business and a M.S. in Social and Organisational Learning with a concentration in Knowledge Management. She is active in the knowledge sharing community within the Federal government and the vendor community in Washington, DC.

Working With Emotional Intelligence, Daniel Goleman. (1998) Bantam.
Reviewed by Denise Lee, EduTech Ltd.

Daniel Goleman's 1996 book *Emotional Intelligence* was a global bestseller, with 4 million copies in print in 24 languages. The sequel *Working with Emotional Intelligence* followed in 1998 and has picked up right where its predecessor left off, garnering similar amounts of praise around the world.

The term "emotional intelligence" sounds touchy-feely, doesn't it? For that reason, you may feel inclined to dismiss these books out of hand. But don't do that. There is much between their covers that project managers should hear about.

First with *Emotional Intelligence*, and now with *Working with Emotional Intelligence*, Goleman shows that emotional intelligence is having a profound impact on the workplace. In today's global, multi-ethnic workplace, many organizations are recruiting employees who possess not only the ability to complete assigned tasks, but also possess the ability to communicate well, empathize with others, and express themselves clearly. A new measure of contextual behavior is being judged in the workplace. This new measure, says Goleman, "takes for granted having enough intellectual ability and technical know-how to do our jobs; it focuses instead on personal qualities, such as initiative and empathy, adaptability and persuasiveness."

Some organizations have already shifted their focus to these new competencies, and are quite delighted with the results. As organizations move towards a team-based work force, organizations that stress emotional intelligence as an important competency will enable their organization to obtain an edge over competitors that do not recognize the importance of these skills. The effectiveness of a group is clearly impacted by how well the team members relate to each other. Teams that possess these skills will be more focused and less bogged down by interpersonal issues. "To the degree your organizational climate nourishes these competencies, your organization will be more effective and productive. You will maximize your group's intelligence, the synergistic interaction of every person's best talents."

No doubt the workplace has changed significantly over the past few decades. Goleman is attempting to give us a different perspective of how to look at ourselves in our work environment. For one thing, the amount of stress that individuals are dealing with in the workplace has increased. At the same time we are working in a more team-based environment that forces people to work more

Comments from you and two book reviews (cont'd)

closely together in a sort of shared stress environment. "In the new stripped-down, every-job-counts business climate, people desperately feel the need for connection, for empathy, for open communication - these human realities matter more today than ever. Massive change is a constant; technical innovations, global competition, and the pressures of institutional investors are ever-escalating forces for flux." Organizations that recognize their employees need these connections and are able to manage the stressors, both on an individual basis and in a team-based environment, are able to maintain a happier and healthier workforce. But how do organizations achieve this? Certainly not by magic.

Apparently it can be accomplished within the team itself, but it takes leaders who are attuned to the emotional health of their people. Enter project managers. Project managers who are able to use their skills in working with people can work within a stressful environment and make their teams more effective. Good project managers possess "An emotional competence... At the heart of this competence are two abilities: empathy, which involves reading the feelings of others, and social skills, which allow handling those feelings artfully."

Emotions are, literally, what move us to pursue our goals," says Goleman; "they fuel our motivations, and our motives in turn drive our perceptions and shape our actions. Great work starts with great feeling." Employees that feel satisfied with their jobs feel connected with their work not just on a technical level but also on an emotional level. Conversely, the less aware we are of what makes us passionate, the greater the tendency for us to feel lost in our work.

Goleman believes, "The key to exhilaration is not the task itself, but the special state of mind called flow. Flow moves people to do their best work, no matter what work they do. Flow blossoms when our skills are fully engaged and then some - say, by a work project that stretches us in new and challenging ways. The challenge absorbs us so much we lose ourselves in our work, becoming so totally concentrated we may feel 'out of time'."

This concept of flow is at the heart of job satisfaction, and what project managers should learn to recognize when it is bunched up or appears to be ebbing among team members. Encourage team members to reach this level of flow in their work, and then the team environment can flourish with each team member doing their job and thriving in their own areas of responsibility to achieving the team's goals. The challenge facing project managers is to find the creative trigger that allows team members to enter that state of flow.

Comments from you and two book reviews (cont'd)

"When all is said and done and a job has been pursued to its end, what are the ultimate sources of satisfaction?" asks Goleman. "Most rewarding is the creative challenge and stimulation of the work itself, and the chance to keep learning. Much lower on the list comes status, and even lower financial gain." If money and status are not motivators that will cause an individual to remain satisfied with his or her work, then it behooves all organizations, including project managers, to consider what it is that you can do to allow your team members to feel more emotionally fulfilled in their work.

Review Board

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 Station.

Hector Delgado is Division Chief of Process Tools and Techniques in the Safety, Health and Independent Assessment Directorate at Kennedy Space Center. He has received many honors and awards including the NASA Exceptional Service medal, the Silver Snoopy Award and various Achievement Awards

A member of the Jet Propulsion Laboratory staff since 1982, Dr. Michael Hecht is currently Project Manager and a co-investigator for the Mars Environmental Compatibility Assessment. He received his Ph.D from Stanford University in 1982 and holds 7 patents, 24 NASA Tech briefs, and has published extensively in both surface science and planetary science literature.

ASK Magazine By practitioners for practitioners

Issue 6

Review Board (cont'd)

Don Margolies is Project Manager for the Full-Sky Astrometric Mapping Explorer (FAME), and Observatory Manager for the Microwave Anisotrophy Probe Mission (MAP). Previously, he was Project manager for the Advanced Composition Explorer (ACE) mission, launched in 1997.

Joan Salute is the Associate Director of Aerospace at Ames Research Center. She has managed many NASA projects including those involving flight testing of thermal protection materials, commercial technology, commercial applications of remote sensing, and remote sensing science projects.

Charlie Stegemoeller is currently Manager for Human Space Life Sciences Programs Office at Johnson Space Center, responsible for the organization and direction of the Human Exploration and Development in Space Enterprise Lead Center programs for Biomedical Research and Countermeasure, Advanced Human Support Technology, and the Space Medicine crosscutting function.

Academy Sharing Knowledge
The NASA source for project management

ASK Magazine

Staff

APPL Editorial Director and Publisher:
Dr. Edward Hoffman
email: ehoffman@hq.nasa.gov

Editor in Chief:
Dr. Alexander Laufer
email: allaufer@askmagazine.org
website: www.edutechltd.com/NASA/Laufer/index.htm

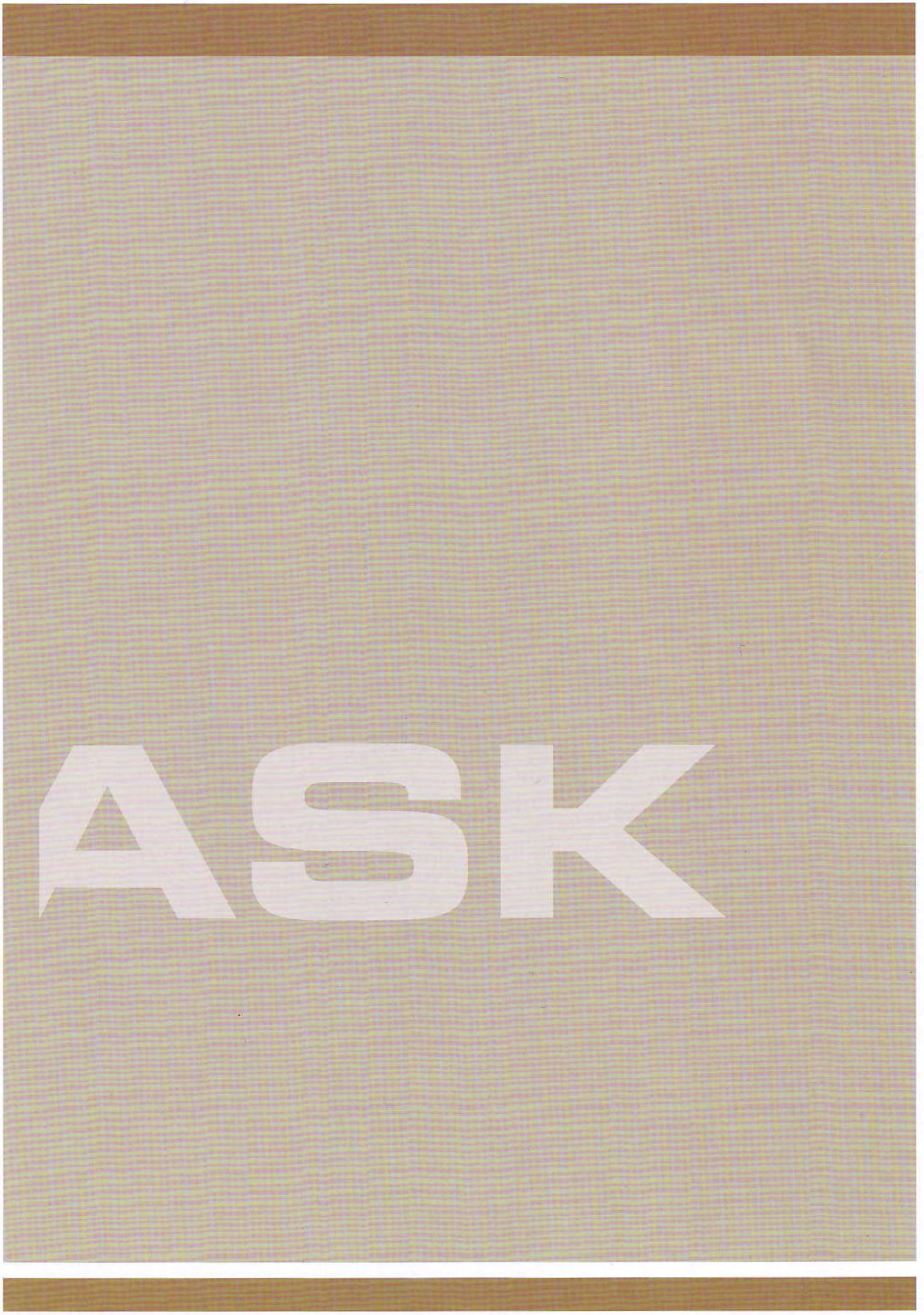
Managing Editor:
Dr. Michelle Collins
email: mcollins@hq.nasa.gov

Editor:
Todd Post
email: tpost@edutechltd.com

Contributing Writers:
W. Scott Cameron
Terry Little

Associate Editor for Practices:
Michael C. Jansen

Design:
Management Worlds



NP-2002-03-285-HQ