

ASK Magazine

Academy Sharing Knowledge
The NASA source for project management**Issue 8 May 2002**

By practitioners for practitioners



"The illiterate of the 21st century
will not be those
who cannot read and write,
but those who cannot
learn, unlearn, and relearn."

- Alvin Toffler

TABLE OF CONTENTS

IN THIS ISSUE

Stories of Innocence, Stories of Experience page 3
by Todd Post

FROM THE DIRECTOR'S DESK

Something Special page 5
by Dr. Edward Hoffman

LETTER FROM THE EDITOR-IN-CHIEF

So Much Depends Upon A Pickup Truck page 8
by Dr. Alexander Laufer

STORIES

Loss and Recovery page 9
by Ken Schwer

Boiling Point page 13
by Michael C. Jansen

When My Name Suddenly Was "Murphy" page 19
by David Mitchell

Less of Me page 22
by Tim Owen

SPECIAL FEATURE: PERSONAL QUEST

Is There A Perfect Organization? page 27
by Julie Schonfeld

FEATURES

A Big Raise, A Promotion, Or... page 33
by W. Scott Cameron

Three Insights About Change page 36
by Terry Little

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TABLE OF CONTENTS

PRACTICES

Continuous Risk Management page 38
by Phil Sabelhaus

INTERVIEW

ASK Talks With Joseph Rothenberg page 40

CONFERENCE REPORT

Masters Forum IV, February '02 page 46
by Todd Post

LOOP

Your Letters page 51

REVIEW BOARD

ASK Magazine Review Board page 52

STAFF

ASK Magazine Staff page 55

IN THIS ISSUE

Stories of Innocence, Stories of Experience

The title above is of course an allusion to the great English poet William Blake and his two masterworks *Songs of Innocence* and *Songs of Experience*. As I think about the stories we've collected this issue of ASK, it seems right on the money to me to invoke these contrary states.

During our lives we lose our innocence and gain experience about the world on myriad occasions. What do we learn about ourselves from this? Uncomfortable as such occasions may be when they occur, reflective practitioners will see them later on for what they are: terrific opportunities to learn.

Experience may come by way of profound moments of change, or occur over long stretches of time by the steady accrual of small changes. A profound moment of change is what occurs in Ken Schwer's gripping story "Loss and Recovery," about a NASA mission that is lost only seconds after launch.

Several of the stories are by young project managers who've gained their experience when they stepped into positions of leadership. Tim Owen's story, "Less of Me," is in the same vein. So is "Boiling Point," by Michael Jansen, and "When My Name Suddenly Was 'Murphy'" by David Mitchell. Ken Schwer's story also shows that leaders learn much about themselves when confronted with adversity.

How would you lead people out of a devastating failure?

Then there is Terry Little's "Three Insights About Change." Here a senior project manager takes on a new job and relearns late in his career that change is valuable because it presents us with the opportunity to learn new things about ourselves. As Terry Little points out, change doesn't occur any less often as we get older, but a lifetime of dealing with change certainly provides us with precious insights of how to weather our changes better.

Essential to being a reflective practitioner is a willingness to test one's assumptions and change what one believes with new knowledge. We find this theme played out in all of the stories, but I find it especially intriguing in Julie Schonfeld's story "Is there a Perfect Organization?" After 12 years at NASA, she took a leave of absence to work at CISCO Systems in an attempt to restore some of the idealism she'd lost over the years at NASA. At CISCO she thought she would find the perfect organization. Did she? Read what she finds out and how it helped to get her to become excited again about working for NASA. This story appears in our "Special Feature: My Personal Quest." Is it too banal to say all



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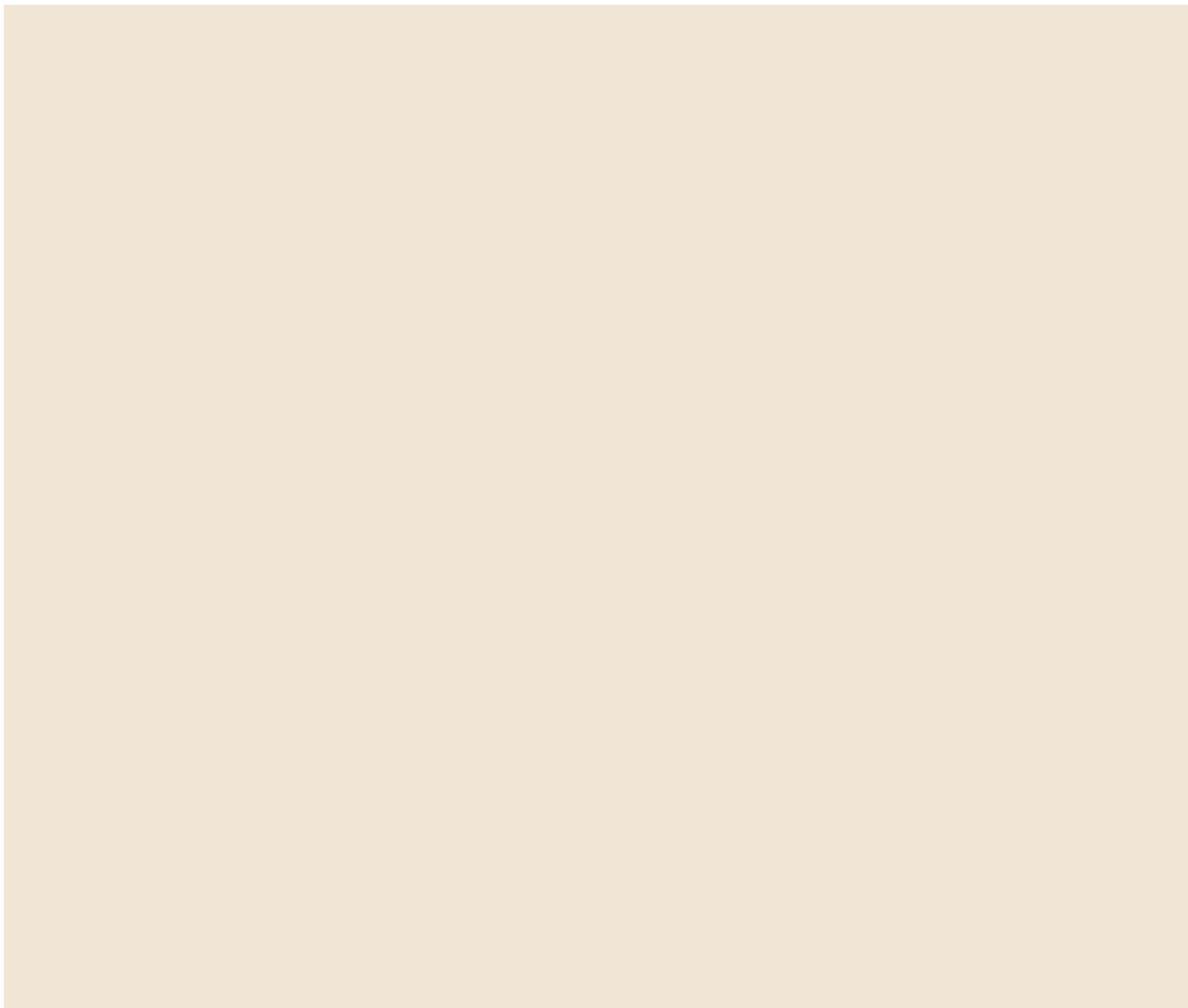
IN THIS ISSUE

Stories of Innocence, Stories of Experience (cont'd)

projects are personal quests? Don't we learn something new about ourselves on every mission? With every team we work with?

Hope you feel you learn something from this issue. Whether that comes by way of a profound moment of realization in a story, or by a steady accrual of knowledge from reading all the stories, enjoy!

Todd Post



FROM THE DIRECTOR'S DESK

Something Special

by Dr. Edward Hoffman

Some of my best decisions have come from a gut feeling that tells me, "This is right." They spring from ideas that I know in my heart are true and important. As it's a straight shot from heart to gut, and since you can't do anything about gravity, I guess that's why they always end up in my gut.

Well, my gut feeling about the APPL Knowledge Sharing (KS) effort is that something special is taking place. And it's not just my gut. There is plenty of interest and excitement to go around.

Communities of Practice

We have received numerous requests for members of the KS Team to give presentations about what we're doing. A recent Knowledge Management Roundtable at NASA Headquarters drew record-setting attendance for the event. A few weeks later, I was invited to give a presentation for the Census Bureau. Ron Taylor, a senior leader of the organization, had requested the presentation. I was looking forward to a group of about 20 people or so. As it turned out, the auditorium was packed. Nearly 300 people were in attendance. They were excited about what we're doing and wanted to pick my brain as to how they could establish something like our KS effort in their organization.

I also recently had the opportunity to address 120 participants of the Navy's Defense Leadership and Management Program. As part of the presentation, I asked the participants to generate and discuss their own success stories. I asked for two volunteers to share theirs with the rest of us. I listened and hoped that the examples would demonstrate the power and wisdom of practitioner-generated stories. No need to worry; the stories were wonderful. My only disappointment that day was not having enough time to hear more stories from the group.

In My Own Backyard

Several months back I was conducting a presentation on "What the Academy is Doing" to a group of project practitioners at Glenn Research Center in Ohio. In the middle of my discussion, a project engineer mentioned that what she really appreciated was ASK Magazine. She mentioned reading a story by Marty Davis of Goddard Space Flight Center and following up with him to gain ideas for applying his approaches to her project. Several managers also mentioned the usefulness and wisdom contained in the ASK stories by their colleagues across NASA.

As I have mentioned in the past, I am thrilled at the way KS has been received at Ames Research Center in California under the guidance of Claire Smith.



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.

“She mentioned reading a story by Marty Davis of Goddard Space Flight Center and following up with him to gain ideas for applying his approaches to her project. ”

Something Special (cont'd)



Increasingly, the KS Team is focusing on Center-specific activities that have included workshops and visits to Kennedy Space Center, Johnson Space Center, Goddard, Glenn, Marshall and Ames. Interest in the effort is further underscored by recent information that the KS portion of the APPL website has received thousands of hits over the past month. Indeed, something special is going on.

Flying with Talent

I have always been a believer that if you want a solid measure of outcomes and benefits, simply look around and see who you are flying with. It's possible to attract talent once or twice, but if class continues to show up at the table that means you are serving them the right stuff. The most amazing part of this effort has been the tremendous amount of NASA talent, experience and wisdom that appear again and again. In addition to our NASA colleagues, we have had increasing amounts of collaboration with leaders from external organizations like Proctor & Gamble, US Air Force, IDEO, AOL, and Boeing. Busy, talented people don't show up just for the free food. Okay, maybe a few.

FROM THE DIRECTOR'S DESK

Something Special (cont'd)

The KS effort has only been going strong for a little over a year. It is probably a little early to tell but on the whole it feels like the best thing I've been part of in my twenty years at NASA. And believe me, I have had a wonderful twenty years.



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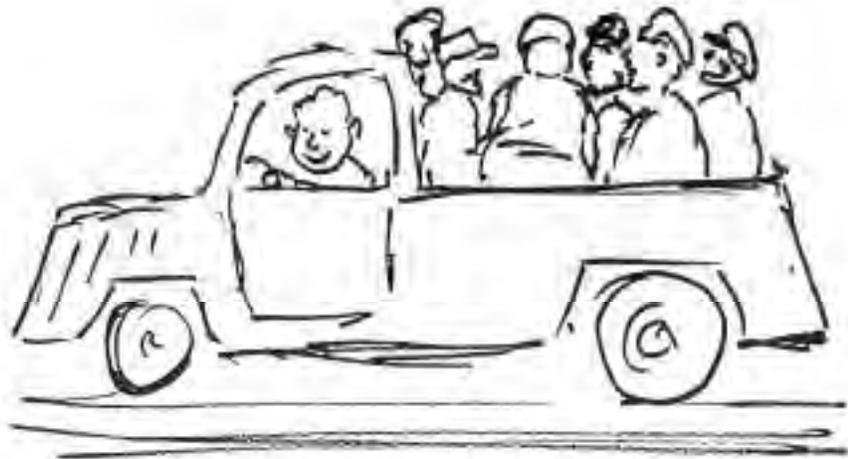
So Much Depends Upon a Pickup Truck

by Dr. Alexander Laufer

In one of my early studies, I examined the factors affecting the optimal size of a construction crew. My list of factors was very elaborate, and included worker's experience, foreman's training, complexity of work, and many others.

I collected data via field interviews and on-site productivity measurements both in Texas and Israel. However, only after I completed collecting my data did I learn that I failed to include one simple but sometimes very crucial factor. It turned out that for some trades in Israel, the deciding factor for the size of the construction crew was no more nor less than the size of the pickup truck carrying the workers from their remote villages to the site. Literature surveys and field pre-testing of the interview guide were insufficient. Deep acquaintance with the phenomena under study is the key.

Only when the researcher acquires a rich and intimate knowledge of the subject, or when the practitioner serves as an active partner in helping the researcher formulate the right questions and design the right research tools, will any of us learn something meaningful.



STORIES

Loss and Recovery

by Ken Schwer

As I stood harnessed in the bucket truck above the Taurus launch vehicle three days before launch, all the difficulties, successes, and memories of this mission came to mind.

I had the privilege of being the project manager on the Quick Total Ozone Mapping Spectrometer (QuikTOMS) Mission. After a lot of hard work and dedication, our team had the mission ready for launch in less than two years. This project was started during the height of NASA's Faster, Better, Cheaper (FBC) era. Besides the normal difficulties of developing a mission under FBC conditions, we were working under an increasingly risk-averse environment due to recent Mars mission failures. This made things even more stressful than they already can be on an FBC project.

Getting QuikTOMS through its final hurdles was especially difficult. Our most recent troubles involved getting everybody in place for the launch, scheduled to occur just 10 days after the 9/11 tragedy. There were flight cancellations, doubts as to whether the launch would occur as planned, and the obvious anxiety of traveling by air to the launch site. With the help of NASA planes, charter flights, and communication networks, we were all in place the Monday before our Friday launch. So with just 3 days before launch and after a very successful Flight Readiness Review, I felt we were ready with our contingency plans in place.

Loss

There were no plans or work-arounds for what occurred just a few minutes after launch. Eighty-three seconds off the pad the Taurus launch vehicle had an in-flight anomaly that caused the vehicle to veer off course. Taurus tried to correct herself but she had lost too much velocity. Our concerns grew as we neared separation from the launch vehicle. Separation went as planned and we had all ground resources up trying to locate our spacecraft. However, after separation, we never heard from QuikTOMS again.

After a hectic few minutes, the informal word was that the launch vehicle never reached orbit, meaning the spacecraft returned to Earth after separation. The data revealed three pieces came down in the Indian Ocean. As I drove over to where the QuikTOMS team was monitoring the launch, I couldn't help but think that the last two years were all a waste.

When I walked into the building, I saw tears in people's eyes and many on the team seemed lost. Our NASA Headquarters teammates did an outstanding job



ABOUT THE AUTHOR

Ken Schwer is currently the Project Manager of Solar Dynamics Observatory at the Goddard Space Flight Center (GSFC). During his tenure at NASA, he has worked as the Observatory Manager and Lead Manager for the Quick Scatterometer (QuikSCAT) Mission. His other assignments have included the Hubble Space Telescope First Servicing Mission and the Geostationary Operational Environmental Satellite (GOES). While at GSFC, Mr. Schwer has been honored for his work on several occasions. These honors include the *Aviation Week* Laurel Award and the NASA Exceptional Achievement Medal for QuikSCAT.

Loss and Recovery (cont'd)

informing management and preparing press briefings. As I tried to cope and understand the loss, I realized my team was carefully watching and listening to all my actions. Over the next few hours, we talked, made phone calls, and tried to further understand what had happened to the launch vehicle. Several managers tried to comfort the team by saying, "its not your fault, our industry is risky, and some things are out of our control." Since the team was still grieving, this had little effect.

On my Saturday flight home, I knew that I had to quickly help my team through the loss. Of course there were no procedures or lessons learned for this situation. What can you do to console people who have just dedicated two years of their lives on a project and then watched it fall to pieces in all of 83 seconds? And how do I, a young project manager, younger by many years in some cases than my teammates, lead them out of this wilderness of grief?

“As I tried to cope and understand the loss, I realized my team was carefully watching and listening to all my actions.”

I wrote the following memo in the early hours of Monday when I returned to work. Since people were still scattered throughout the country, I elected to e-mail it to the entire QuikTOMS Team and upper management.

“I know it feels like we lost a friend. Friday evening as I went thru my QuikTOMS Mission Operations information, I felt lost and had great difficulty with the finality of our Observatory's fate. She never got a chance to show her true colors in orbit. I kept thinking, "what a waste for all" but that didn't last for long. Once I realized all the triumphs, lessons learned, and working relationships created on this small but important mission, the purpose of QuikTOMS started to become clear.

“I saw the telemetry stop after separation and unfortunately that was the last we heard of our Observatory. Our Mission Operations & Ground System team used every resource available in an attempt to establish contact with QuikTOMS. Our Taurus team should also be proud. Taurus-6 was a sight to be seen on the pad as she was flying the American Flag. Even after the in-flight anomaly, Taurus showed her strength & control by trying to correct her course. Taurus completed the sequence of events but did not have enough speed to get us into orbit. I want to thank our Taurus friends for their hard work and dedication. With the experience and strength of the Taurus team, I know they will rebound even stronger.

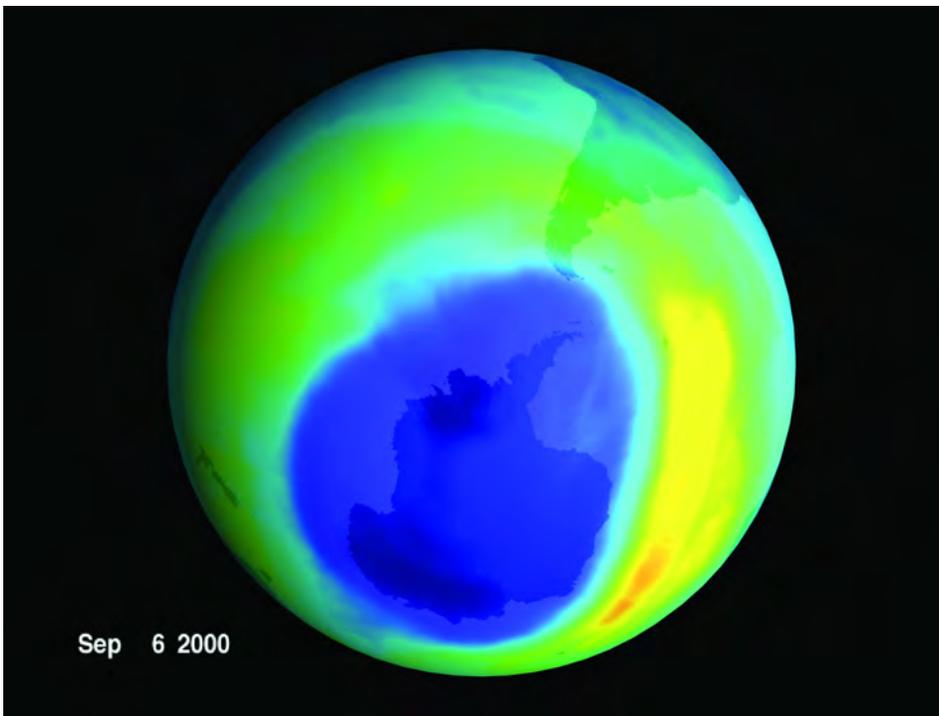
“I truly want to thank all of you and your families for the tremendous effort, dedication, and personal sacrifices you gave to the QuikTOMS mission. Many of

STORIES: KEN SCHWER

Loss and Recovery (cont'd)

you went way beyond the call of duty. I know this week will be difficult, especially for our Mission Operations team, so reflect on our journey and realize the QuikTOMS Mission was not meant to be that of science, it was a mission for human will and teamwork.

“All of you moved a mountain for me and I am forever grateful.”



The largest-ever ozone hole, roughly three times the size of the U.S., was detected on September 6, 2000 by NASA's Total Ozone Mapping Spectrometer (TOMS). The TOMS mission discussed in Ken Schwer's story "Loss and Recovery" would likely have expanded our understanding of the Earth's ozone.

Recovery

I received many encouraging responses from my teammates. They thanked me for sending this note and not forgetting about the human factor in our project. A spirit of cooperation guided the negotiations during contract closeouts. The we-don't-want-to-work-with-each-other-again approach gave way to teamwork

Loss and Recovery (cont'd)

and fairness. All of this led to an all hands “wake party” where Center management expressed their appreciation and thanks to the team. I want to pass on the kind words from the Director of Flight Projects at Goddard Space Flight Center:

“The reason that QuikTOMS was ‘quick’ is that the team worked exceptionally hard to get the spacecraft ready in two years. On top of the normal challenges, the QuikTOMS team was thrown the curve caused by the Mars failures, resulting in a huge amount of unplanned work: Red Team, parts analysis and testing, etc. It was only by extra hard work, near round the clock in the last few months, that the Project remained ‘quick.’ Under those circumstances it is particularly devastating to have nothing to show for all that work. We are reminded that although the rewards for our work are high, risk is high. The spacecraft was lost, but not everything was lost. Relationships built over the past two years will remain ever strong in the future and will be important in future projects and collaborations. Knowledge gained in teamwork and spacecraft development will be the springboard for future successes and career growth. Please join me in offering condolences to the QuikTOMS team, but also congratulations for a fantastic job, well done.”

We all know where the money goes on a project, but we often forget there is a face and family behind every dollar we spend. The loss of QuikTOMS hurt and jeopardized the uninterrupted monitoring of ozone. However, the loss of good people in our industry would have impacted our future missions. Even though we can't recover QuikTOMS from the ocean, as asked to me by my kids, we recovered from our loss with lasting relationships and a strong feeling of success.

Lessons

- Leaders lead by showing their humanity to the team. When the whole team is hurt or grieving, perhaps the strongest thing a leader can do is to express his or her pain and grief with them.
- Never forget that missions are made up of the people who accomplish them. Honor the experience of working together to achieve a goal as much as you do the accomplishment of the goal.

Question

In high-risk projects, can a team work together passionately and still be resigned to failure in the event of that happening unexpectedly?

STORIES

Boiling Point

by Michael C. Jansen

One of my first experiences as a journeyman engineer paralleled Dickens' *A Tale of Two Cities*. It was the best of times; it was the worst of times. Not quite six months after I came on-board permanently, the Shuttle Challenger exploded 73 seconds into mission 51L. Never have I experienced such a period of unified purpose and unhesitating professional cooperation across organizational boundaries as I did during our activities following this tragic event--not since has the subject of work been so grim.

As did many of my colleagues in Engineering, I doggedly threw myself into the piece of the accident investigation assigned to me. From the long-range photo and film footage, it was evident that a spurious plume had emanated from one of the solid rocket boosters (SRB), beginning roughly a minute into the flight. The visual data was backed by telemetered data that showed SRB nozzle gimbal angles changing to adjust for the slight loss of thrust in the affected booster. Judging by the ensuing glow, the plume had apparently impinged upon the External Tank (ET), fairly near its lower dome. From the telemetry data received up to the time of the explosion, the propulsion team ascertained that the ullage pressure in the ET's hydrogen tank, upon which the plume seemed to be impinging, began to drop shortly after the glow was first visible in the film footage. This was an indication that the tank might have been breached, which spawned the theory that the liquid hydrogen therein ignited explosively, thereby triggering the Challenger's destruction. Analysis was required to confirm or disprove this supposition, and, along with the above scanty information, I was given the task of supplying that proof.

Problem was, I had an extremely limited background in this (indeed, any) type of thermal analysis, which was considerably complicated by our gaps in knowledge. The spurious plume's heat flux level was unknown. The exact location of the plume's impingement point was unknown, which meant that the geometry of the affected portion of the tank wall could only be guessed at. The analysis had to account for the presence of a cryogenic liquid on the inside of the tank wall, which surely would begin to boil locally, with who knew what impact on the heat transfer away from the tank wall. And, most hindering, I knew absolutely nothing about heat transfer in boiling liquids.

As it turned out upon some quick research in our tech library, few people in the world did, and when it came to cryogenic boiling, the number of experts was in the single-digit category. Hmmm. But there, amid the handful of Russian names in the literature, was one American and his academic affiliation was with a local



ABOUT THE AUTHOR

Michael C. Jansen was recently named the Technical Assistant to the Assistant Business Manager for Assessments within the International Space Station Program's Business Management Office. This is his fourth story to appear in ASK. Others were published in Volumes 1, 2, and 5.

Boiling Point (cont'd)

“He returned my call almost immediately and showed great interest in the situation: Was I investigating the *Challenger* accident?”

university! I couldn't believe my good fortune! After obtaining permission to contact a non-NASA source as part of what we were supposed to treat as a secure investigation, I called this professor's office immediately to set up an appointment to get some valuable guidance on how to approach my problem. He returned my call almost immediately and showed great interest in the situation: Was I investigating the Challenger accident? I told him we at NASA were under orders to treat all circumstances of the investigation as confidential, and that I could therefore not answer that (which, of course gave him his answer). He agreed immediately to a meeting.

If it walks like a duck and quacks like a duck, don't try to tell me it's a moose!

My first indication that I was in for a difficult meeting came when I walked into the professor's office and was greeted not only by this world-class expert, but by one of his visiting Soviet colleagues as well. This being the pre-détente era, when the Soviets were actively “borrowing” our technology to develop their own Space Shuttle system, and considering the confidential nature of the investigation I was a part of, the man's presence made me quite uncomfortable. The professor, perhaps instinctively reacting to my obvious youth and his role as learned advisor, immediately justified his colleague's inclusion in our meeting as a means of getting another expert to consider the technical problem in order to bring this serious situation to a rapid conclusion. Certainly I had no objections, right? Fresh from college, I allowed myself to fall into the professor-student relationship and acquiesced.

He wasted no time in resuming his questioning: This was part of the Challenger investigation, right? My attempts to deflect the question only strengthened his conviction that he was correct. His excitement was palpable: So, what are the details of the problem? I explained that I was interested in calculating the heat transfer away from an aluminum wall that had a heat source on one side and liquid hydrogen on the other. What type of aluminum? I didn't know, but could find out. What local wall thickness? Not sure, the heat source impingement point was only grossly estimable, and the local geometry changes dramatically in that region. What was the heat flux to the wall? Don't know; the engineers estimating that hadn't yet released any numbers. What is the inner wall surface roughness? Don't know; I could perhaps estimate it based on manufacturing specifications. Size and distribution of bubbles coming off the inner wall? How would I know that? Number and depth of nucleation sites? Huh??

What do you know?

STORIES: MICHAEL JANSEN

Boiling Point (cont'd)

Well, not much--that's why I came to you for help on how to approach this problem.

The professor, obviously disgusted, rattled off the myriad variables that estimation of the heat transfer coefficient depended on, all of which were important, and none of which I seemed to know. I asked whether the general approach couldn't be outlined, with best guesses and available data to be inserted later to arrive at a good ballpark number? He scoffed, smirked at his Russian counterpart, and told me the problem could not be solved without knowing the variables he had laid out for me. Then the professor, in one of the more open displays of condescension I've witnessed, told me in essence to come back again when I knew what the heck I was talking about, or send someone else more experienced who might have a better handle on the problem.

I fumed during the entire 45-minute drive back to my office.

Seat-of-the-pants engineering...

Bruised ego notwithstanding, I still had a problem to solve. I returned to the reference books I had borrowed from the library and reevaluated the information to be gleaned therefrom. The problem that had caused me to seek assistance to begin with was that no single boiling point curve (in essence, a representation of how quickly heat could be carried away from a surface by a boiling liquid) existed for cryogenics. Myriad empirical formulae existed, each typically valid for only a narrow temperature range, specific surface material, surface finish, etc.; all of them sported the alphabet soup of variables for which I had no estimates.

Well, if there was no single cryogenic boiling curve to suit my situation, I'd piece together one of my own. Several sheets of log paper later, I had in front of me an approximation of a hydrogen boiling curve spanning the gamut of temperature differences ever tested in the history of cryogenic research. Considering the incredible scatter in the empirical data I had synthesized to form my curve, I had no idea whatsoever if I was in the same universe with reality, but I had my start-point. I just needed to test it, but how? The team working on an estimate of the plume-induced heat-flux to the ET weren't quite ready with a heating range, and the kind of testing I had in mind wouldn't be safe to do with liquid hydrogen anyway. Ah, but of course: inert liquid nitrogen! I quickly repeated my kludge-work, this time to approximate nitrogen's boiling curve.

“He scoffed, smirked at his Russian counterpart, and told me the problem could not be solved without knowing the variable he had laid out for me.”

Boiling Point (cont'd)

I consulted a friend of mine in the thermal analysis area and together we designed a test setup that included simple open-top aluminum box (of the same aluminum as the E.T.... I had researched the materials). We had the techs build and instrument several such tanks with thermocouples radiating from a central target zone on one side. We then set up a calorimeter-instrumented target and measured the heat flux from a blowtorch at various distances along a centerline perpendicular to the calorimeter's face. My friend then developed a simple two-dimensional conduction model of the tank's face and made predictions, using my nitrogen boiling curve, of the time it would take to melt the tank's wall at the various heat flux levels for which we had blowtorch distance data. Following a test plan scribbled on a sheet from an engineering pad, we had the techs fill the first tank with liquid nitrogen and position the blowtorch at the closest (highest incident heating) position. Then, with a roomful of bemused older techs watching and our cauldron bubbling over with nitrogen fog, I signaled one of them to fire up the torch, the signal for my friend to click the stopwatch

"Time!" I yelled at the first sign of nitrogen pouring from the new penetration into the overflow basin.

And the answer is...

"8.6 seconds!" answered my friend, even as the tech shut down the torch.

"What was the prediction?" Dared I hope? The actual time had sounded fairly familiar...

After the moment it took my friend to search our handwritten matrix, the techs' grins changed purpose and broadened.

"8.8 seconds!"

We repeated the process several times for various torch distances; in each case the experimental burn-through time matched our prediction to within ten per cent. Later plots of the thermocouple data revealed that we had also matched the wall temperature time-histories very well, not just the time needed to reach the aluminum's melting point. Having validated my nitrogen boiling curve and my friend's two-dimensional wall model, we set our sights on the real problem at hand.

Working from the plume team's estimates on where the jet was impinging on the ET, my friend developed two- and three-dimensional thermal conduction models

STORIES: MICHAEL JANSEN

Boiling Point (cont'd)

of the local ET wall geometry. Since the models' thermal responses turned out to be only negligibly different, we felt that the validation provided by our test results could be extended to our three-dimensional approach as well. From that point onward it was a mere matter of plugging in my hydrogen boiling curve, making a burn-through prediction based on the plume team's estimated time-varying incident heating rates, and comparing our prediction against the flight data.

Our prediction matched within four percent.



Boiling Point (cont'd)**Epilogue**

The hypothesis that the ET's liquid hydrogen tank initiated the Challenger's explosion turned out to be false. (The plume was determined to have melted the booster's aft attach strut, which allowed the booster to rotate about its forward strut and puncture the ET's liquid oxygen tank, which resulted in the initial explosion.) Nevertheless, the plume's penetration of the ET's aft dome was confirmed by our analysis, which added to our understanding of the events that transpired during this tragic disaster.

I took away from the experience a great appreciation for the ability of a group of focused, committed people to accomplish seemingly miraculous results within extremely short timeframes, with a minimum of information to go on. I also acquired a healthy skepticism for the infallibility of theoretical experts, coupled with new confidence in the ability of common-sense engineering to produce usable results even in the absence of all the data one would normally like to have. However, don't take this to mean that I think engineers are better equipped than theoretical experts to address such problems as the one described in my story here. "Experts" can seldom give useful answers to unexpected questions without an opportunity for study, and it is rare that they will volunteer to put aside their own work to study "your" problem. Unless we are willing to fund them for an extended period, their advice must be used judiciously, and primarily in a review capacity.

Still, in a pinch the back of the envelope can work quite well.

Lesson:

- Don't be buffaloes by experts and elites. Experts often possess more data than judgment. Elites can become so inbred that they produce hemophiliacs who bleed to death as soon as they are nicked by the real world

Question

In situations like the one in this story, is it better to try solving a problem without an expert's help, or is it better to try and collect more data and visit the expert one more time?

STORIES

When My Name Suddenly Was “Murphy”

by David Mitchell

The 1995 - '96 timeframe was a busy period for NASA's Delta II missions. Several spacecraft were slated for launch. During one particularly crazy stretch, four separate missions were launched within four months, and we had to jump between launch bases on both coasts (Cape Canaveral and Vandenberg Air Force Bases).

I was the Launch Services Manager. My job consisted of the traditional responsibilities that go with a fixed price contract: managing schedule and budget, and overseeing the delivery of launch vehicles. The final step in each mission was, of course, the launch. The Project Manager traditionally led the team through the final two weeks at the launch base.

My Project Manager took it upon himself to push me out into territory that I had never experienced before. For example, he had me plan the launch campaigns (manpower, resources, durations), lead some of the launch vehicle reviews, present launch vehicle readiness statuses to Center Management at Goddard and JPL, conduct pre- and post-launch press conferences, and be a part of the launch readiness “go/no-go” polls.

However, he did not just throw me out to sink or swim. He hammered away at me to make sure I was thoroughly prepared. An example of this was when he assembled a panel of three people to hear a dry run of my first pre-launch press conference. His panel of mock reporters fired away at me with a series of questions to make sure I was quick on my feet in responding to some very good and sometimes “off the wall” questions

As with every mission, we always had to wrestle with late breaking launch vehicle issues. In the case of the Mars Global Surveyor and Mars Pathfinder, two high profile missions, that included a lot of scrutiny from senior management. In the past I might be associated with the senior managers through a photo opportunity (i.e., award ceremony) or an “All Hands” meeting. Now my project manager had me briefing some of these individuals on a weekly basis.

This was both an exciting and nerve wracking time for me. My project manager's confidence in me was a great motivator and I learned a lot about addressing and solving issues from the technical, programmatic, and political perspectives. Still, it all seemed to be going rather smoothly, until the unexpected occurred.

We were finishing our launch campaigns for '95/'96 with great success, leading into the last mission, Mars Pathfinder, in December 1996. Just one day before



ABOUT THE AUTHOR

David Mitchell is the Deputy Program Manager of the Geostationary Operational Environmental Satellite (GOES) Program at NASA's Goddard Space Flight Center. The GOES Program is responsible for the design, assembly, integration, test, launch, and on-orbit checkout of the GOES weather satellites for the National Oceanic and Atmospheric Administration (NOAA). Prior to his work on GOES, he concentrated on expendable launch vehicle programs. Mr. Mitchell joined NASA in 1987.

When My Name Suddenly Was “Murphy” (cont’d)

launch, I received a call from my project manager who said he’d been incapacitated and would not be able to make the launch. It turned out that he had suffered a heart attack. He said he had all the confidence in me and wished me the “best of luck in tomorrow’s launch.”

Although our deputy project manager and other senior managers had now converged on the launch site in preparation for the following day’s launch, the decision was made to put me in the role of NASA Launch Vehicle Manager (LVM) for the next day’s launch attempt. Fortunately, and by design, I had participated in many launch simulations and previous launches sitting next to my project manager observing his methods and actions as the NASA LVM. Now I was the person giving the launch vehicle readiness go/no-go to the NASA Launch Manager.

Had my project manager not prepared me as he did, it would have been quite daunting for me to be thrust into the limelight just a day before one of NASA’s highest profile missions. In the end, the preparation was good, and everything went off smoothly.

You can never know when the unexpected will occur. And anybody who is intimately familiar with “Murphy’s Law” knows that the unexpected is going to occur at the worst possible time. My project manager wanted me to be as ready as possible in case Murphy reared its head. The bottom line is there is no better way to be prepared than by experiential learning.

My project manager taught me a valuable lesson. You prepare your people by giving them many different tasks, including tasks that are traditionally reserved for you or other senior people. I was motivated to accept the challenge fate tossed my way, but not just because I had trained for it. My project manager’s confidence in me brought out my confidence in myself. It motivates the heck out of people when you show them your confidence by giving them increasingly more responsibilities.

Lessons

- Learning by doing expedites doing something well.
- Your trust in people whom you feel are potential leaders brings out their confidence. Tell them that they’re doing a good job and that you have confidence in them and they will generally become self motivated and exhibit a greater degree of confidence in themselves.

“My project manager’s confidence in me was a great motivator and I learned a lot about addressing and solving issues from the technical, programmatic, and political perspectives.”

STORIES: DAVID MITCHELL

When My Name Suddenly Was “Murphy” (cont’d)

- Convey that you expect much from people, and the chances are you will get much from them.



David Mitchell was launch manager on Delta II missions. Pictured here, the Mars Pathfinder begins its journey with liftoff atop a Delta II expendable launch vehicle.

Question

Looking back at your career, do you agree that taking on a variety of responsibilities has enhanced your performance?



ABOUT THE AUTHOR

Tim Owen is currently the Project Manager within the Transportation Directorate at Marshall Space Flight Center for the Expendable Launch Vehicle program. He has worked with NASA at Marshall Space Flight Center for over 12 years in a number of different positions and organizations. He most recently served as the Project Manager for a space station experiment called the Dynamically Controlled Protein Crystal Growth (DCPCG) within the Microgravity Sciences and Applications Department of the Science Directorate.

Less of Me

by Tim Owen

Let's be frank, things just weren't working out. The project was a microgravity experiment that was supposed to be ready for launch in August 2000. Right from the get-go the hardware development team was behind schedule and over budget.

The Principal Investigator (PI) and his science team had been responsible for not only the science but also the hardware development. This was one of the first projects coming out of the Microgravity office at NASA's Marshall Space Flight Center to use the PI mode for the bulk of the project management. "Thank you very much for the money. Please leave us alone." That about summed up their relationship with NASA.

My management asked me to step in and get a handle on the project. On the NASA end of things, we'd been relatively hands off until now. The culture at Marshall is steeped in systems engineering, and what we had set off to do on this project was 180 degrees opposite of that. Now we were trying to get back in the picture. The way my management put it to me was like this: "You've got to--you know--roll up your sleeves and get down in there. Take back control. You're our guy."

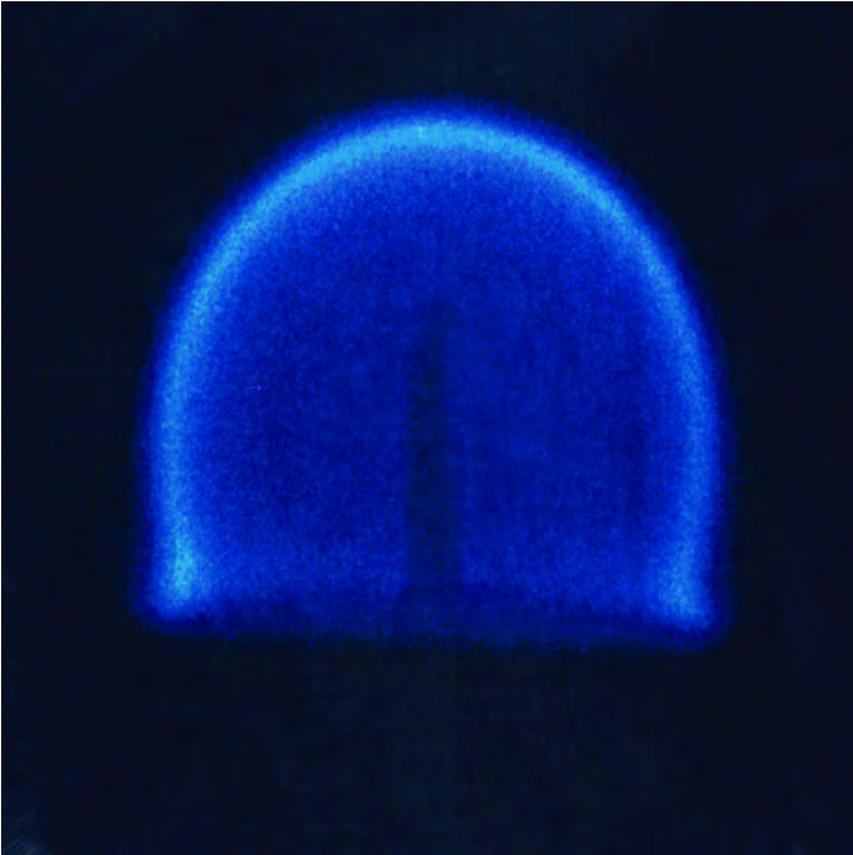
I came on as the project manager for NASA in the fall of 1999. In the winter of 2000 initial verification testing began. Right off the bat one of the key technologies was failing. The PI needed to capture digital snapshots of the crystal growth process in order to understand and determine the physics of crystal growth as it occurs in a microgravity environment. Clarity of resolution was required at two different points on the crystal growth chambers: one for capturing the digital images, and the other for measuring the laser light scattering ratio. In the case of the latter, the resolution of the laser light scattering ratio was not meeting the science requirements.

Such were the kinds of technical problems I was expected to get a handle on. There were other problems beyond the hardware developer's control. Defining hardware requirements, in particular hardware interfaces, was complicated by the fact that the development of the vehicle (Space Station) and carrier (EXPRESS rack) was taking place concurrently with the development of this experiment.

If all this doesn't sound like enough high drama, it was my first assignment as a project manager. Naturally, I wanted to prove myself and be successful. I also wanted to do right by NASA and live up to the example set for me by the best project managers I had worked for during my twelve years at Marshall Space Flight Center.

STORIES: TIM OWEN

Less of Me (cont'd)



Sometimes described as "weightlessness," microgravity is a condition in which the effects of gravity are greatly reduced. In microgravity, researchers can isolate and study the influence of gravity on physical processes, such as the flame shown here.

Bull in the China Shop

It's a precarious situation to be in when you start off riding one horse across a river and decide in the middle to get on another. The hardware development team was confused at first, and not exactly amenable to this new arrangement. They felt like they had been empowered to go do this job and now NASA was telling them, "Look, you're not meeting your cost and schedule commitments. We're going to have to step up our involvement."

Suddenly their relationship with NASA, including our level of technical involvement, had changed in quite a dramatic way, in part because we were entering the

Less of Me (cont'd)

testing and verification phase but primarily because of their poor performance. There's no way you can change from one way of working together to another without somebody on their side wondering, "What's going on here? Am I doing something wrong?"

Part of the problem was me, too. When I see that something is not going well, I have a tendency to push everyone out of the way and take charge. Maybe that's why my management thought I was the person to step in and take hold of the reins on this project. I had been through enough project management training to know the value of consensus building and the need to establish good communication across the team. Funny how natural tendencies, despite training to the contrary, can undo our best intentions. Given the state of the project, the pressure I felt under, it was hard not to succumb to the urge to overcontrol.

“Funny how natural tendencies, despite training to the contrary, can undo our best intentions.”

My objective was to stay focused on results. Schedules, deliverables. Did we pass that verification item, or did we fail? If we failed, what do we have to do to get back in line? We had some very long meetings, and there were painful discussions. In order to focus them on cost and schedule performance, we started each meeting with a schedule review. The schedule was generally about six pages long with maybe a dozen items on each page. As we worked through that, it became obvious to me that the hardware development team did not have a solid understanding of what was on their schedule and how it impacted other parts of the project. A lot of my questions started to sound the same: "Tell me what you mean by this activity."

It was rough on them because they were seeing that they really didn't know what their drivers were. Not surprisingly, they developed something of a defensive posture to me. I asked hard questions. A lot of these folks on the hardware development team had been going along and never been held accountable. I came in and one of the first things I did was say, "Let's look at who the people are on the project, what their responsibilities are, and hold each person accountable for what they're supposed to be doing."

Was it wrong to ask hard questions? Certainly not. But just like the impact of a joke depends so much on its delivery, so does the ability of a leader to effectively communicate where the team is going. My approach rubbed some people the wrong way. Feelings were hurt. The tone I was conveying, and none too subtly, was that you all are screwups and I'm here to fix things.

STORIES: TIM OWEN

Less of Me (cont'd)**Learning What I Already Knew**

Part of establishing accountability, and being a good project manager, is learning to work with your team. Because every project team is only as good as the weakest link.

I realized soon enough that I could not do everyone's position. Who knows how long I might have kept pushing had I not recalled a similar situation on a project about six years earlier? At the time I was working as a subsystems lead and there were some computer sequences that needed to be completed by a certain time. I had a particular understanding of how I thought it ought to be done, and when I gave the job to the person who was going to do it I said, "Have this ready in three weeks, and this is how I want it done." To his credit, he said to me, "Look, if you've given me the responsibility and you've empowered me to go do this, then let me do it the way I think it ought to be done."

“Look, if you've given me the responsibility and you've empowered me to go do this, then let me do it the way I think it ought to be done.”

That was a profound realization for me. You could even call it a "Eureka" moment. At that point I recalled working under project managers whom I considered to be the best. The ones who were the best examples, my mentors, gave me the authority to go off and do the job my way. Because they gave me that authority, I felt accountable to them and to the project.

Eventually, the guy assigned to the computer sequences worked out the problem, and I was glad in the end that it was not done in the way I wanted. I was able to see the merits of what that person was doing, and this opened up my eyes to realizing that I was not alone on this project. Help was always there. All I needed to do was reach out to it instead of pushing it away.

Here I was six years later, learning that same lesson all over again. You build your team by building your people. There was no doubt that people on this project were working hard. Clearly, they were not focused on being accountable for their cost and schedule, but there was never any question about whether they were putting in enough hours or doing enough analysis.

There are ways of getting people to be accountable, and some strike me as far more favorable to the overall good of the project. Just like in any relationship, you have to try to understand each other's point of view. You can't say, "Go do this, just because I said it." It doesn't work that way. Milestones and accountability are great, but the key is to agree upon goals. Once you do that you must let them work. You don't have the competencies of all the team members, and you don't have enough time to learn them all.

Less of Me (cont'd)

A perfect example dealt with the concurrent development of the science instrument with the vehicle and the carrier. This was a tremendously tedious and complicated task. It required an enormous amount of coordination between the hardware development team, vehicle and carrier development organizations and the responsible engineering disciplines at Marshall. By empowering and allowing the lead systems engineers to perform their roles made a big difference in the project running smoothly amidst the confusion.

The significance of allowing the hardware development team, science team, and the engineering team and their discipline/element leads to do their jobs and know that I, the project manager, was going to let them to do their jobs, but with the expectation that they would do it in a timely manner and in a cost conscious way was so crucial to the ultimate success of this project.

In the end, we were able to gain back some of our schedule after a major de-scope and launch date slips. More importantly, I learned something about myself, yet again, that is going to make me a better project manager. The bull-in-the-china-shop approach leaves little room for movement. There's only but two things left on the floor after the bull has had its way in a china shop, and neither one of them is very nice.

When I came onto this project, I was very ambitious and very sure of how I thought things should be handled. This is going to be a brand new project, starting my first day. Sorry, but it doesn't work that way. As much as I wanted to take hold of the reins, grab the bull by the horns, be active, "You do this; you do that," it's just not the right way.

Question

What lessons have you had to relearn throughout your career?

You can't force people to do what you want them to do. Instead, what you really want is to encourage people to take responsibility so that they're doing something because they want to do it, not because you want them to do it. A little less of me in this case went a long way.

Lessons

- Resist the urge to micromanage. Encourage the team effort. Inclusion and openness work better than exclusion and arrogance.
- Be open to team members who can approach a problem and solve it differently than you because of their expertise.

SPECIAL FEATURE: PERSONAL QUEST

Is There A Perfect Organization?

by Julie Schonfeld

When I was 10 years old, I decided I was going to be the first woman astronaut. By the time I was 12, I knew what schools I was going to attend, what degrees I was going to get; basically, I had the whole thing figured out.

This is the way I've always been. I make a goal for myself and plan the best path to get there.

In high school, I was an intern at the Kennedy Space Center. I went on to be a pre-co-op and a co-op student at Kennedy too, and when I graduated I was offered a position at Ames Research Center in California.

Which is where I am now, still at NASA, the place I've always dreamed of working, and while I'm not an astronaut, I'm fine with that. Being a project manager has turned out to be wonderfully challenging, and I enjoy contributing to the Agency that way.

But this story is not so much about dreams as it is about the real world. A couple of years ago I was feeling restless. After 9 years at NASA as a project manager, I felt I had reached a point in my life where I needed a change. I took a leave of absence to find out what it was like to be a project manager in private industry. This was not an easy decision. All I ever wanted to do was work for NASA. In fact, it was absolutely heart wrenching for me to leave because I was thinking I might not come back.

My personal philosophy of project management is that you should place the highest value on the people doing the work, your team. I believe that the people doing the work know better than anyone what should be done in their individual areas, not management. I've seen cases where project managers and upper managers above them will decide something on a project despite the views of someone who has more knowledge about the issue in question. Letting the team know what the goal is and giving each individual a role in that and clearly defining what their responsibilities are and just letting them go--that's what I try to do as a project manager. In general, I don't find that to be the case. Too many managers are concerned with appearing to know more than anyone below them. I suppose this was the source of my dissatisfaction at NASA, and why I thought I needed a change. Was it like this everywhere? I needed to know.



ABOUT THE AUTHOR

Julie Schonfeld is currently the acting Deputy Project Manager of the IT Strategic Research Project. Previously at Ames Research Center. She has also worked at Ames on bio-instrumentation for life sciences research, including the Neurolab STS-90 Mission, and prior to that, chemical/gas detection systems at Kennedy Space Center. In July 2000, she took an eight-month leave of absence and went to work at Cisco Systems, and considers this one of the most valuable experiences of her career.

Is There A Perfect Organization? (cont'd)**The Big Leap**

Through a process of elimination, I arrived at Cisco Systems. I knew they were doing really exciting work there, and clearly, they were a company that could produce. Everything that I'd read in the press about them said such marvelous things. And then it's rated as one of the best companies to work for.

Now, what position I was looking for at first, I didn't have a clue, but I knew I could offer pretty solid skills as a project manager, so I went with it. Define the goal, and then develop a plan that points in that direction.

It turned out there was an opening for a Project Manager in one of their Information Technology (IT) design groups. I applied and was hired straight away.

Initially it seemed like a nice fit, and I was quite pleased. One of my goals was to see why Cisco was talked about in such glowing terms. I wanted to find out if it was just hype or if Cisco really was different. So I set out to see if they "had the goods."

Cisco has a different take on project management than I was used to at NASA. They do not assume that the project manager is necessarily the technical expert in her group. In this particular IT group that I was part of, I was partnered with a network architect, and we worked together as a team. It was a partnership in the true sense of the word. The network architect was responsible for the technical direction, and as the project manager I was responsible for managing the effort and being the interface to upper management and to other lines of business within the company. At the same time, I was not excluded from the technical side of the project, and I felt that my contributions there were welcome.

At Cisco, teams have more say than any one individual. Project teams can even overrule vice presidents. If a Vice President says you will do this, the project team can say, "Well, these are all the reasons why we think we shouldn't go in that direction." Naturally you have to do more than just offer an opinion. You must build a case, but it is a real policy. I saw it in action several times.

The project that I was working on dealt with video conferencing, and they wanted to deploy a product immediately. We showed all of the problems that would occur if it were deployed too soon, and how it would prove to be unmanageable and unreliable. Because we could not guarantee service, we convinced them it was best to wait.

“After 9 years at NASA as a project manager, I felt I had reached a point in my life where I needed a change.”

SPECIAL FEATURE: JULIE SCHONFELD

Is There A Perfect Organization? (cont'd)

What impressed me about Cisco is that management focuses on enabling employees to succeed. That's why their acquisitions of other companies are so successful. Within two weeks, all the employees of the acquired company have their benefits, salary packages, and computers. The beginning-to-end transition process is three months. These people are not suffering, wondering what is going to happen to them.

A major focus of the company is "What's good for Cisco as a whole is what's good for everyone." That focus makes for a constructive work environment, and it's within that environment that people remain enthusiastic about their jobs and hence maximize their productivity. That aspect of "the people element" is what I believe management should be about.

Straight Down

Now why did I return to NASA when it seems I had found my niche at Cisco? The reason that I left actually was because a situation developed that was incongruous with what the Cisco culture was supposed to be about, and I wasn't sure that they were going to live up to their reputation.

The manager who had hired me thought our group was getting to be too large. He decided to break us up into three subgroups and was going to put a new layer of management between him and the group. We actually got to help hire this person, and in the interview he seemed fine. Well, he turned out to be someone who assumes that he knows more than anyone.

He didn't respect anybody's input. The whole team would say, "We think we should go here," and he would say, "Well, that's fine, but I think we need to go here, and so we're going to do what I say."

When I showed him a presentation, he told me what I needed to do technically and was clearly wrong, but wouldn't listen to me when I tried to explain. I watched him publicly belittling someone, and additionally, performing strong-armed "corrective measures" with someone who was one of the best performers in our group. "You will be on my calendar every single day and I'm going to monitor your progress daily," he told him.

One Friday at the end of the day, many of us who were disgruntled held this meeting to discuss the situation, how he was micromanaging this process that we

Is There A Perfect Organization? (cont'd)

Do virtual realities and perfect organizations have something in common?
Hope it's not the dress code.

were supposed to be developing, and what we should do. There were just a lot of hostile comments from everyone in the group and how this was totally incongruous to the way things were supposed to be done at Cisco.

We went to our original boss and said he's being horrible. We expected him to be fired, or moved to somewhere else in the company at least, but this didn't happen. Our original boss said, "I'm going to work with him, and we'll see about improving this."

SPECIAL FEATURE: JULIE SCHONFELD

Is There A Perfect Organization? (cont'd)

A month later we weren't seeing any improvements. I actually went to my original boss's manager, and then I went to a Vice President, and I said, "There is a big problem. He's horrible, we're miserable, and our productivity is being affected." I did this because John Chambers, Cisco's CEO, says in his meetings, "We cannot afford to have bad managers. We cannot afford to lose good employees. If you have a manager who's bad, you need to escalate it, you need to take it to your manager's manager, and if they don't address it, you take it higher." When it was clear that my manager wasn't going to take any action, I went higher.

Around this same time my leave of absence was about to come up. I had to either go back to NASA or resign. I called and begged for a month's extension on my leave, and NASA said okay. At the end of the month I still wasn't seeing any improvements. I lost faith that Cisco was going to do anything about him, and so I decided to return to NASA.

Parachute

I was the first one to go, a month later somebody else left, and then when the third person quit, Cisco did what it should have done at the beginning. They demoted him, six months after we raised the issue.

When I returned to NASA, I was afraid it was going to feel like I was moving back in with my parents after I had gone to college, but instead it turned out that I felt refreshed and ready to take on a new challenge, set new goals.

I don't regret leaving. It was a huge learning experience for me, personally. A growth experience. I became a little wiser, a little more realistic about organizations. None are perfect. Mostly what I wanted, I realize, was to work with really smart people doing really interesting work, and that's right here. Maybe I had to leave NASA to see that, but I'm glad for the experience I had at Cisco, and the renewed sense of optimism I have about my future at NASA. I'm still idealistic. In fact, I feel even more so now than ever.

I'm on this crusade now to change things at NASA to the way that I think they ought to be. NASA's a great organization. When I compare the best people they've got at Cisco with who we have here at NASA, I see the same high caliber. Let's allow the people who are doing the work to use their intellects to do the best job that they can.

Is There A Perfect Organization? (cont'd)

A lot of it is bringing over some of what I learned about the culture at Cisco. I'm talking to people whenever I get a chance, advocating for some of the things I saw in the culture at Cisco, like individual empowerment, focusing on the team. I want to take this to people in upper management who will listen to me.

Question

How do you maintain the right balance between realism and idealism?

I feel like this is my NASA, and I want to do what I can to make it what it should be.

Lessons

- Cultures do exist that respect the knowledge of practitioners and the power of team. They are not just artfully crafted success stories.
- Even excellent organizations have their own limitations because people are just people.
- Change is a great opportunity to rejuvenate oneself. When you feel frustrated with your situation, don't dwell on your frustration but see it as an opportunity to restore your idealism.

FEATURES

A Big Raise, A Promotion, Or...

by W. Scott Cameron

I recently got an e-mail requesting nominations for our 11th Capital Management Leadership and Mastery (L&M) Award program. This program recognizes capital management practitioners in project management, construction management, capital purchasing, facilities engineering, design management, capital finance, and initiative management for their functional leadership and mastery throughout their career.

This e-mail caused me to reflect on how organizations recognize peoples' contributions in traditional (pay and promotion) and non-traditional ways (recognition, etc.). I was fortunate to be chosen as the project manager of the first L&M program. As our company's Capital Management Organization matured, we discovered we had a lot of experts in various capital management functions who we wanted to recognize but were limited as to how to do that within our traditional pay and progression programs. Thus, the stage was set to explore new ways to recognize individuals and their contributions.

A team of project managers, including myself, evaluated a number of recognition programs and proposed our own to recognize individuals within the disciplines noted above. Our objectives were clear:

- Establish a program where there were no winners and losers, only award recipients.
- Get Capital Management practitioners and their hierarchy to view the program as a positive development.
- Establish simple nominating criteria. Nominees had to have demonstrated sustained technical mastery and leadership in ways that led to significant contributions to their business areas.
- Limit the number of award recipients so that getting an award would be regarded as something special.

We proposed an awards luncheon where each award recipient would receive a plaque commemorating their achievements in front of their peers and hierarchy. Hierarchy agreed to this proposal.

Thus, the process began:

- Nominations were requested and received.



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.

A Big Raise, A Promotion, Or... (cont'd)

“As I talked to each of them, I learned how much it meant to be recognized by their peers.”

- Nomination Committee reviewed nominations and recommended award recipients.
- Award recipients and their hierarchy were informed of their selection.
- Invitations to the luncheon and awards presentation were sent out to all practitioners.
- Luncheon and award presentation were held on schedule within cost.

Everything was going along as planned until the day of the luncheon when something totally caught me off guard. I knew each of the award recipients but on the day of the luncheon I noticed I had never seen each of them so happy in all the time I had known them. As I talked to each of them, I learned how much it meant to be recognized by their peers.



I've attended each L&M celebration and been involved in managing other recognition events. The one thing that continually stands out in my mind in all of these occasions is the happiness of each individual on being recognized by his or her peers.

FEATURES: W. SCOTT CAMERON

A Big Raise, A Promotion, Or... (cont'd)

By being a participant in the formation of this recognition event and watching it flourish over the years, I feel I have had a rare opportunity to better understand how important it is to individuals to be recognized for their accomplishments throughout their careers. It is easy to become cynical about traditional and non-traditional rewards and recognition programs. However, as we continue to raise the bar on what we expect out of our project managers, we need to look for new and exciting ways to celebrate not only their team's successes but also their individual success.



ABOUT THE AUTHOR

Terry Little is currently the head of the Air Force's Center for Acquisition Excellence. Before that he was the Program Director for the Joint Air-to-Surface Standoff Missile (JASSM). He is one of DoD's most seasoned program managers. He entered the Air Force in 1967 and served on active duty until 1975. In 1997 he was promoted to the grade of SES.

Three Insights About Change

by Terry Little

Recently, I changed jobs. I moved from Eglin Air Force Base in Florida, where I had worked for 30 years managing programs, to a newly created job in Washington, D.C. as the Director of the Air Force Acquisition Center of Excellence (whatever that means!). This experience has led me to reflect some on job changes and how to adapt to them.

Insight #1

My first insight is that I have had to restart the process of developing my credibility. While I am well known within the Air Force as a program manager and, hopefully, a capable one, it is clear to me that I have to re-establish my credibility in this new job. In other words, I cannot live on my past laurels. How do I get people to listen to what I have to say? More importantly, how do I get them to act based upon what I have to say?

Certainly neither my position nor rank is very helpful in my new role. Lots of people at the Headquarters have high-sounding positions and high grades, but don't deliver anything other than words of caution or dissent. Many view their roles as keeping something bad from happening rather than helping make something good happen. These folks have no credibility and the system merely tolerates them.

I have to prove that I can be effective here--effective not just in generating new ideas, but also in making them bear fruit. That's tough. It demands that I don't promise more than I can deliver which, in turn, infers that I should know reasonably well what I can deliver. Right now, I don't know because a lot of it depends upon my ability to persuade people to my way of thinking. I do have some confidence in my ability to persuade, but I know that results will hinge on my skill in getting people to buy into my agenda for change and to accept accountability for it. As a program manager, I never had that challenge. I had (or took) lots of authority to act unilaterally and my goals seemed clear. Now I have come to understand how fragile credibility is and that establishing and maintaining it is continuous.

Insight #2

My second insight has come from pondering over the answer I give when people ask me how the new job is going. My stock answer is that "It's too soon to tell." The real answer is "I don't know." The reason is that I still haven't grasped what constitutes success in this new job. Is it as simple as making my bosses happy? How about pleasing my customers--program managers and industry partners?

FEATURES: TERRY LITTLE

Three Insights About Change (cont'd)

I am not comfortable with these measures because they imply that making people happy or comfortable is equivalent to doing the right thing. My experience tells me otherwise. Approval-seeking behaviors virtually always produce bad results both because (1) we never really know what will make others happy and (2) making others happy often hinges on telling them what they want or expect to hear. I am still working on this one and am fairly certain that there is no easy metric for this.

Insight #3

Third, I am finding to my surprise that my experience as a program manager is, on balance, a liability in my new job. The problem is my unconscious reliance on that experience to know what is right without taking into account that every situation is different. No matter how well intended, one-size-fits-all approaches never work. The reasons are simple. Every situation is unique and thus demands different approaches--different than what may have worked in the past for me or for others. More importantly, I know the key to success is implementation, not strategy or approach. There are plenty of OK approaches to every problem, but the best one will always be the one that someone can implement well.

For example, one of my first tasks in the new job was to totally rewrite the Air Force's instruction for managing acquisition programs, starting with a clean sheet of paper. I wrote the instruction based upon what I thought would be some guiding principles for an empowered manager; it contained no long list of "how-to" instructions. To my dismay, many in the field have been critical of the instruction because they don't know how to translate guiding principles into action. They want more detailed guidance. What I concluded was that I wrote the instruction as one that I would want and didn't consider that most managers in our system view lack of guidance as a problem and not an opportunity. That's something I mean to change, but it hasn't happened yet. My experience played too dominant a role in my thinking.

Finally, I have already confirmed what I previously thought. This change is healthy for me. It has re-ignited my passion and given me a new challenge that I never would have had where I was. Admittedly it is uncomfortable, but it is also exciting in a way that my previous job was not. I had done it so long that my zest and sense of vitality were gone. In short, I was bored and didn't even realize it. Three cheers for change!!!

“Many view their roles as keeping something bad from happening rather than helping make something good happen. ”

**ABOUT THE AUTHOR**

Phil Sabelhaus is the Deputy Director of Flight Programs and Projects for Earth Sciences. He has also served as Project Manager for several Goddard projects, including TOMS, Landsat-7, EOS Aura, ESSP VCL and EOS Aqua.

Continuous Risk Management

by Phil Sabelhaus

Background

Risk identification is an ongoing activity that takes place during the routine project workflow. Project activities such as programmatic and technical meetings, telecons, reviews, and other forms of communication often bring to light project risks. When this occurs, we record and analyze the risk on a Risk Information Sheet. The process outlined below helps the project team identify and cope with project risks throughout the life of the project.

Procedure

1. Team identifies list of potential risk items. Not all items identified are accepted. Risks can be current problems or potential future problems.
2. Risk Mitigation plan with action items and due dates is developed for each accepted risk item.
3. Team meets regularly (every 2 weeks for us) to assess risks and add new risk items, if necessary. See Status section on Risk Information Sheet below.
4. Risks are closed when all the actions to close the risk have been taken. Some risk items are closed quickly; others are open for a long time. Some are considered watch items and the action plan doesn't kick in until certain negative events happen.
5. Action plans include second sources of some items, requirements redirection, different technologies, etc.
6. Closed risks remain in the base for future learning.

Example of a Risk Information Sheet

see opposite page

PRACTICES: PHIL SABELHAUS

Continuous Risk Management (cont'd)

Example of a Risk Information Sheet

ID TS 001	Risk Title Chemistry DRAM		Identified 4/19/99
Priority	Statement Since there are a limited number of DRAM spares between the Aqua and Aura spacecraft and Aqua is given first priority; there may be inadequate DRAM to meet the two-orbit data storage requirements for the Aura Solid State Recorder (SSR).		
Probability Medium			
Impact High			
Timeframe Near Term	Submitter Name	Class	Assigned to Andrea Razzaghi
Context TRW plans to meet the current two-orbit data storage requirements by augmenting the DRAM units reserved for Chemistry with DRAM units currently being reserved as PM spares. There are no more DRAM units available beyond those currently allocated for PM and Chemistry. The Common Bus SSR design is based on these 5.4V DRAM units (current technology is 3V).			
Mitigation Strategy A. Track the Usage and Attrition of DRAM B. Enable OMI Data Compression C. Challenge Data Storage Requirements D. Redesign SSR			
Contingency Plan and Trigger <ul style="list-style-type: none"> Spacecraft trigger point for using mitigation B is when the amount of DRAM available for the Chemistry SSR is less than the amount required to meet the two-orbit data storage requirements without OMI data compression implemented (less than 104 Gbits). IAM trigger point is TBD. Ground system trigger point is TBS. Spacecraft trigger point for using mitigation strategy C is when the amount of DRAM available for the Chemistry SSR is less than the amount required to meet the two-orbit data storage requirements with OMI data compression implemented (100 Gbits). TRW indicates that there would be an impact to the launch date for using mitigation strategy D due to the immaturity (not flight qualified) or the alternative high-density technology. 			

ASK Talks With Joseph Rothenberg

Joseph Rothenberg has had a remarkable career at NASA. In December 2001 he retired as the Associate Administrator (AA) for Space Flight in charge of Human Exploration and Development of Space. Under his tenure as AA, the International Space Station began orbital assembly and human operations, a new Space Shuttle upgrade program was initiated, and a joint Human and Robotic Space Exploration Plan and Technology initiative was developed. Before this, he was Director of NASA's Goddard Space Flight Center. During his tenure as Director, he developed a new strategic plan for the Center and transformed Goddard from an internally focused organization to a customer focused one. In addition, he established a large number of new outreach activities, including using NASA programs to help increase the math and science literacy of America's students. Before becoming Director, he was Associate Director of Flight Projects for the Hubble Space Telescope at Goddard. He is widely recognized in the Aerospace and Space Science community for leading the development and execution of the highly successful first Hubble on-orbit servicing mission, which corrected the telescope's flawed optics.

Long before his ascent into these high profile positions at NASA, Joseph was a project manager. He started at NASA during the Apollo era, and was managing his first project almost as soon as he exchanged his cap and gown following college graduation for a suit and tie at the Agency. We spoke in February at the Fourth APPL Forum of Master Project Managers, where he was invited to talk about his career at NASA.

ASK: Is there a golden age of project management at NASA?

Rothenberg: It's an interesting question. I never thought about it as a golden age, but when you look at it that way, the first one probably would have to be the 1960s with Apollo. Managing the Apollo program was the biggest challenge NASA had at the time. Something that large, as complex as that, with as much new technology as there was, clearly, that was a feather in NASA's cap. Everybody wanted to be a part of it, to make it succeed, so it had a tremendous priority. The best and the brightest were struggling to be a part of the team. If you look at the age of some of the key people, they were young even by today's standards for project managers, and in those days they were handling the largest projects in the country. They were managing those projects, leading them, making decisions, billion dollar decisions, and with great success. I think that was something unique to the Apollo era, it attracted the best and brightest, and it enabled a lot

INTERVIEW

ASK Talks with Joseph Rothenberg (cont'd)

of young people very early in their career to take on leadership roles.

ASK: You were a project manager during the Apollo era. How were you involved with the program?

Rothenberg: I was on the periphery of Apollo. I worked on the robotics side. Three months out of school I was managing my own little project. I could barely spell the word 'project.' I was 24-years old, right out of school, and I was given my own budget, my own set of deliverables, and a team of engineers who worked for me, some of them twice my age.

ASK: That must have been exciting, managing a project at 24? What were some of the challenges being that young and having so much responsibility?

Rothenberg: Like anybody that age, I worried about the decisions I was making. I had no basis to make them on after all. I'd be doing technical calculations as well as managing the project, and I'd be spending a fair amount of time at night, just re-checking all my calculations, and still I got one out of five wrong. Of course I made every mistake one could make, but I was learning, and I'm still learning.

ASK: One of the things Jerry Madden told me when I interviewed him for an earlier issue of this magazine (see issue 5) was in those days the project manager could hold the whole spacecraft in his head. He said now that's just impossible. The systems and subsystems are so complicated.

Rothenberg: That was certainly the case for small satellites like the ones Jerry worked on, but you think about Apollo, and then the Sky Lab a little later, and then the Shuttle--I mean those were never systems that one could get your arms around. In fact, there's a big distinction in the role of the project manager on those large human space flight missions and the smaller robotic spacecraft. In human space flight projects, they manage the paper, the specifications, and the interfaces, and the contractors worry about the hardware performance. Large-project managers depend much more on configuration management systems and interface control systems to manage the end-item products. With the smaller robotic spacecraft, it's much more hardware and product oriented.

ASK: Is there a difference in the kind of person you would choose to manage a large project as opposed to a small one?

“I was 24-years old, right out of school, and I was given my own budget, my own set of deliverables, and a team of engineers who worked for me, some of them twice my age.”

ASK Talks with Joseph Rothenberg (cont'd)

Rothenberg: In a large project, the technical skills are important to recognize what's important, but day-to-day technical decisions are made layers below him. The important thing is to be able to communicate to very large teams of people. He's much more working through other people, where the small project manager is often looked to for technical input. Not always, it depends on the individual, but a smaller-project manager can be much more technically oriented.

Todd: Earlier you said the 60s was NASA's first golden age of project management. Are there others?

Rothenberg: Oh, I think the 90s could be called a golden era, and I don't mean that because it was the Dan Goldin era. You think about the 90's. We started out still in the traditional large observatory mode. We went to the Faster, Better, Cheaper mode to try and go back to that time when the project manager could get his arms around the whole thing. The goal was to build smaller spacecraft, and have smaller teams building them. There were lots of opportunities in the 90s to manage projects of that magnitude. The 80's we had a few large projects, and we weren't developing a lot of project managers. In the 90's we went back to smaller spacecrafts and built more of them. So why was that a golden age? To some extent, there were lots of project management opportunities. There was also the ability to learn, and a little bit more tolerance for mistakes than on the very large projects. Although the failure of the two Mars missions right in a row set us back a little bit. I still think the 90's and the Faster, Better, Cheaper concept, or at least the ability to have lots of small spacecrafts, really was a better way to go than putting all our money into a few large observatories. And I think it trained people, it was more fun, and people were able to be more creative.

“Right now there is not a training ground for project managers for the next generation of human space flight programs.”

ASK: If you look at those two eras, the 60s and the 90s, do you find any differences in the project managers themselves?

Rothenberg: Well, people are still people. The big difference to me is in the automated tools today that project managers have at their disposal. Just take email. Years ago communication was slow; it required paper to be circulated. The tools for reproducing things, the analytical tools that people had to use, all of these things were far more labor-intensive years ago, far more cumbersome. Today, we can do more with less people mainly because we've other ways of communicating. Management practices I think are the same, and in fact one of the things we have to re-learn periodically is some of the practices, the discipline, that is, the project management discipline. Take monthly reviews, for instance.

INTERVIEW

ASK Talks with Joseph Rothenberg (cont'd)



Spacewalks like the one shown here were required on the first servicing mission of the Hubble Space Telescope. Joseph Rothenberg is widely recognized in the Aerospace and Space Science community for leading the development and execution of the highly successful first Hubble on-orbit servicing mission.

You want to use them to nurture people, not beat them up. You've got to encourage people to report problems, and deal with them in a constructive way, not a punitive way. These are things we have to re-learn periodically.

ASK Talks with Joseph Rothenberg (cont'd)

ASK: In what way should NASA be focused on developing good project managers?

Rothenberg: Part of it is just the exposure to project management techniques. Some of the centers continue to do a very good job on their own in developing a pipeline of project managers. I'm most familiar with Goddard, and I think they've always done a good job there in grooming the younger people to take on project management responsibilities. The same is true of JPL, I think. In the human space flights, the very large programs, for lots of reasons, we have not developed a large number of people capable of managing those sorts of projects. In fact, if I went out to look for one today to replace somebody like Tommy Holloway, it would be very, very difficult. The choices are limited. I also think that on the human space flight side once we get the Station problems behind us, and I think we will, there will be opportunities to start training the next generation of project managers to manage those projects. Right now there is not a training ground for project managers for the next generation of human space flight programs. Part of it is the fact that we haven't had programs. Another part of it is we haven't been hiring. We don't have a lot of people, and so there's going to be some holes in the pipeline. And I think rebuilding both the technical workforce as well as the project management workforce in human space flight is going to be a real challenge.

“My view, and I've had this view for a long time, is that we must excite the next generation of children in this country to go into science and math, to stir their imagination.”

ASK: What advice do you have for NASA's project managers today?

Rothenberg: Use every opportunity you have to train the people below you with management skills. Don't only have them solving technical problems, but make sure they learn how to recognize costs, to recognize cost trends at the contractor, and to analyze manpower. Give them a set of management skills that allows them to plan something well, to control requirements. Everyone on a project needs to understand that the most important thing is controlling requirements. Typically, you get a set of requirements in place and some technical guy will dream up a better way of doing something. The first question you have to ask is why do I need to make it better, and if you absolutely must make it better, how do you get the funding for it. I can point to a number of missions where they made things better without shoring up the funding. They dipped into the reserves to spend money on new requirements that were unfounded and got themselves into trouble. Somebody who understood the consequences of such things would have asked early on why do I need to make it better.

INTERVIEW

ASK Talks with Joseph Rothenberg (cont'd)

ASK: To your mind, what is the biggest challenge facing NASA as an agency?

Rothenberg: Establishing a vision for the future. We do not have a vision of where NASA is heading. We have a space science program that sort of has a road map. We have an earth science program that has a road map. These are fragmented things. I could take the space transportation work, and I could put it some place else. I could certainly take the space science work and put it under the National Science Foundation. I think we need an integrated vision of what NASA's role is in society. Everybody has a different view. If we went away, would anybody miss us? Certainly it's the role and responsibility of the Administration, of which NASA is a part, to provide a vision that's believable, credible, affordable and relevant. There are some things one can do to excite the nation. My view, and I've had this view for a long time, is that we must excite the next generation of children in this country to go into science and math, to stir their imagination. I think we have an obligation to do this, all of us who are involved with NASA, for the good of the agency and the country.

Conference Report: Masters Forum IV, February '02

by Todd Post

The purpose of the APPL Masters Forum is to bring together some of the best project managers at NASA, as well as those in industry and other government agencies, for 2 1/2 days of knowledge sharing. The project managers come eager to reflect on their project experiences, to learn new things from one another--and to unlearn a few things, too.

“On learning to think like a project manager, Stokely talked about how she had to “unlearn” to think like a scientist.”

This was the fourth Masters Forum, and the first one held outside Washington, DC. Fifty participants from across the country came to Dallas at the American Airlines Conference Center, a wonderful facility that was conveniently located by the airport and yet still seemed isolated from the rest of the world. Masters Forum IV was also the first one held during the winter. Previous Masters Forums have been during the summer. Hot, sticky Washington, D.C. in the summer may sound unpleasant, but frankly the popularity of earlier Forums is what led to this annual event becoming a semiannual one.

Monday, February 11, 2002

On the first night, the keynote presentation was by Judy Stokely, a program manager in the Air Force, who discussed the Advanced Medium Range Air-to-Air Missile (AMRAAM) program; however, the most compelling part of her presentation was about leadership.

For Stokely, leading is more than just motivating, it's empowering people to be leaders themselves. The ones who rise to the challenge in an organization are whom she calls the “change agents,” and she had some advice on how to spot these people and how to nurture them. “You must find them, trust them, and reward them, because your change agents are the most precious resource you have as a project or program manager.”

There were many notable observations in her presentation. For instance, on learning to think like a project manager, Stokely talked about how she had to “unlearn” to think like a scientist.

On the subject of metrics, she advised, “Ask[ing] the people doing the work what you should be measuring. Tell people what you want to achieve and ask them what should you measure.”

And more about her favorite topic, leadership: “Don't toss out the problem and expect the workforce to manage it. Toss out the vision, what we want to achieve, and then let people go off and create it.”

CONFERENCE REPORT

Conference Report: Masters Forum IV, February '02 (cont'd)



With 40 years of experience at NASA, Marty Davis exemplifies the kind of talent there is at the Masters Forums.

At the outset of the Masters Forum, Alex Laufer told the participants that one of the objectives, beyond those mentioned in my first paragraph, is to help participants become more reflective practitioners. Stokely seemed to be the quintessential reflective practitioner, inspiring us to reflect on ways that we can be better leaders on our own projects, and so it seemed fitting that she be the first speaker at this Forum. In the evaluations at the end of the Masters Forum, several people pointed to Stokely's presentation as the high point of the whole thing. Maria Littlefield, a project manager from Kennedy Space Center, remarked, "Judy Stokely was inspirational. She was successful in spite of typical government garbage, which is hopeful and refreshing. I wish I could bottle and distribute her sense of duty for her country."

Conference Report: Masters Forum IV, February '02 (cont'd)

Later in the evening, participants teamed up in small groups to participate in a fun little "learning activity" organized by Craig Lawrence of the Silicon Valley-based design firm IDEO. For those whose day had begun with a flight in another part of the country, it seemed to be just what they needed to inspire a second wind. Groups of small teams were given a deck of cards, a large marble, and a roll of tape in a container, and were instructed to try and launch the marble from as far away as possible so that it landed inside the container. There were several ingenious designs, but then what do you expect at a NASA conference? Joseph Rothenberg, a retired Associate Administrator at NASA and a guest speaker the next night, arrived about the time the teams were ready to go head to head. A good thing he recognized some faces. Otherwise he might have thought he had stumbled into the wrong conference--or a marbles tournament.

Tuesday, February 12, 2002

Among the many virtues of stories, one is how they disentangle contradictions in such a remarkably concise way. Some things may well be black-and-white issues, but in project life these sorts of distinctions do not always exist. Stories typically allow the many hues of gray to show through.

“Howell has thought long and hard about planning—maybe longer and harder than anyone.”

For instance, Ken Schwer's story about the QuikToms mission demonstrates that a story about a catastrophic project failure can also be a success story. Although QuikToms was lost at sea, Schwer understood it was his responsibility as the project manager to prevent his team's heartbreak from destroying all that they'd accomplished before the launch. What he did in the aftermath transcends the loss of the launch vehicle. His presentation opened the conference on Tuesday morning, and his story about the QuikToms mission, "Loss and Recovery," appears in this issue.

We also heard presentations by NASA project managers Dennis Grounds (JSC), Tim Owen (MSFC), Joan Salute (ARC), Jeff Bauer (DRFC), Lynne Cooper (JPL), Julie Pollit (HQ), and Ed Mauldin (ARC). In the evening, Joseph Rothenberg spoke about his career with NASA from being a project manager during the Apollo era to retiring as an Associate Administrator for Space Flight in charge of Human Exploration and Development of Space a few months earlier.

February 13, 2002

The final day of the Masters Forum was over by lunchtime. It was a short day, yes, but it was chock full of excitement. Chuck Duff, Procurement Officer out of Ames Research Center, opened with a presentation on the relationship of pro-

CONFERENCE REPORT

Conference Report: Masters Forum IV, February '02 (cont'd)

curement to project management. Duff flew in the night before just to give this presentation and had to leave immediately after. Believe it or not, he had just had surgery!



Group discussions are some of the most exciting moments at Masters Forums. Here a table of participants are engaged in a small group discussion that will broaden to include all the tables. These discussions follow the presentations by the individual speakers and are perfect examples of why this is truly a knowledge sharing conference.

Watching Duff, I couldn't help but be reminded of a wonderful story I'd heard about Teddy Roosevelt. Having barely survived an assassination attempt, the bullet still in his breast and his suit soaked in blood, Roosevelt told a crowd who had come to hear him speak, "I will give this speech or die!" We have since learned that Chuck is doing well and showing great signs of a full recovery. We were delighted he could make it, but would certainly have understood had he decided to cancel under the circumstances.

Following Duff came Greg Howell. According to most evaluations, this was another of the high points of the Forum. Bob Menrad, a project manager at Goddard, stated, "All the folks were very good, but this one hit the chord the

Conference Report: Masters Forum IV, February '02 (cont'd)

most for me." Don Margolies, also from Goddard, remarked, "Greg Howell's talk was among the highlights of the meeting for me. Thought provoking, radical (in my experience) and screaming out for future considerations."

Howell is an expert on planning, especially as it bears on large construction projects, and that was the subject of his presentation "Lean Project Delivery." Howell has thought long and hard about planning--maybe longer and harder than anyone. He shared with us how his ideas have evolved, and that in itself was fascinating. Like Stokely, Howell is another exemplary reflective practitioner. Here is a man who has spent the better part of his life thinking about why things occur, and what is the most likely way to get a desired result on a project. Howell dazzled the audience with graphs and interactive slides to spice up his Powerpoint. It reminded me very much of listening to a college professor again--one of the good ones--and that image was reinforced afterwards by the number of people surrounding him, unwilling to let him go without bending his ear.

After Howell's presentation there were some remarks by a handful of guests outside of NASA regarding what they'd heard over the past 2 1/2 days and how it compared to project life in their domains. Irv Kieback, a project manager from Proctor and Gamble, put it best: "This was a great experience. It helped me to see how other organizations are dealing with the same problems, and through stories I can go utilize the knowledge."

All that was left then was to lock up the room, head to lunch, and say our farewells. Many seemed to think this was the best Masters Forum yet. Indeed there were a rich variety of presentations and some exceptional discussions by the small and large groups. All I can say is keep up the good work APPL.

Talk with you next time about Master's Forum V at Tysons Corner in August '02.

LOOP

Letters

We received the following email in response to Dr. Owen Gadeken's story "Activation Energy" in our last issue.

The short but to the point article by Dr. Owen Gadeken brought home something I have tried to push for all my life: Team + Work (on the team) = Teamwork. I have gone even as far as saying that there is a new 4-letter word in today's vocabulary: W.O.R.K

The article by Dr. Owen Gadeken begins with this exact problem: Concern for "moving up," rather than working toward the objectives of the project at hand. Another problem that wasn't pointed out has to do with "Leader and leadership." I do not view "being a leader" as "being in charge." Unless everyone accepts that everyone is a leader in some way or another, that everyone must respect each other's leadership capabilities, AND that the profile of everyone involved in a team FITS, there would only be room for "managing projects," or "conflict resolution."

In short, I believe in Teams, Teamwork, and Project Management as long as a conflict prevention plan is in place.

Truly yours,
Miguel A. Prieto
Oakland Park, Florida

.....

And we are always glad to receive emails like the one below.

Hi! I am a Project Manager with Siemens Transportation Systems in Cedar Rapids, IA. I just wanted to write you to say thanks! I absolutely love reading ASK magazine, and I find it to be one of the most interesting reads out there today on Project Management. I often go to back through the older ASK issues looking for new PM techniques, or tools. The short story approach is excellent, as are the lessons learned at the end of each story. I have my comrades here at the office reading it now as well. Thank you and keep up the good work!

Regards, Shawn Aucutt

P.S. It still blows my mind that this is a free resource....

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Thanks to all our readers for their support. We love hearing from you!

ASK Magazine

By practitioners for practitioners

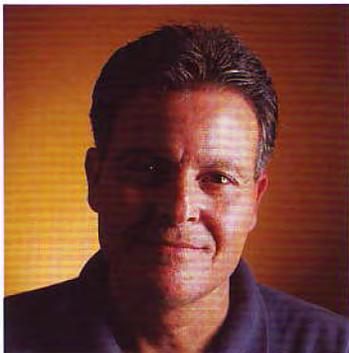
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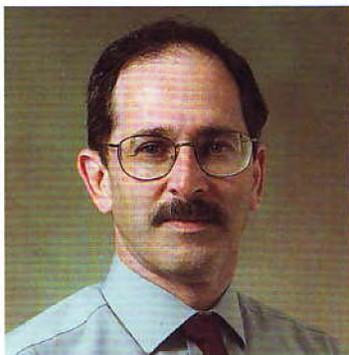
Review Board

**John Brunson (MSFC)**

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 (KSC)**

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

**Dr. Michael Hecht (JPL)**

Michael Hecht has been a member of the Jet Propulsion Laboratory staff since 1982. He is currently Project Manager and a co-investigator for the Mars Environmental Compatibility Assessment project. 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.

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Review Board (cont'd)

Jody Zall Kusek (World Bank)

Jody Hall Kusek is a Senior Evaluation Officer at the World Bank. She is currently involved in supporting the efforts of seven governments to move to a focus of performance-based management. She has spent many years in the area of public sector reform, serving the Vice President of the United States, the U.S. Secretary of the Interior and the U.S. Secretary of Energy in the areas of Strategic Planning and Performance Management



Don Margolies (GSFC)

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



Joan Salute (ARC)

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.



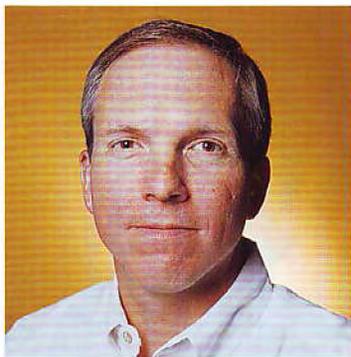
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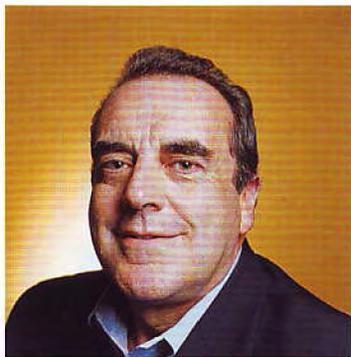
REVIEW BOARD

Review Board (cont'd)



Charlie Stegemoeller (JSC)

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.



Hugh Woodward (PMI)

Hugh Woodward served as the Chairman of the Project Management Institute (PMI) for consecutive terms in 2000 and 2001. He was elected to the Board of Directors in 1996, and before being elected as the Chair, served terms as Vice Chair and in several other key leadership roles. He is a Program Manager for Global Business Services with the Procter & Gamble Company.

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