ASK Magazine

Issue 7 March 2002

By practitioners for practitioners

NASA

"There are no problems
we cannot solve together,
and very few that we can
solve by ourselves."

- Lyndon Baines Johnson

Academy Sharing Knowledge
The NASA source for project management

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Teaming with Possibilities

What makes a successful team? This issue our contributors look closely at the subject and come up with several answers. Working on team chemistry is the "Activation Energy" Dr. Owen Gadeken's story is about. Scott Cameron thinks it's getting to know people one to one. Tony Maturo says it's getting the most out of your support staff. Dr. Michael Hecht finds the best people he can and builds the team around their talents.

Teamwork is a theme we explore often in ASK, but never so directly as in this issue. You'll not only find formulas for building successful teams, you'll see examples of ones in action, strategies for how project managers can motivate their teams, and expert advice on how to choose who to work with and who not to work with.

It seems like all the stories make one common point: everyone on a team counts. Few project managers can pull off a project alone, and when the whole team is performing to everyone's potential, the chances of pulling off a successful project goes up exponentially.

If that doesn't seem like enough by itself, listen to this...

Discerning fans of ASK will note the last two issues our Special Feature was "There are no Mistakes, Only Lessons." We have not abandoned this feature, but for now we want to broaden our repertoire. This issue we add a new Special Feature, "My Metaphor," starting with Paul Espinosa's article "My Big Wall" about his rock climbing adventuress on El Capitan in Yosemite National Park. If you think getting to Mars is work, read what it's like to scale a 3,000-foot rock face.

This issue we're also welcoming two new members to our Review Board, Hugh Woodward and Jody Kusek. Hugh and Jody are our first reviewers from outside NASA, and we are delighted to have them on our team. Read their bios on the ASK Review Board page and see why we feel privileged to have them on our team.

Hope everything is copasetic with you and your team. But if it's not, be sure to take notes on this issue of ASK.

Todd Post

ABOUT THE AUTHOR

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

Sounds like Team Spirit
by Dr. Edward Hoffman

ABOUT THE AUTHOR

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

I recently accompanied my son Dan to one of his guitar lessons. As I sat in a separate room, I focused on the music he was playing and the beautiful, robust sound that comes from a well-played guitar. Later that night, I woke up around 3 am. I tend to have my best thoughts at this hour. The trouble is I usually roll over and fall back asleep. This time I was still awake an hour later, so I got up and jotted some notes down in my study.

I was thinking about the pure, honest sound of a well-played instrument. From there my mind wandered into the realm of high-performance teams and successful projects. (I know this sounds weird, but this is the sort of thing I think about at 3 am. Maybe you have your own weird thoughts around that time.)

Consider a team in relation to music. It seems to me that a crack team can achieve a beautiful, perfect unity in the same way that a band of brilliant musicians can when they're in harmony with one another. With more than a little satisfaction I have to admit, I started to think about the great work performed for you by the Knowledge Sharing team, including this magazine you are reading.

Over the past two years I personally have received some of my greatest pleasures as the APPL Director from the Knowledge Sharing activities - the Masters Forums, NASA Center visits, ASK Magazine. The Knowledge Sharing team expresses such passion for their work, just like great musicians convey their passion in the music they play. In the case of Knowledge Sharing, there are many factors that have made this so enjoyable (and hopefully worthwhile for NASA).

Three ingredients come to mind -- ingredients that have produced a signature sound.

First, through the crazy, passionate playing of Alex Laufer, Michelle Collins, Denise Lee, and Todd Post, I always know that something startling and original is going to come out of their activities. This team has consistently done things that are unique and innovative. For me, best of all is that they are always trying to improve on what they've done before.

Second, success in any endeavor stems from people who know how to interpret a composition to sound beautiful when played in a different style. For Knowledge Sharing to work, it must be adapted, reinterpreted, shaped and played with at the centers. In this regard, we've been blessed with another crazy, passionate, inspired artist named Claire Smith. Claire has turned Ames Research Center in California

FROM THE DIRECTOR'S DESK

Sounds like Team Spirit (cont'd)

into APPL-west. She is so good and committed to what she does that I just refer people to her whenever they have questions about implementing project management development at the field level.

Finally, any great effort requires talented people working behind the scenes, the people who formulate a business approach and know how to manage the money so that the music gets heard. I have known many brilliant and creative people with a ton of ideas that never take off due to an inability to work the business. Again, the Knowledge Sharing team has been fortunate to have competent and passionate people, specifically Tony Maturo and his procurement team at Goddard Space Flight Center, to make sure the process is in place to support the effort. This kind of support is every bit as crucial as the activity itself, and the efforts and creativity that go into successful procurement and contracting is a vital ingredient of this successful team.

When I consider the Knowledge Sharing effort, I hear the sound of great music. You can't tell me there isn't a connection between inspired musicianship and the accomplishments of a great team. Not when I've heard it with my own ears.

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Issue 7 LETTER FROM THE EDITOR-IN-CHIEF

A "Sweet 16" Of Rules About Teamwork
by Dr. Alexander Laufer

ABOUT THE AUTHOR

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

The following "Sweet 16" rules included here derive from a longer paper by APPL Director Dr. Edward Hoffman and myself entitled "99 Rules for Managing Faster, Better, Cheaper Projects." Our sources consisted mainly of "war stories" told by master project managers in my book *Simultaneous Management: Managing Projects in a Dynamic Environment* (AMACOM, The American Management Association, 1996). The Simultaneous Management model was a result of 10 years of intensive research and testing conducted with the active participation of master project managers from leading private organizations such as AT&T, DuPont, Exxon, General Motors, IBM, Motorola and Procter & Gamble.

In a more recent study, led by Dr. Hoffman, we learned that master project managers in leading public organizations employ most of these rules as well. Both studies, in private and public organizations, found that a dynamic environment calls for dynamic management, and that is especially clear in how successful project managers think about their teams.

1. Two parties (and certainly more than two) of a speedy project launched with incomplete information will find it impossible to sustain an ongoing relationship based on a fixed agreement that was made between them at the beginning of the project. A more flexible mechanism, based on teamwork and collaboration, is needed to handle the unexpected changes that are bound to arise. Therefore, contracting should emphasize cooperation rather than risk allocation.

2. Project success depends on successful teamwork. Establishing a multifunctional group with team spirit facilitates both communication and coordination, and it promotes strong loyalty to the project. Such a team can make quality decisions that represent all disciplines.

3. No real teamwork can take place in an organization that maintains the traditional division of labor, because R&D, marketing, engineering and production people are loyal primarily to their respective disciplines, departments and managers. Therefore, breaking down the organization's functional walls is the minimum essential condition for teamwork.

4. Assign people for the duration of the project. Team member continuity is vital for better accountability and commitment. Since team knowledge lies in the shared viewpoints and experience that team members develop over an extended period, greater continuity means better decision-making and faster projects.

LETTER FROM THE EDITOR-IN-CHIEF

A "Sweet 16" Of Rules About Teamwork (cont'd)

5. Master project managers pay great attention to the size of their project team. They create the smallest team possible that includes all the necessary skills.

6. A project team should first concentrate on getting to know one another and then on deciding on how best to function as a team. Sharing clear expectations, appreciating cultural differences between organizations, and understanding the different reward systems of these organizations will reduce the time it takes to form a finely tuned, effective team.

7. Trusting relationships are conducive to full and open exchange of information within the team. In contrast, when project parties distrust each other, they withhold relevant information and distort intentions, thus adding uncertainty to the project. Trust reduces the cost of planning and monitoring transactions between organizations.

8. Once you stereotype a team member, prejudice shapes what you see and how you act. Thus, initial opinions of the individuals entering the project are important in shaping its final outcome. These initial opinions can force the project into a spiral of increasing or decreasing trust. Therefore, if possible, don't select team members who start the project distrusting you. Build trust incrementally by making statements of intent, which express your desire to trust the other party, followed by actions that support and comply with these statements.

9. You should make sure that members of your team feel dependent upon each other, and share a belief that they are mutually responsible for project results. A group of people who don't feel dependent upon each other is a committee, not a team.

10. You can't manufacture extraordinary team performance merely by designing the right structure, selecting the right people, providing the right vision and rewards, and facilitating the right work processes. All these are very helpful, but to achieve peak team performance you must develop rich, intimate, and emotional relationships among skilled people who trust one another and who enjoy spending time with one other.

11. Dedicated teamwork does not require the ultimate sublimation of the individual. On the contrary, as a leader you should empower team members to be constantly at their peak by giving them the necessary discretion and autonomy to make things happen.

A "Sweet 16" Of Rules About Teamwork (cont'd)

12. Having members with diverse professional orientations and different organizational interests and cultures can have only negative implications, and this is the reason why projects and conflicts are always bound to be synonymous. True? No! Definitely false. In a collaborative environment these differences may provide the crucial positive edge that leads to innovative solutions.

13. Don't ignore space and neighborhood management. Teams must spend a lot of time together, especially at the beginning. The chances are considerably better that geographic proximity allows people to come to appreciate and even like one another. Also, in co-located teams many informal face-to-face interactions occur daily. This frequent face-to-face communication clarifies understanding and accelerates speed.

14. Don't overlook the intangibles, such as team culture, language, and ritual. They help create team identity, establish a sense of order, build team spirit, release tension, and cope with time pressure and uncertainty.

15. If you are having fun, you aren't working, right? No -- that's absolutely wrong! Look for the many natural opportunities to celebrate team accomplishments and hard effort. Use these events to give team members the high visibility and special recognition they have earned. In successful teams, fun both sustains and is sustained by team achievements.

16. To sustain performance, teamwork requires constant massaging. Therefore, throughout the project life cycle, master project managers ensure alignment on project objectives, assess team functioning, and renew team energy.

Read all of the "99 Rules for Managing Faster, Better, Cheaper Projects" at http://216.141.196.2/NASA/Laufer/99Rules.htm

STORIES

Activation Energy
by Dr. Owen Gadeken

Teaming is so common in today's project management environment that most of us assume it comes naturally. We further assume that when presented with meaningful and challenging work, project teams will naturally engage in productive activity to complete their tasks. This assumption is expressed in the simple (but false) equation: Team + Work = Teamwork.

Although this equation appears simple and straightforward, it is far from true for most project organizations whose reality is a complex web of institutional norms based on individual achievement and rewards. This is illustrated by the very first successful team experience from my early Air Force career. As a young lieutenant, I was sent to Squadron Officer School, which was the first in the series of Air Force professional military education courses I was required to complete during my career. We were immediately formed into teams of twelve officers. Much of the course featured competition between these teams.

As the most junior member of my team, I quickly observed the tremendous pressure to show individual leadership capability. At one point early in the course, almost everyone in our group was vying to become the team leader. This conflict was so intense that it caused us to fail miserably in our first outdoor team building exercise. We spent so much time fighting over leadership that we were unable to complete any of the events on the outdoor obstacle course. This complete lack of success was so disheartening to me that I gave our team little hope for future success.

What followed was a very intense period of bickering, conflict, and even shouting matches as our dysfunctional team tried to cope with our early failures and find some way to succeed. Slowly some real leadership emerged from the more senior members who were also experienced pilots, and an informal sense of teamwork and organization took shape. When we began to have some success in team competitions, the momentum grew. As evidence of our total turn-around, we successfully completed all events on our second try at the outdoor obstacles near the end of our course. Our team even won the chief of staff trophy as the best overall (academic and athletic) team in the course. The most surprising part of this turn-around was that it emerged from almost complete frustration as we slowly and even painfully worked through our conflict to develop a sense of teamwork. Most of the other student teams in our course also performed poorly on their initial team activities but did not improve as significantly as the course went on.

British physician and researcher Wilfred Bion (*Experiences in Groups*, 1961) discovered that there are powerful psychological forces inherent in all groups that

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Dr. Owen Gadeken Gadeken is a Professor of Engineering Management at the Defense Systems Management College (DSMC) where he teaching Department of Defense program and project managers. He recently retired as a Colonel in the Air Force Reserve where he was senior reservist at the Air Force Office of Scientific Research. Owen is a member of the Advisory Board of the NASA Academy of Program and Project Leadership and a frequent speaker at project management conferences and symposia.

Activation Energy (cont'd)

> "We spent so much time fighting over leadership that we were unable to complete any of the events on the outdoor obstacle course. "

divert them from accomplishing their primary tasks. Examples of these forces are over dependency on the leader, splintering off into subgroups or cliques, and fight or flight (engaging in or fleeing from intragroup conflict). Simply stated, most teams are dysfunctional by nature. To overcome these restraining forces and use the potential power of the team, greater emphasis must be placed on establishing and maintaining group cohesiveness. This relationship is expressed in the revised (true) mathematical equation: Team + Work (on the Team) = Teamwork.
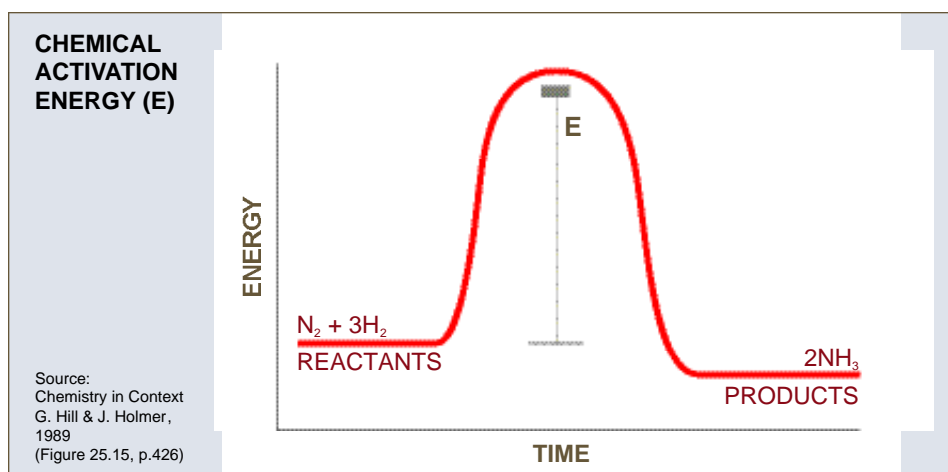

CHEMICAL ACTIVATION ENERGY (E)

Source:
Chemistry in Context
G. Hill & J. Holmer, 1989
(Figure 25.15, p.426)

$N_2 + 3H_2$
REACTANTS
E
$2NH_3$
PRODUCTS
ENERGY
TIME

Figure 1.

This "work on the team" is akin to a concept in chemistry called "activation energy." Activation energy is particularly significant to me since I remember it was the one concept I missed on a college chemistry final exam. So this time I want to get it right. Most chemical reactions (see Figure 1) require infusion of energy to drive the reactants to form new products. We can be thankful for this or our environment would be much more unstable with many spontaneous reactions occurring.

> "Simply stated, most teams are dysfunctional by nature. "

Using this analogy, we can then superimpose the classic stages of team building on this same graph (see Figure 2). Forming is the entry level with storming* and norming* using a much higher level of non task-oriented energy. Most teams spend much of their time storming in what Wilfred Bion identified as the natural restraining forces present in all groups. To overcome these natural restraining forces and move over the "hump" to high performance, team "activation energy" is required.

As my Air Force Squadron Officer School team confronted our conflicts openly, we actually got much worse before we got better. This proves to be a hallmark of

STORIES: DR. OWEN GADEKEN

Activation Energy (cont'd)

high performing teams: openly confronting their conflicts rather than smoothing them over or concealing them as hidden agendas. Teams unwilling or unable to devote the energy to working through their conflicts will remain on the storming and norming "roller coaster" with most of their energy dissipated in nonproductive activity. My Air Force Squadron Officer School team was able to move over this hump but only through some very intense storming.

To be successful, project teams must work as hard on their team as they do on their projects. Only then will they have the "activation energy" to reach and sustain high performance.
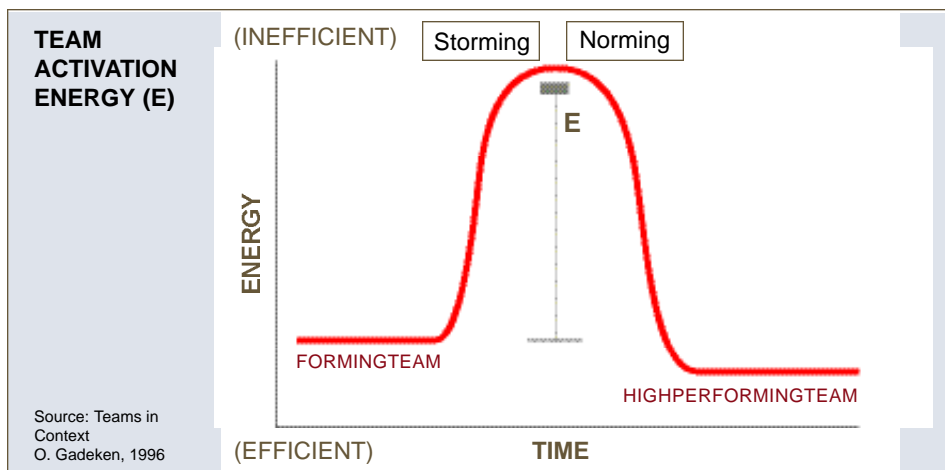

TEAM ACTIVATION ENERGY (E)

(INEFFICIENT) · Storming · Norming · E · ENERGY · FORMINGTEAM · HIGHPERFORMINGTEAM · (EFFICIENT) · TIME

Source: Teams in Context
O. Gadeken, 1996

Figure 2.

Question

Do you have your own example of how team "activation energy" worked for (or against) you?

Lessons:
- To be successful, project team members must work as hard on the team (relationships and processes) as they do on their project.
- Openly confronting conflicts (rather than smoothing them over or concealing them as hidden agendas) is a hallmark of high performing project teams.

* **Storming**. This stage of team development is often marked with interpersonal conflict. Members may form alliances resulting in subgroup competition and conflict, and questions may arise about both the task and process of the team.

* **Norming**. In this stage of team development, the team establishes guidelines for their group processes, and commitment develops for achieving team goals.

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ABOUT THE AUTHOR

Anthony J. Maturo is the deputy director of NASA's Academy of Program & Project Leadership. He is responsible for the management of contract arrangements and day-to-day operations. In addition, he has a beautiful wife named Nan.

How I Love My *80 Percenters*
by Anthony J. Maturo

Don't ever take your support staff for granted. By support staff, I mean the people in personnel, logistics, and finance; the ones who can make things happen with a phone call or a signature, or by the same token frustrate you to no end by their inaction; these are people you must depend on.

I've spent a lot of time thinking about how to cultivate relationships with my support staff that work to the advantage of both of us. The most important thing that I have learned working with people, any people--and I will tell you how I learned this in a minute--is there are some folks you just can't motivate, so forget it, don't try; others you certainly can with a little psychology and some effort; and the best of the bunch, what I call the *80 percenters*, you don't need to motivate because they're already on the team and performing beautifully.

The ones you can't change are rocks. Face up to it, and just kick them out of your way. I have a reputation with the people who don't want to perform or be part of the team. They don't come near me. If someone's a rock, I pick up on it right away, and I will walk around him or her to find someone better.

The ones who can be motivated I take time to nurture. I consider them my projects. A lot of times these wannabes are people who want to help but don't know how. Listen, you can work with them. Lots of people in organizations have the mindset that all that matters are the regulations. God forbid if you ever work outside those regulations. They've got one foot on that regulation and they're holding it tight like a baby holds a blanket.

What you're looking for is that first sign that their minds are opening. Usually you hear it in their vocabulary. What used to sound like "We can't do that...the regulations won't allow it...we have never done this before," well, suddenly that changes to "We have options...let's take a look at the options...let me research this and get back to you."

The *80 percenters* you want to nurture too, but they're already on the team. The *80 percenters* know the regulation, but if there is a problem because of a regulation, they will still tell you, "Don't worry about it, I've got it under control." These people don't see themselves as guardians of the regulations. Instead, they see themselves as customer service representatives. Two *80 percenters* on my team are Hettie Courtney at Goddard Space Flight Center and Debbie Randall at NASA Headquarters in Code B. Thank you, ladies, very much. You are the best.

How I Love My *80 Percenters* (cont'd)

Back to Basics

I said I would talk about how I learned to work with support people. My greatest education came before I was at NASA in what may seem the unlikeliest of places. While I was an elementary school principal in Fairfield, Connecticut, I learned that my best ideas could never be implemented unless I had my support people at the school behind me. These were people like the janitors, the cafeteria workers, the school nurse, the librarians, the bus drivers. For example, if I wanted the kids to be proud of the school and take care of it, the rooms had to be kept tidy and neat. If Sam the janitor didn't line the chairs up, what did that tell the kids about how the adults felt about the school?

Here's another example. I wanted everyone who worked for me to respect each other, so I instituted a "switch day" twice a year. I would be the third grade teacher for a day, and she would be principal. The school nurse would teach gym, and the librarian would work as the cafeteria monitor. Everybody got a chance to experience a day at the school from someone else's perspective. The point was to show that we were all working as a team and that everybody was contributing.

What kind of rewards did this yield? I remember going into the cafeteria one time and seeing a group of first graders spilling milk all over themselves. You ever open up one of those milk cartons kids are expected to drink out of? Well, you should try one day, because it's not easy.

I wanted the kids to have a good lunch period. I didn't want them spilling their milk all over themselves. I wanted them to be comfortable, so that when they got back to their classrooms they could settle down, they weren't frustrated, and it wasn't a burden on the teachers. This meant I had to ask the teachers on duty in the cafeteria and the cafeteria workers to help the kids open their milk cartons. The teachers didn't want to pay for this later with disturbances in their classrooms because the kids were frustrated. Someone was going to have to clean up the mess, and that was going to be those cafeteria workers. People could see that what affected one person spilled over (pun intended) into other people's work.

When you ask people to do more than what's narrowly defined by their positions, you have to be willing to show you too will step outside the box. Sometimes when it was real cold outside I would tell the teacher to go inside and I would stay out on the playground to watch the kids. They knew I was doing them a favor because their contract stated that they had to be out there with the kids. Doing things like this made it possible to get the same kind of help in

> "The ones who can be motivated I take time to nurture. I consider them my projects."

How I Love My _80 Percenters_ (cont'd)

> "When you ask people to do more than what's narrowly defined by their positions, you have to be willing to show you too will step outside the box. "

Astronauts stand out from the rest of the team, but no one would get off the ground without the hard work of the unsung _80 Percenters._

return. For example, I wanted the teachers to come out and meet the students when they got off their busses in the morning, especially in the cold when there was ice on the ground. The kids could slip as they got off the bus. I knew the teachers preferred to be in their classrooms, or in the teacher's lounge, smoking and drinking coffee. I could have bullied them, but I believe nurturing people is a better way to get them to move to where you want to go. I kidded around with them. I bought them little boots to wear. They saw me out there too.

STORIES: ANTHONY J. MATURO

How I Love My *80 Percenters* (cont'd)

By and large, what I found is that if you start nurturing people, if you respect them and try to understand them, they will try to understand you too, and everyone starts playing as a team.

My 80 Percenters, And How They Work For Me
It's always tough when a person I've nurtured and has become an 80 percenter has to leave. I had this happen recently with a gal in Procurement. At the start she was a wannabe, and I worked hard with her. To come that far, I hated to lose her. She left to take care of her sister who had cancer. What can you say? A person's got to do what she has to do. I could gnash my teeth and get all frustrated, but that doesn't solve my problem of filling that void.

The person we brought in to replace her I've been working with for a few months now, and she's coming up to speed. It's a great feeling I get when I know the change has occurred, like the first time I ask them to bend around the requirement, and I don't hear any objection to this.

You know that people are on the team when you hear them say, "Hey, do you mind if I take a cut at this first?" When they come to me and say, "Hey, Tony, did you ever think of doing it this way?" At that point I know they're on the team. When I start hearing that, the commitment, the passion, the understanding, it's there and they're motivated.

When you've worked with enough people as I have, you have a cadre of experienced *80 percenters* around to help out when newcomers arrive. "Look, this is how you deal with Tony," they told my girl in Procurement. "Yeah, he's a pain in the butt, but this is what he needs, and this is why he's got a lot of pressure on him." Now it's not just me anymore doing the nurturing. It's just like when I was a school principal. You want the team to see all our work as interdependent and that helping each other is as important as helping me. The more staff you have who see it this way, the easier your job becomes in bringing people along.

It's The Nurturing, Stupid
It's not enough just to work with them, and then leave them alone. You can do that, but if you really want to put a crack team in place you must continue to nurture them. The way you do this is by recognition.

Whenever I can, I try to show I appreciate their contributions. For instance, I have some young ladies who handle my invoices. Right before their evaluations

> "No one works harder than he who is proud of his job, and people who are recognized for a job well done can't help but feel proud."

How I Love My *80 Percenters* (cont'd)

come up, I will talk with their managers and tell them what a great job they are doing for me. I bring Ed Hoffman, the APPL Director, to visit them when he stops by. "You know who this young lady is?" I say to him. "She's the one who takes care of all of our invoices. She's done a hell of a job. Tell them how many you missed." "I didn't miss any," she says. "See that, Dr. Hoffman. This is the kind of person you have working for you." I make sure that he understands the people he rarely notices are contributing to the success of his program.

You want people to feel like they are part of a team, and understand that their contributions to the team matter. Respect the people you expect things out of and you are much more likely to get more than you bargained for from them. No one works harder than he who is proud of his job, and people who are recognized for a job well done can't help but feel proud. It's what we've learned works in motivating kids at school, and it works with adults in their jobs.

Support staff is the backbone to project work. Project managers who see their contributions and recognize them are improving the whole team's chances of success.

Question

Do you remember an experience where having a good relationship with a person in a support position made a significant difference on a project?

Lessons:

- Figure out the people you need to nurture. A few people are not worth the effort, but most definitely are, and you can save yourself a lot of time and aggravation if you determine early on who can be motivated.

- It pays to nurture people and help them understand their importance to the overall value of the team.

- Respect people and you are much more likely to get more than you bargained for from them.

- Don't disregard lessons in life from previous experiences. What you learned in these different situations may be transferable to your current work.

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Keeping the Deal
by Dr. Michael Hecht

On the 4th of July 1997, I lay on a blanket with my family at a fireworks display near our home in Los Angeles, California. The pyrotechnics, they tell me, were dazzling. I wouldn't know. My attention was fixed on a tiny orange dot in the sky - Mars.

A month earlier, NASA had released an Announcement of Opportunity for a supplementary payload on the Mars Surveyor Lander mission scheduled for launch in 2001. The Human Exploration and Development of Space (HEDS) organization had been authorized to make the most preliminary of investigations into the feasibility of sending humans to Mars. Among the requested investigations was an opportunity to study the dust and soil of the Red Planet, emphasizing possible hazards to human explorers. I spent that summer of '97 working on a proposal for the project I would eventually lead, the Mars Environmental Compatibility Assessment (MECA). MECA was selected in February of '98. We promised to deliver four new instruments by April 2000 with a modest budget of $5M. I suppose we were too inexperienced to know any better.

Assembling the team

This is a story about some of the people who created MECA. Like the Superbowl champion New England Patriots, the MECA team was built from castoffs, organizational misfits, and a few superstars that had been overlooked in the draft.

The 5-7 core members were mostly "technologists," the nomenclature we use at the NASA Jet Propulsion Laboratory (JPL) for R&D scientists in non-space disciplines. We were generalists, not specialized engineers, and we had little or no flight experience. We were creative, but not very good at following instructions. But this was a good time for innovators and problem solvers. JPL was rolling out "faster-better-cheaper" projects, replacing one-a-decade mega-missions with a flotilla of micro-missions, and implementing our own brand of corporate re-engineering.

Veterans of the great observatories, of Cassini, Galileo, and Magellan, were in many ways no better prepared than we were for this new way of doing business. We took the most motivated people we could find and built an organizational chart around them. I pushed people out of their professional comfort zones, encouraging them to grow in other areas. As the technology expert, I presented budgets and schedules at our reviews, while the schedule and budget expert reported on technical progress. I aimed to have at least two people capable of doing every job.

ABOUT THE AUTHOR

Dr. Michael Hecht is project manager and a co-investigator for the Mars Environmental Compatibility Assessment (MECA). He has been with NASA since 1982 at the Jet Propulsion Laboratory (JPL). In his previous assignment with NASA's New Millennium Program, he was instrumental in defining the "microlander" that was adopted as NASA's New Millennium Program Deep Space 2. Dr. Hecht is a member of the ASK Review Board.

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Keeping the Deal (cont'd)

> " We took the most motivated people we could find and built an organizational chart around them. "

I secured a large room adjacent to a laboratory, setting up desks along the walls and a small conference table in the middle. No walls, no dividers. I didn't force people to give up their offices, but I did move everybody's computer to his or her new desk. It was remarkable how fast they followed! We were constantly together, each of us listening with half an ear to every meeting, conversation, and phone call. There was no such thing as privacy, but we were enormously efficient. We didn't need staff meetings to know what was going on, and few potential mistakes or opportunities went unnoticed. We spent two years in close company, and developed an intimacy that got us through hard times.

While many engineers can competently design and build instruments, I felt that our unique challenge was to find the 100 gremlins waiting to trip us up. Finding a mistake was a good thing, it meant one less gremlin to worry about. And notwithstanding JPL's institutional fervor for process-based management and thorough review, that last gremlin can only be found by a particularly dedicated individual waking up in alarm in the middle of the night. My job as Project Manger was to cultivate that attitude of ownership.

You Gotta Have Heart (and Soccer)

I thought I knew all about Mitch Shellman until his funeral. That's when I learned about the fellow who, late in the Vietnam War, dropped out of the Green Berets and joined the medics because that was the only available avenue to the front lines. About the veteran who clawed his way up from custodian to contract negotiator. About the quotes from Mother Teresa peppering his logbooks. About his passionate commitment to youth soccer.

Mitch never doubted that, despite his lack of technical education, he would someday be a Project Manager. I signed him on because he was willing to do whatever it took, and because he had somehow learned an enormous amount about building and managing flight instruments. To the institution, he was a contract negotiator from procurement. To me, he was Instrument Manager, Deputy Project Manager, and friend. Tenacious and tireless, he turned on the lights in the morning and was the last to leave at night. It took us a year of argument with management about his credentials before he was transferred to a technical division. A week later, the day after Christmas, he died of a heart attack in his driveway. The toughest thing I ever had to do as a Project Manager was to come in on January 2 and say to the rest of the team, "Let's get back to work."

STORIES: DR. MICHAEL HECHT

Keeping the Deal (cont'd)
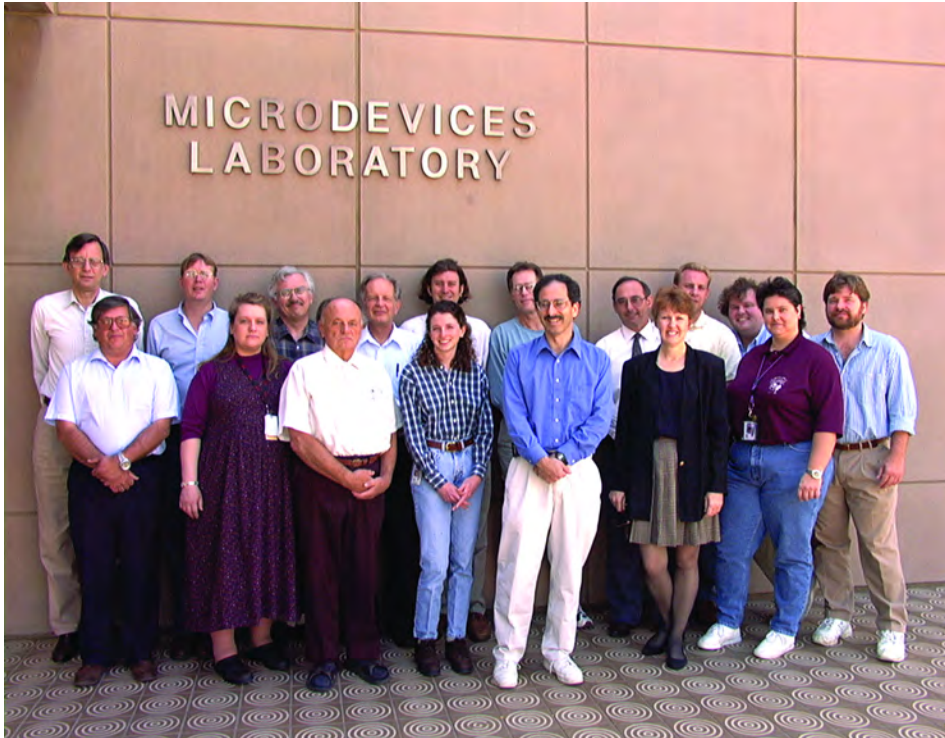
The MECA team pictured here at their home base, NASA's Jet Propulsion Laboratory in Pasadena, California.

The Wit and Wisdom of Tom Meloy

Twenty years ago a doctor gave Tom Meloy six months to live. That doctor is no longer with us but Tom, well into his eighth decade, shows no sign of slowing down. An expert in the physics of particles (the gritty variety, not the subatomic ones), Tom had last worked for NASA in the Apollo era and was now comfortably ensconced in an endowed chair at West Virginia University. When I asked him to be the MECA Principal Investigator (P.I.), Tom's response was "You don't want me, I'm an emotional cripple." His wife of 50 years had died 3 months before. But I convinced him of the therapeutic value of the new challenge, and neither of us ever regretted it.

Unlike other P.I.'s, Tom was not the project architect, the autocratic decision-maker, or even the scientific guru of MECA. He was, quite simply, our mentor and our inspiration. No person or task was of lesser importance to him than any other. Every visit to JPL began with his asking me "whom should I take to din-

Keeping the Deal (cont'd)

ner?" And whoever it was, sponsor or secretary, technician or engineer, would come in the next day with renewed motivation and appreciation of their role in our unusual project.

Tom never forgot that, to the rest of the world, ours was the most extraordinary of opportunities. At our first meeting he reminded us that we had "an opportunity to place a tile in the corridor of history." He coached me on how to manage when your project is "long on prestige but short on cash." He taught me that, on a small team, everybody needs someone who can step into their shoes at a moment's notice. He taught me to be parsimonious with the written word, to banish adjectives, to never say "very," and to avoid starting sentences with "the." Tom always said, "Managing is parenting." He was, I'm sure, one hell of a parent.

Keeping the Deal

My first presentation as a project manager featured a slide that said, "Keep the Deal." By this I meant not just the deal with our sponsors, but with our team, our contractors, our management, and ultimately with the American people.

> "I made a point to find contractors who were big enough to do the job but small enough to care about us."

MECA depended on subcontractors to make several of our instruments. I made a point to find contractors who were big enough to do the job but small enough to care about us. It was my objective to treat these contractors much the same as we treat our in-house technical organizations, and vice versa. I tried to react even-handedly to overruns, schedule slips, and product failures, and to be equally willing to help them out when they were in trouble. I encouraged them to tell me about problems, concerns, and innovative ideas. I remembered to ask the contractors regularly how they were making out - were they making money or losing money on the contract? I tried to find other ways to help them out, by writing articles for their trade journals or helping them with proposals. As a rule, the MECA contractors outperformed their in-house counterparts, and we formed personal relationships that have outlasted the project.

Part of the deal was encouraging our team members to enjoy their lives outside of the Laboratory. I encouraged people to make working late the exception, not the rule, and to take their two weeks of vacation every year. A Project Manager who can't accommodate the 4% schedule margin those vacations represent just hasn't planned very well.

I made a point to set a personal example, not to try to prove that I could work

STORIES: DR. MICHAEL HECHT

Keeping the Deal (cont'd)

longer hours than anyone else. I made sure that nobody was so indispensable that we couldn't do without him or her. At JPL's suggestion, we declared (and enforced) "meeting-free" weeks during prime vacation time. We remembered to knock off early for the occasional beer, to go off for lunch, or to turn a long discussion into a walk in the woods.

Did it work? Only partially. MECA was under-funded and over-ambitious, and people will do what's necessary. Two team members filled up their "non-working" time with grueling degree programs. But five babies were born into our small project, so folks must have spent some time at home!

Loss and Legacy

Lynne Cooper, who rescued us in mid-project by replacing Mitch Shellman, taught me about legacy. Legacy is not, as I had imagined, just about hardware and software delivered and documented. It is equally about skills learned, methods evaluated, students inspired, and people trained and educated.

Nearly three years of our lives felt swept away when our mission was scrubbed after the loss of Mars Polar Lander. My grief for the loss of MECA, in a smaller way, lives in the same place as my grief for the loss of my friend Mitch. Thinking of either can bring a momentary, crushing sense of weariness. It can also bring an upwelling of pride. This isn't, after all, a story about a failure. We kept our deal and left our legacy.

Lessons:

- Build your organization chart and your team norms around the talents and personalities of your staff.

- Gently broaden perspectives and build a sense of ownership by assigning responsibilities outside people's comfort zones.

- Establish an understudy at every position, including your own, to allow for vacations, illness, or reassignment.

Question

What does it take for an entire organization to 'keep the deal'?

ABOUT THE AUTHOR

Tony E. Schoenfelder has been with NASA for 21 years and is currently on detail with the Office of Space Science. Prior to this, he served at both Reston and NASA Headquarters where he performed independent management-level assessments, worked in resource management, and developed and presented program analysis training materials for the Space Station Program. With the exception of a four-year hiatus in the mid 90s, he has worked on the Space Station Program since January of 1984.

The Idyllic Workplace
by Tony E. Schoenfelder

How many of us have worked in organizations where the discipline was so rigid and unyielding that it would send even a Marine Corps Drill Instructor screaming into the night? How many of us have worked in organizations where sightings of senior management were sporadic and rare, and any other interactions were by appointment only? Or, how many of us have worked in organizations where your role, absent specific direction, was to be seldom seen and rarely heard? And how many of us have worked in organizations where seemingly light itself was not permitted to escape without the acquiescence and approval of the director? Sadly, there are organizations that embody some of these conditions, and the resultant adverse effects on employee productivity, creativity and morale are profound.

But what if you could work in an organization in which there was little hierarchy, where rank and seniority played no part, where there were no closed meetings or doors, where everyone knows what was expected of them, and where creativity was not only tolerated but encouraged and celebrated? Was there ever such a place? There was, and it was known as NASA's Space Station Task Force. I was fortunate enough to work there for a time, and I would like to tell you how this organization with few apparent rules led to incredibly high levels of employee satisfaction and fulfillment, and yielded work products of enduring quality.

On May 20, 1982, NASA Administrator James M. Beggs established the Space Station Task Force under the direction of John D. Hodge. The Task Force was charged with the responsibility for "the development of the programmatic aspects of a Space Station as they evolve, including mission analysis, requirements definition and program management," and was authorized to draw on Space Station activities at the NASA Program Offices and Field Centers. No additional conditions or directions were provided.

Hodge knew that in order to accomplish the job he had been given, he was going to have to obtain the services of the "best and the brightest" and facilitate the unleashing of the full force of their creative capabilities. In order to avoid the stultifying effects of a typical hierarchical organization, he set up a loosely structured, horizontal organization with only one supervisor of record - himself. He populated this organization with detailees from Headquarters, the field Centers and the Jet Propulsion Lab, thereby assuring himself of the political and technical expertise with which to deal with Congress and the bureaucracy, and conduct the required engineering studies and analyses. The decision to use detailees was an important one, as it enabled the best talent available to sign on to the Task Force for up to a year while still retaining rights to their permanent positions.

The Idyllic Workplace (cont'd)

An early model (circa 1961) of an inflatable space station concept, 24 feet in diameter with an internal fabric bulkhead that could be separately pressurized in an emergency.

There were so many tasks and so few people to accomplish them that almost everyone was in charge of something. Members had multiple assignments, served in several different working groups, and in general knew what everyone else was doing. The absence of any kind of organizational turf to defend allowed the members to participate fully with one another toward achieving a common goal, thus engendering a strong sense of ownership in the program. This unity of purpose led to spontaneous offers of assistance to colleagues who were wrestling with particularly difficult problems. It was almost as if the entire Task Force turned out on snowy days to help each other dig out their vehicles. Grade levels or seniority were ignored when pulling together teams to address particular issues. A GS-14 could lead a team comprising any and all grades, including Senior Executive Services (SES). This unselfishness led to the existence of an esprit de corps whereby the vast majority of the members truly cared more about getting the job done than who received the credit.

> "If Hodge had lived in ancient Greece, he would have been one of Aristotle's peripatetics."

Hodge combined a number of practices and innovations that led to a unique and uninhibited atmosphere. Each day started at 8:15 AM with an unstructured 15-minute all-hands stand-up meeting. Only those who had something important to say took the floor, while everyone else crowded into the office or hallway to listen. It turned out to be a useful device in that it not only conveyed information, but also physically reunited the team each morning to reinforce the spirit of camaraderie and the sense of shared purpose.

If Hodge had lived in ancient Greece, he would have been one of Aristotle's peripatetics. He practiced "management by walking around," and was liable to pop up unannounced anywhere at anytime, but more often after five o'clock in the evening. Once the members learned that he was not engaged in some new form of "gotcha," these impromptu one-on-one sessions proved very useful. He not only got to know each member as a person, but also received an unfiltered heads-up as to what was going on.

Hodge didn't believe in secrets. He was completely open with the staff. What he knew, they knew. Members appreciated this unusual candor and reciprocated by keeping him and the leadership well informed. This policy of openness extended to meetings as well. If notice of a meeting appeared on a calendar, it was open to anyone to attend. The exchange of information far outweighed any potential abuse of the privilege, and besides, no one had enough time to become a professional meeting-goer. Hodge also had a unique open-door policy whereby anyone was free to visit with him and discuss any matter of importance. Members were encouraged to take advantage of this opportunity by Hodge's own mantra of, "Forgiveness, not permission." Needless to say, rumors didn't stand a chance in this environment of openness.

Within the Task Force, there was no such thing as a dumb idea. Members were encouraged to speak up without fear of laughter or reprisal, and as soon as everyone learned that even far out ideas or concepts would be given just and due consideration, brainstorming sessions became very productive.

Just as important as the uninhibited atmosphere was the manner in which the creative capabilities of the members were unleashed. With so many things to do, the needs of the Task Force soon outstripped the formal skill mixes of the employees then onboard. Hodge recognized that NASA employees tend to become typecast early in their careers, so he gave them the opportunity to work on things entirely new to their experience. A number of people subsequently

STORIES: TONY E. SCHOENFELDER

The Idyllic Workplace (cont'd)

embarked on entirely new careers as a result. Members were encouraged to take risks, and were assured that failure was an absolutely acceptable consequence. One remarkable innovation that encouraged risk-taking and the demonstration of flexibility and heretofore unknown talents was "Try-A-Job." New members had the opportunity to work in any or all functions for up to thirty days before having to commit to a single job. This led to an almost unheard of degree of job satisfaction, with a concomitant impact on results and productivity.

Hodge also practiced a unique form of participative management. He believed that by allowing the members to participate in decisions that directly impacted their jobs, they would tend to support what they helped create. The decision process that resulted could best be described as collegial, although decisions were made by the Director rather than collectively by the members. However, these decisions were preceded by lively and often boisterous debates wherein members could argue their viewpoints, pro or con, without fear of retribution. Hodge retained ultimate control of the process, but the decisions that resulted were "owned" by those who agreed with them and at least understood by those who didn't. There were no "secret" decisions.

> "Members were encouraged to take risks, and were assured that failure was an absolutely acceptable consequence."

With such an open, informal and unstructured organization of such disparate talents, there had to be some unifying force to focus the members' energies. It turned out that they all shared the dream or vision of a permanently manned presence in space. Everything they did was geared toward realizing that goal, and the unique opportunities offered by the Task Force served as very powerful motivators.

The Space Station Task Force accomplished many things during its two-year life, the most important of which led to the announcement during the State of the Union Address on January 25, 1984: "Tonight, I am directing NASA to develop a permanently manned Space Station and to do it within a decade." But the most enduring legacy of the Task Force may lie within the hearts and memories of those who served as members. It is simply that almost everyone remembers that time as the most enjoyable and productive of his or her career.

Lessons:

• A leader understands that when confronted with a challenging task the most important factor is selecting the best people from across the organization.

The Idyllic Workplace (cont'd)

Question

Assuming you were part of a team where the chemistry was terrific and everyone felt like he or she was contributing, what was the catalyst?

- A culture of freedom and trust coupled with excellent people committed to one objective enable you to achieve both the openness required for innovation and the discipline necessary for rapid progress.

SPECIAL FEATURE: MY METAPHOR

My Big Wall
by Paul Espinosa

"Rain! Rain! Why today?" I cursed to myself.

It was June and I was in Yosemite National Park in California, 2,000-feet off the ground . I was climbing El Capitan, a majestic 3,000-foot high, mile-wide granite monolith--one of the most sought after and spectacular rock climbs in the world. After three days of climbing on its sheer face, and having completed the most difficult part of the route, my partner and I were heading down. A thunderstorm lasting all night and into the morning had soaked our tiny perch and all our worldly possessions.

We began rappelling down the vertical wall by sliding to the ends of two 50-meter ropes tied together and looped through a set of fixed rings bolted into the rock. At the end of the ropes was another rappel station consisting of a set of rings, placed by previous climbers for retreating parties, which we used to anchor ourselves to the rock face. We then pulled the ropes down from the rings above, threaded the ones in front of our noses and started down another rope length.

Everything we brought up for our five-day climb to the summit we had to bring back down with us: ropes, climbing gear of every sort, sleeping bags, extra clothes, food, water, and other essentials. All this we either stuffed into a haul bag (an oversized reinforced duffel bag) or slung over our shoulders. The retreat was slow and methodical, akin to a train backing down a mountain, giving me ample time to think.

My situation made me think about my work, mostly, about all the projects I have managed, or been involved in managing. As a NASA project manager, I have worked on a number of successful projects. I have also been involved in a number of projects I never saw the end of. I thought about all the projects I transferred off of for other opportunities, projects that were in full stride and ran out of funding, and ones put on the shelf because they would not meet a flight date. Oh yes, I have had many success, to be sure, or I would have burned out years ago. Lessons from both the successful and not-so-successful projects have taught me valuable lessons, but it has always been the failures where I've learned the most. This is the thought I held onto as I headed down El Capitan, trying to keep in perspective the immense disappointment I felt in retreating.

We were about half way down the cold wet wall, coming down from out of the clouds, when the rain began easing up. By now each of us had experienced our

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My Big Wall (cont'd)

> "Lessons from both the successful and not-so-successful projects have taught me valuable lessons, but it has always been the failures where I've learned the most. "

own personal despair, shivering, wondering if we had made the right decision: should we have tried to stick it out just a little longer? To counter the self-doubt, we swapped tales of climbers swimming for their lives in torrential waterfalls, freezing to icy walls like a child's tongue on an icebox, or slowly dying of hypothermia. We knew we had made the right decision to head down, but it was still hard. Good judgment sometimes means cutting your losses lest you lose everything, and in this case "everything" was no mere figure of speech.

Retreating was made worse by the fact that this was not the first, nor the second time, I had been on this route, but the third. I have successfully climbed many other "big walls" (technically challenging rock faces usually requiring more then one day to climb), including another route on El Capitan; however, this particular route is my Holy Grail. It is called the "Nose" route because it runs down the center of El Capitan.

On my first attempt to climb the "Nose," I was ill prepared for the enormity of the task. In spite of weeks of planning and preparation, and years of climbing between my partner and me, I did not understand what was involved in a climb of this scale. Climbing a 3,000-foot big wall entails inching one's way up crack systems amidst dizzying exposure while hauling 150 pounds of supplies with you. On the second day, my partner dropped a bag of gear, requiring us to retreat to the ground, and the climb ended for us there.

My second attempt was two years later with the same partner. He had completed this particular climb since our failed attempt. I also had two extra years of climbing experience, including a different big wall climb under my belt. I was well trained, had made careful preparations and was fully ready to follow my partner's leadership on the climb. There was however one thing I was not prepared for. In the year prior to the climb my partner had lost a loved one. He had not climbed more than a day or two since then. This climb was going to be his way of "getting back into shape."

By the middle of the third day we were only one-quarter of the way up the wall. The pace was torture, and there was the ever-increasing certainty that we would run out of food and water before reaching the top. In spite of my experience and meticulous preparations, I was not prepared to take the leadership roll and the initiative to speed up the pace. I was frustrated, he was frustrated, and a trip to the ground was in order.

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SPECIAL FEATURE: PAUL ESPINOSA

My Big Wall (cont'd)

Yosemite National Park is a rock climbing Mecca. Conquering El Capitan, the rock pictured here, was NASA project manager Paul Espinosa's objective on this mission.

> "The pace was torture, and there was the ever-increasing certainty that we would run out of food and water before reaching the top."

So here I was on my third attempt, another two years later. I had trained physically for the climb, practiced numerous shorter routes, and was prepared to climb as an equal with a new partner, one who was very competent and climbed at my

My Big Wall (cont'd)

level. The climb had been going wonderfully. For two days we swapped leads, working together to compensate for each other's weaknesses. By the end of the second day we made it to 2,000 feet. We fell asleep under the stars, looking forward to the remaining 1,000 feet of climbing we figured to take another couple of days.

At some point during the night I heard raindrops. We both had waterproof covers over our sleeping bags, and were prepared for a storm, as long as it didn't become too severe. Unfortunately, severe is what we got. Raindrops came at us from all directions, even blowing directly up at us from below by the wind. To top it off, our granite "camp" was covered with 1/4 inch of flowing water. Luckily the lightning stayed about 5 miles away, but at 2,000 feet up the wall with all the metal of our gear around us, we still felt like sitting ducks.

Everything that was not in our individual sleeping bags got soaked. We peered out of our dry cocoons in the morning's first light to our new watery world. And three hours later with no letup in sight, we decided to head down.

Below 1,000 feet the rest of the retreat got easier as the rain turned to drizzle. We passed another party of climbers whose retreat was not going as smoothly. When we asked them how things were, they answered with a raft of expletives.

Question

Have you seen projects where it was clear they would fail because their leaders lacked the fortitude to abort before the inevitable?

By two o'clock in the afternoon we were on the ground. I was happy to be safe and looking forward to hot cocoa and a shower. Still, I was saddened over the defeat. For future climbs, this kind of experience helps one keep success in perspective. Things happen that you can't always control in such unstable environments as a 3,000-foot rock climb. On projects like this you can never control all the objective hazards you may face. But this is what makes it such a thrilling challenge, and why I keep coming back.

My triumph on "The Nose" route of El Capitan will come eventually, I'm sure of it, and at that point I will certainly have earned it.

Lessons

- A can-do attitude and willingness to take risks should not distort your judgment to know whether to abort the project in midcourse.

- In project life, we very often learn more from our failures than our successes.

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ASK Magazine

FEATURES

The Join-Up Meeting
by W. Scott Cameron

I recently took on a new assignment and, as is my norm, I scheduled a series of one-hour, 1:1 join-up meetings with the various lead personnel on the team and their hierarchy. During one of these meetings, the person I was meeting with informed me how pleasantly surprised she was that I had scheduled this meeting as very few individuals took the time anymore to have them.

I was shocked. I was taught that establishing a 1:1 relationship with the people on your team is critical to the project's success. This was the first time I'd heard anything like this about join-up meetings. I filed this feedback away.

Later I was talking to my project manager-mentor, and he indicated he had finished his join-up meetings with every person in his new organization. He also indicated his predecessor had conducted few, if any, join-up meetings.

Again, I was shocked. When I reflected on these two experiences, I realized a very negative trend might be emerging in our fast-paced, schedule-driven, 500-e-mail-per-day, cell-phone-ringing, 24/7-communication, multi-tasking work lives: NO FACE TIME!

Face time is what you spend with people to talk about the project you are working on, their expectations of you, your expectations of them, your hierarchy's expectations about each of you, and/or—last but certainly not least—what each of you plans on achieving during the project. A 1:1, face-to-face, join-up meeting is the only way I know to build solid trust between the project manager and the team members and their hierarchy. The project manager can then use the information gathered in these meetings to help develop the team structure and dynamics.

Join-up meetings are a big deal for me, and I rate them at the top of my meeting-importance meter. These are the meetings where I discover if an individual's success criteria are different than the team's success criteria. Even though a person has agreed to the team's criteria, they may actually be motivated by other criteria, which could negatively impact the project.

"There is no I in team" is an axiom that applies to a project as much as any other kind of team endeavor. A project manager spends most of his or her time and effort managing/motivating individuals on the team to get in sync with the whole team's success criteria. The face-to-face join-up meeting is integral to understanding each "I" in the team.

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 1:1, face-to-face, join-up meeting is the only way I know to build solid trust between the project manager and the team members and their hierarchy."

ASK Magazine
By practitioners for practitioners

The Join-Up Meeting (cont'd)

Join-up meetings are not only crucial for hardware integration, but also form an important stage of team building, as Scott Cameron points out in his article.

Another thing I've learned in my career is that no matter how well I think I know people, if I don't take the time to have a "formal" join-up meeting with them, and understand what is motivating them, it's possible I may find out their expectations are very different than what I've assumed. For example, I was the project manager of a project in which the lead technical engineer and I had worked

The Join-Up Meeting (cont'd)

together earlier in our careers. Since I had worked with him before, I didn't feel the need to "join up." That was a big mistake.

This individual consistently committed to doing things on the project. I was impressed and felt he was showing great leadership. However, as the project progressed I noticed another trait. The individual did not meet any of his commitments. This was having a negative impact on the project. Thus, I began taking responsibility away from him and giving it to others to ensure the project's success.

After awhile, the individual and I had a belated join-up meeting. During this meeting I learned his boss had said that he needed to demonstrate leadership and commit to do more than his fair share of work on this project to be considered for promotion. The boss failed to point out that meeting his commitments was also crucial to being promoted.

This example is a continual reminder for me of the importance of the join-up meeting. Had I known what his success criteria were, I certainly would have reevaluated his role on the project, or at the least talked with him about how best to synchronize his personal success criteria with the team's.

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.

Willpower
by Terry Little

I am struck by how often failure is blamed on a lack of discipline. You often hear losing coaches cite this as the reason for a big loss. I don't recall the last time I heard one say that his team lost a game because of his players' lack of skill. I think a breakdown in discipline is also one of the key reasons why program and project management teams fail to meet expectations.

The first program I ever managed had a clear set of priorities. I understood the mandate, and so did everyone else on the team. We set an ambitious schedule and started to work fervently. Not too long into the program the customer wanted to know what performance he was going to get. I replied by categorizing the performance parameters into three bins:

1. Performance you will get.

2. Performance you may get.

3. Performance that there's no way you will get.

Did that cause an uproar. The customer demanded everything in the second bin be moved to the first, and most everything in the third bin be moved to the second. My immediate impulse was to agree, but I managed to overcome that. In my heart, I knew that we would never meet the already ambitious schedule if we had to deliver more performance. "No" was my answer.

"If you don't give me better performance, then I am going to get the program cancelled," the customer argued. Fine. He attempted to carry through on his threat, but senior management, to their credit, came down on my side.

The program turned out to be a huge success, but the result would have been largely different had senior management or I failed to maintain discipline. Since then I can't tell you how many times saying "no" has kept the programs I've managed on track.

Program and project managers have to be vigilant about maintaining discipline. So many temptations exist. Development programs are a really good example of how this occurs. When using a cost reimbursable approach to pay for them, we can be sorely tempted to plan as we go, excusing ourselves because of the risk involved, or because we did not think we had enough time to plan adequately. Government is particularly susceptible to this kind of behavior. Watch out!

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FEATURES: TERRY LITTLE

Willpower (cont'd)

Requirements grow. Work scope grows. Cost and schedule grow.

Commercial companies only rarely use a cost reimbursement approach when investing in risky projects. Rather, they do fixed-price, incremental investing, and put a high premium on detailed planning. They place a fixed amount of money into a research or development project with the expectation (but not a guarantee) of a certain result. Periodically, or when the money is gone, they look at interim results (compared to plan) and decide whether to invest more funds. This makes for a very disciplined approach that program and project managers in government can learn from.

> "The program turned out to be a huge success, but the result would have been largely different had senior management or I failed to maintain discipline."

A performance test firing of a U.S. Air Force Expendable Launch Vehicle project. Not the same kind of performance Terry Little is talking about in his article, but there is probably just as much bang for the buck in his suggestions about how to maintain project discipline.

Successful program and project managers understand the value of maintaining discipline on a project. Being disciplined is not easy, and requires strong willpower. It pays to always be thinking about key decisions where you've either acted to maintain discipline or allowed a breakdown to occur. The payoff is a better understanding of why discipline is important to your project and what your role is in fostering a disciplined attitude for the entire project team.

Hot Meetings
by Mary Chiu

A colleague walked by my office one time as I was conducting a meeting. There were about five or six members of my team present. The colleague, a man who had been with our institution (The Johns Hopkins Applied Physics Lab, a.k.a. APL) for many years, could not help eavesdropping. He said later it sounded like we were having a raucous argument, and he wondered whether he should stand by the door in case things got out of hand and someone threw a punch.
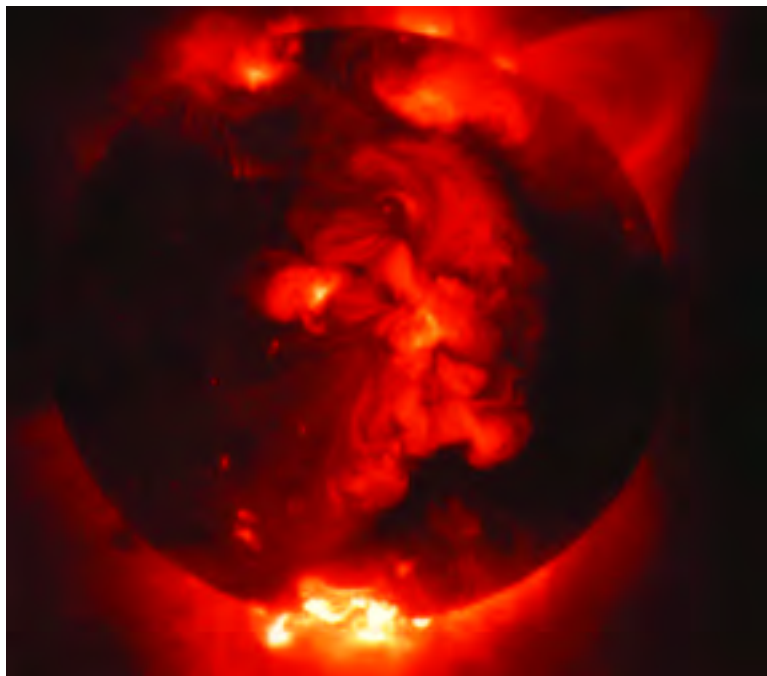
Mary Chiu and her "hot" team from the Johns Hopkins Applied Physics Laboratory built the Advanced Composition Explorer spacecraft for NASA. Instruments on the spacecraft continue to collect data that inform us about what's happening on our most important star, the Sun.

I laughed when he told me this, and he looked even more puzzled. It was business as usual in there I tried to explain. "We were exchanging ideas."

He didn't get it. That was not the way meetings in our organization were typically conducted.

In the early 90s, my team at APL was building the spacecraft for the NASA Advanced Composition Explorer (ACE) project. It wasn't exactly a new endeav-

ABOUT THE AUTHOR

Mary Chiu has been a Program Manager in the Space Department at the Johns Hopkins Applied Physics Lab (APL) since 1985. She has managed a variety of programs, including the APL UltraStable Oscillator programs for the Navy (NRL) and NASA (Mars Observer, EUVE, Cassini), Altimeters for the Navy (SPINSAT), and NASA spacecraft (ACE, CONTOUR). She is currently Project Manager for the CONTOUR mission, which is part of NASA's Discovery Program.

Hot Meetings (cont'd)

or for APL to be building a spacecraft, we had built plenty before for NASA; but this was a team of mostly young people, highly motivated, extremely intense and dying for the opportunity to be part of something as exciting as a NASA mission. Our energy came into full flower at meetings.

As for the tendency of team members to express oneself, well, loudly, I didn't only condone this behavior… I encouraged it. I said up front to everyone on the team, "Meetings are an occasion to voice your opinion and get your views on the table. We want to debate all points of view, and if that means raising your voice to be heard then you had that permission." The volume was just a byproduct of having that many voices contributing to the discussion. It got loud because people felt they had to raise their voice a notch—if not several notches—to be heard. My objective was just getting people to talk. When decisions have to be made, I believe people must speak up. Living with bad decisions is one thing, but I cannot live with a bad decision because somebody has not come forth with important information. Silence, as far as I'm concerned, is consent.

Because there were so many voices competing, it was easy for an outsider to think our meetings were unstructured. But just because there was a lot of noise didn't mean they were unstructured meetings. I always had an agenda, and before the meeting I'd send it out. Even if the meetings occurred impromptu, at the beginning of the meeting I'd always say to the effect, "By the end of this meeting we need to do this."

Even though it may have sounded like we were yelling at each other, we liked one another, and we knew each other's habits good and bad. We didn't think of ourselves as yelling at each other. What distressed my colleague who stood outside the door was that he assumed if people were raising their voices at each other they must be fighting. Nobody was fighting. There was enough trust and respect among team members that we understood it was okay to express ourselves in this way. The volume reflected the passion in people's hearts, the comfort level that existed among us. I'm not saying that passion can only be expressed this way. I'm saying this was one way we expressed ours.

Understand we didn't maintain a fevered pitch throughout the entire meeting. Once we got all the ideas on the table, then we would sort through them in a more orderly fashion to determine how best to approach a specific issue. We tried, and were successful most of the time, to arrive at a consensus. Some people were not always happy with the final decision, and sometimes later they were proven right, but at the end of the meeting people accepted decisions and were willing to move

Hot Meetings (cont'd)

on because the issue had been aired, all points of view discussed. No one came back later on and said, "Well, I had something to say that never got heard."

So often we expect one person to be the leader in a meeting, and that's usually the project manager, taking the pulse of the group, asking for input—but not really giving up the floor. A lot of times that person just gets what he or she wants. Rare it is then when someone is willing to stand up and play the Devil's Advocate, which is a critical function on any project team. This is how you test ideas and give them the opportunity to prove their merit.

It was remarkable to me how deeply people were thinking through situations and problems because they were expected to voice their opinions. With everyone expected to talk through an issue from his or her own point of view, assessing the impact of what was up for consideration, I have no doubt we steered clear of many wrong turns we could have made on this project.

Our ACE team was a hot group, to invoke the language that is fashionable today, although we never thought of ourselves in those terms. It was just our modus operandi. The tenor of the discussion got loud and volatile at times, but I prefer to think of it as animated, robust, or just plain collaborative.

Tips On How To Lead Productive Hot Meetings

- Limit the number of attendees. Hot meetings generate a comfortable amount of heat for me when the number of attendees is small. At most 5-7 people. With too many people there, you risk creating too much noise. Also, my meetings tend to be the most productive when the attendees represent complementary disciplines.

- Spontaneity should be a high priority. Yes, you want to have an agenda, and certainly you may feel you need to accomplish something specific by the end, but at the same time be open to letting the meeting unfold naturally out of the discussion.

- Listening is important. Encourage everyone at the meeting to listen to what other people are saying. You want people to examine their own ideas as they hear others express theirs.

- For hot meetings to be effective, the group must function as a cohesive team who trust one another and share a belief that they are mutually responsible for project results. A group of people who don't feel dependent upon each other is a committee, not a team.

INTERVIEW

ASK Talks with W. Scott Cameron

Scott Cameron is the Capital Systems Manager for the Food & Beverage Global Business Unit of Procter & Gamble, and has been managing capital projects and mentoring other project managers for the past 20 years at Procter & Gamble within its Beauty Care, Health Care, Food & Beverage, and Fabric & Home Care Businesses. Scott also has been an ASK feature writer since Volume One. Here at ASK we consider Scott a dear friend, a generous colleague, and a great storyteller. We are all too happy to provide a venue for his wit and wisdom. He and his family live in Cincinnati, Ohio.

ASK: Tell me about a project that has had an enduring impact on you?

Cameron: The project I look back on with probably the most pride was my first major project. It was a multi-site, five-plant project wherein the first plant start-up was 18 weeks after funding and the fifth startup date was 26 weeks after funding. Only two of the sites were identified at the time we received funding, and none of the process and packing equipment had been ordered. Two things about this project had a huge impact on me. First, it gave me the courage to be accountable for the decisions I made, as there was no time to second-guess myself. Secondly, it taught me that every day of a project's life is important and you need to get the most out of each day.

ASK: You met the schedule?

Cameron: We did. I remember sitting in a hotel room with a pad of paper and drawing up the project's critical path schedule and deciding what things had to be done and the milestone completion dates the project team had to meet. I then called my project manager-mentor and reviewed my thought process and assumptions. He listened to my plan, questioned me about it, and said, "If you can meet all your milestone dates, you can make your schedule." He also told me that meeting this challenge was no easy feat but could be done with some major "mountain moving."

ASK: It is interesting to hear you did it with a pencil and paper, especially for something that I imagine was awfully complex. Do you ever use computer programs, like Microsoft Project, to do your scheduling?

Cameron: A lot of times when I talk to people about doing schedules, they ask me what scheduling program I use. To be quite honest, I use a pencil and paper

> "The project manager must motivate the team based on the project's unique challenges, the team members' experience level, and the project schedule."

ASK Talks with W. Scott Cameron (cont'd)

most of the time to sketch out the critical path as I see it, which in an electronic age probably says I'm an old fogy. The schedule is just a tool to align the project team to what they have to do by when in order to be successful. How you prepare or draw the schedule is more a philosophical debate because there are many good software programs. The key is getting your project team members to be honest as to how long their work is going to take and how much time the schedule will allow them to accomplish their tasks. Whenever I put together an initial schedule I work right to left (start-up to today) versus left to right (today to startup date). When you ask people how long something is going to take, their response always results in the initial schedules being two to three times longer than the time you have. That's why I believe if it's a six-week or two-year schedule, every day matters and aligning the team to this fact early in the life of a project will help insure its success. When you start off on a two-year project, you tend to feel like nothing is restricting the schedule at that point, but those initial days are days which are hard to recover or very expensive to recover later in the project's life.

ASK: Is it different motivating a team when the schedule is six weeks as opposed to two years?

"Part of your job (as project manager)," says Scott Cameron, "is to figure out how to mold the team to meet the success criteria of the project."

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ASK Magazine

ASK Talks with W. Scott Cameron (cont'd)

Cameron: Each team takes on its own personality. The Project Manager must motivate the team based on the project's unique challenges, the team members' experience level, and the project schedule. With that said, I believe, it is far easier to motivate a team with a short schedule because people realize everyday is important and there isn't as much time for divergent thought processes. This is one of the things I find exciting about being a project manager. You never really have the same team, same schedule, or same project scope twice in a row. Each project team and their respective hierarchy have a different experience and knowledge base to manage. Part of your job is to figure out how to mold the team to meet the success criteria of the project.

ASK: Tell me about one of the more challenging experiences you've had trying to motivate a team.

Cameron: I once worked on a project where I was "thrown in" at the last minute to replace the project manager who requested to be taken off the assignment. We had six weeks from when I arrived at the site to complete engineering, construction and start up the project. We had completed only 20% of the construction, and the remaining 80% was extremely complicated. I had to immediately step in and get everyone to start working together to meet this very aggressive, if not unattainable, schedule. To add to the challenge, the various functional personnel on the team hated one another. I sat down with each functional leader on a one-on-one basis and said, "Okay, so how do you view your situation and your role, and what is it going to take to get us to start-up 6 weeks from now?" It wasn't threatening, but it was like I had to say, "My job here is to lead us to start-up in six weeks. Are you with me?" The key in this case was getting people aligned in meeting the schedule and finding out what was motivating the team's dysfunctional behavior. They may not have liked the end date, they would tell me all the reasons why they couldn't achieve perfection, but once we were aligned they were able to start working together. In the end, we started up within 8 weeks instead of the 6 weeks.

ASK: One-on-one communication proved to be the magic formula?

Cameron: It wasn't exactly magic, but yes. The project manager is seen as the single point of contact, and I had to quickly get to know people on the team and what was motivating them. When you're the project manager you are going to spend a lot of time with these people. Best to understand what is making them "tick" early in the project's life. One thing I should add. You also have to under-

> "If the hierarchy is not well informed, then you will have a problem regardless of how well your team is functioning."

ASK Talks with W. Scott Cameron (cont'd)

stand the system you work in and how the components are supposed to work with one another. A long time ago I had a boss who said, "When I assign a project manager, I want to make sure she or he knows every way possible to defeat the system and the processes we have in place." The point being if you thoroughly understand the environment you work in, you can understand how each system will impact your project. Thus, you can help yourself see and eliminate future bottlenecks the team may encounter. In the first project I've talked about, I understood how the company's systems worked. I took apart my schedule and said here are the bottlenecks we will encounter, and then I took steps to eliminate them. That was a major reason why we met the schedule.

ASK: How can you tell when a team is really functioning well together?

Cameron: For one thing, there is a lot of good communication. You see people stopping each other in the hall, they are active, they are animated, they are resolving things, they are keeping you informed, but they are pretty much making most of the decisions on their own to meet the success criteria. They feel empowered and show it!

ASK: That must be nice. How then does your role as project manager change in that case?

Cameron: You spend more time with the hierarchy making sure their needs are being met and they are knowledgeable of the work their people are doing to make the project successful. You should also be insuring that the hierarchy is taking time to recognize their organization's good work. If the hierarchy is not well informed, then you will have a problem regardless of how well your team is functioning.

ASK: Is this like running interference for the team so upper management doesn't get in their hair?

Cameron: Sort of, but let's be careful here. There are times where you need to run interference because you want to keep the team focused, but most of the time the team needs to understand their hierarchy and their needs. You also need to give the project team a forum to "strut their stuff" for their bosses. You certainly don't want the team to think it is only the project manager who interfaces with hierarchy. I don't want my team members to get burned or crushed by their hierarchy in reviews, but I'm okay if they get "singed." So while I would agree at

> " By the way, good project managers at any stage of their careers should be willing to be singed. "

INTERVIEW

ASK Talks with W. Scott Cameron (cont'd)

times you need to shelter the project team, they have to learn their hierarchy is integral to the success of their projects and sometimes have different expectations than the project team may assume. Isolating the team from interfacing with hierarchy would be the worst thing I could do.

ASK: Describe a situation where somebody got singed, and how you knew it wasn't a serious burn.

Cameron: How about something that happened to me. Early in my engineering career, I was the technical engineer on a project. My boss and I had a disagreement on what technical scope should be installed. He had his position and I had mine. Since I was leading the hierarchical technical review, he allowed me the forum to present my case and he presented his. As the smoke began rising around me during my technical presentation, I learned a valuable lesson about the hierarchy. Luckily, my boss had a fire extinguisher handy. I just got singed and not burned.

ASK: What do people say to you after you let them get singed?

Cameron: Sometimes they come back and say I was right, or come back and say I was kind of right. They rarely come back and say I was wrong. By the way, good project managers at any stage of their careers should be willing to be singed. No one is immune to the fire. But if you've been doing this long enough, you understand that getting singed is necessary to your growth and to challenge the status quo.

ASK: I remember hearing you speak once at a conference about how rewarding it was for you to be a mentor to young project managers. What is it that you get out of mentoring?

Cameron: As I've gotten older, I've started to wonder, "Where are the next generation project managers going to come from?" I think about how I have grown throughout my career and can talk about the projects I've worked on, but when I get down to the root cause of my growth and development the most important factor has been the people who managed and coached me and let me get singed and challenged me. Individual managers had a profound impact on me. As I look back, I can see how this boss taught me how to write proposals. This mentor taught me financial aspects and cash flow of the company. This peer focused me on schedules. This one focused me on team dynamics. This one taught me how

> "The last thing I want to do is clone "little Scotts" who can carry out my ideas about project management without thinking."

ASK Talks with W. Scott Cameron (cont'd)

to listen and not immediately react. It's a collection of people, and I feel its part of my job to instill these learnings to others as others invested in me.

ASK: How much of mentoring is just listening?

Cameron: A lot. Project managers don't have many avenues to vent their frustrations or brainstorm ideas to improve their projects because of the demands on their time. They can vent to spouses or loved ones, but that's usually not very healthy and, probably in the long run, somewhat destructive to their personal lives. They can vent to their bosses, but there is the risk their bosses will see them as weak and wonder, "Did I put the right person on the job?" They can talk to themselves, but then the people in the white lab coats may come around for them. So as I look at myself as a mentor, the major part of the job is to just listen. What I may have dealt with 10 - 20 times in my career, they are dealing with for the first time, and want to discuss it.

ASK: Is there anything in particular you are listening for?

Cameron: I let them talk for 10-15 minutes and at the end of it I say, "Well, let me play back what I heard, and then lets talk about what you want to do." A large percent of the time they just wanted to vent or brainstorm concepts/ideas and to know that other people have experienced similar things. When you say, "Yep, that is pretty typical for projects like this," that generally makes them feel better. Sometimes we will discuss what the person wants to do to solve a problem and other options they may want to consider. Again, I am a resource and mentor who is trying to help the person grow and be successful. I don't see myself as being there to provide answers to their every problem. The last thing I want to do is clone "little Scotts" who can carry out my ideas about project management without thinking.

ASK: You've been at Procter and Gamble about 30 years, right?

Cameron: Actually, 31.

ASK: Okay, 31. What do you regard as the biggest milestone of your career?

Cameron: The biggest milestone was the birth of our triplet daughters Laura, Beth and Caroline--but I guess you mean professionally.

INTERVIEW

ASK Talks with W. Scott Cameron (cont'd)

ASK: Yes, I was thinking professionally.

Cameron: I think the answer to the question is probably I haven't done it yet. I'd like to believe the best assignment or challenge is still in front of me. Since the girls are now 10, I figure I've got another 13 years of work to find out if I'm right.

ASK: And if they go on to graduate school, forget it. You may never see retirement.

Cameron: Yeah, but I can live with that.

Check Out These Books

Dr. Michelle Collins is the Managing Editor of ASK Magazine. She is currently on a one-year detail to NASA Headquarters from Kennedy Space Center where for the past five years she has conducted research on air pollution control technology. She also is responsible for the Knowledge Sharing Initiative within NASA's Academy of Program & Project Leadership.

Fusion Leadership: Unlocking the Subtle Forces that Change People and Organizations
Richard L. Daft and Robert H. Lengel (1998) Berett-Koehler Publishers, Inc.

Reviewed by Dr. Michelle Collins, NASA Headquarters

If you've already read books on leadership and organizational change by authors such as Moshe Rubinstein and Iris Firstenberg, Peter Senge, Tom Peters, and Steven Covey, and you were thinking of rereading them, you don't have to do that now. Just read this book instead. It's a *fusion* of many of their same concepts presented from a different view.

The book does not explore any particular subject in depth. Rather the authors "skim" many subjects and concepts, interlacing them to develop the concept of "*Fusion Leadership*".

The fundamental concept of treating people as people rather than machines is the main theme. "Fusion Leadership" is the process of fusing people together by nurturing six "subtle" forces: mindfulness, courage, vision, heart, communication, and integrity. To do so, hierarchy is diminished and responsibility both for oneself as well as for the team is emphasized.

There are a number of organizations and managers that will find such a change threatening. The concepts behind such a management style are straightforward and the benefits are intuitive once you've reflected on them; however, the obvious benefits of the behavioral change proposed in Fusion Leadership can be completely lost in a fear-based system.

The concept of caring about people in one's organization was the common thread in Chris Turner's book *All Hat, No Cattle* (see book review, ASK 5). Much is being written about the re-humanizing of the workplace, but the basis of it is so common sense that one wonders what's taking so long for the workplace to change?

Whether you're in a position to change your organization or simply your project team, you'll find the concepts in fusion leadership equally applicable.

Ratings:
Ease of Reading ★★★★☆
Usefulness to Job ★★★☆☆

Check Out These Books (cont d)

Relax, It's Only Uncertainty: Lead The Way When The Way Is Changing.
Philip Hodgson and Randal White (2001). London: Pearson Education LTD.

Reviewed by Dr. Gerald Mulenberg, Ames Research Center

There are four types of people, Hodgson and White suggest, who will be attracted to the ideas in this book:
1. High-flyers: ambitious people who want the latest thinking in management and leadership.
2. High-learners: people who have even more curiosity than ambition.
3. High-worriers: people concerned about the rate of change and are looking for solutions.
4. High-careers: developers and sponsors of people.

Doesn't that just about sum up everyone in NASA?

"Effective leadership is finding a good balance between behavior, context and need." Does this apply to you and/or your situation? If you're like most project managers, the answer is a resounding YES.

The authors believe that a "relaxed leader is more likely to be the most effective," and describe behaviors necessary to have this confidence. The basic premise is that attitude matters, and behavior counts. It is perhaps the first book on leadership to suggest that at some point it is necessary for everyone to be a leader: "...leadership is not a status, it's a state of mind."

They argue that, "...the real mark of a leader is confidence with uncertainty--the ability to admit to it and deal with it...*ambiguity is how it is, and uncertainty is how you feel about it* (italics added)." They then offer help in handling the ambiguity that leads to this uncertainty, and not only by clarifying the role of a leader, but also by explaining how one can assume that role.

Everyone needs to be able to handle the ambiguity that leads to uncertainty in today's world. Just as much, we need to realize that the approach we used last time may not work now. Hodgson and White focus on two types of ambiguity that create uncertainty: 1) ambiguity that can be mitigated by using expert knowledge, and 2) ambiguity where everything is new and there are no experts to call on (as in many NASA projects). They concentrate mostly on the second type, and provide readers, "...with a genuine set of workable skills that they can
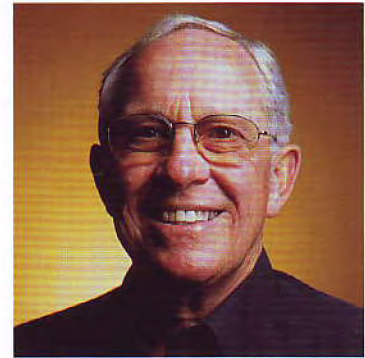
Dr. Gerald Mulenburg is the Manager of the Aeronautics and Spaceflight Hardware Development Division at the NASA Ames Research Center in California. He has project management experience in airborne, spaceflight, and ground research projects with the Air Force, industry, and NASA. He also served as Executive Director of the California Math Science Task Force, and as Assistant Director of the Lawrence Hall of Science.

apply immediately and which will enhance the rest of their lives and careers."

Whether you have been thrust into a leadership role or consciously sought it out, the authors show you how to identify where your strengths lie and explain how these can help you to be a leader. In addition, they show how to identify what your weaknesses may be, and offer some easy and effective ways to create positive change that will help you to become a better leader.

The authors describe the book as their "field notes," the result of 10 years of research in over 30 countries and 100 organizations. They provide many examples and brief exercises to help you identify and understand your own behaviors, and then show how to enhance these behaviors to become a better leader. This is not a how-to book about project management. It is, however, an excellent book for project managers who want to understand how to be a more effective leader.

I think this book is a must read for anyone in, or planning to take on a leadership role in NASA.

Ratings:
Ease of Reading ★★★★★
Usefulness to Job ★★★★☆
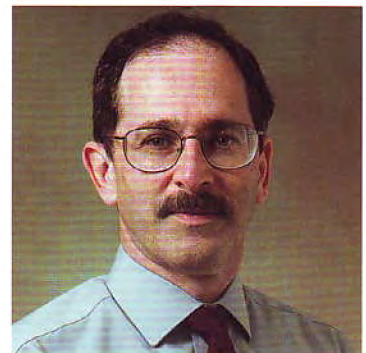
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Review Board

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

Hector Delgado is Division Chief of Process Tools and Techniques in the Safety, Health and Independent Assessment Directorate at Kennedy Space Center. He has received many honors and awards including the NASA Exceptional Service medal, the Silver Snoopy Award and various Achievement Awards
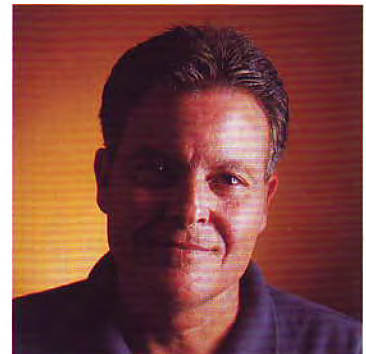
Michael Hecht has been a member of the Jet Propulsion Laboratory staff since 1982. He is currently Project Manager and a co-investigator for the Mars Environmental Compatibility Assessment project. He received his Ph.D from Stanford University in 1982 and holds 7 patents, 24 NASA Tech briefs, and has published extensively in both surface science and planetary science literature.

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Review Board (cont d)

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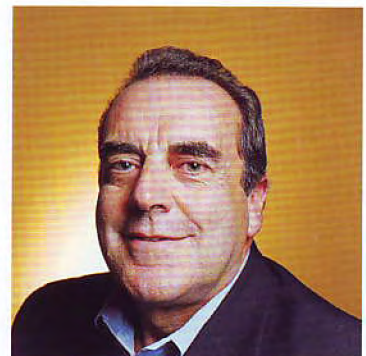
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