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## Management Lessons from Mars

by Alan MacCormack

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In January, two small spacecraft bounced onto the surface of Mars, delivering rovers that have captivated the world with their stunning photographs of the Martian landscape. By contrast, four years earlier NASA had watched in horror as two successive Mars missions blinked out of existence within a three-month span. Much of the blame for those failures was placed on the agency's Faster, Better, Cheaper (FBC) initiative, a program established in the early 1990s and designed to transform the way NASA developed unmanned spacecraft. The goal was to drastically reduce project costs while speeding development times. Development was indeed faster, and missions were indeed cheaper—but the approach was flawed, as the doomed 1999 missions suggest. As I talked with NASA managers about the FBC program, I discovered an overarching organizational problem—a learning disability, if you will—that holds lessons for managers in many other environments.

In shifting to FBC from a slow, reliable, but costly approach to development, NASA forced its project managers to invent radically new processes and procedures. FBC imposed on them budget, schedule, and weight constraints that could not be met using NASA's traditional approaches to spacecraft development. "The attitude was 'The book's not working. So throw out the book, try something different, and then write a new book,'" one NASA manager explained. Implicit in this approach was the need for project managers to learn from the organization's collective experiences, adopt what worked, and jettison what didn't. Unfortunately, NASA undermined this learning process in several ways.

First, with the launch of each FBC mission, NASA demanded ever faster development times and even lower costs. But because it typically takes more than four years for a small spacecraft to go from drawing board to completed mission, managers were forced to meet the tougher demands on new projects while earlier projects were still in progress. So they couldn't capture all the potential lessons from

one mission before moving to the next. In short, NASA was raising the bar before seeing if project managers could clear it where it was. By the time the organization realized it had set the bar too high—around the time the first FBC missions began to fail—the project pipeline was full of missions that were potentially compromised. It's no surprise that later FBC missions failed more frequently than earlier ones did.

Second, NASA didn't realize that because the FBC initiative depended so much on shared learning, it would require a more aggressive and systematic approach to knowledge management. Although NASA had implemented a "lessons learned" database in 1995, a 2001 survey found that only one-quarter of its managers contributed to it. A similar number of managers were unaware the system even existed. Furthermore, while "red team reviews"—periodic progress reviews conducted by NASA's most experienced managers—proved invaluable in early FBC projects, NASA conducted fewer of these assessments in later missions. As a consequence, the transfer of learning across the organization suffered.

Finally, NASA fell prey to "superstitious learning"—the assumption that there is more to be gleaned from failed missions than from successful ones. In the challenging climate of space exploration, however, the difference between what makes one mission succeed and another fail can be subtle. There is no reason to believe that success indicates a flawless process while failure is the result of egregious bad practice. For example, as many mistakes could have been made in the celebrated 1997 Pathfinder mission as were made in the failed 1999 Polar Lander mission. But NASA will never know. By not conducting detailed postmortems on its successful missions, the space agency missed the opportunity to identify problems (and solutions) that might have helped avoid later failures.

NASA's costly experience with FBC holds important lessons for any organization undertaking a change initiative, whether it's a pro-


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cess improvement, a restructuring, or a fundamental shift in mission or culture:

- Determine in advance what feedback you'll need about an initiative's progress and when you'll get it.

- Don't raise the bar on performance until you're certain the organization can hurdle it where it stands. Use the feedback from your early efforts to determine how much to raise (or lower) the bar.

- Implement knowledge management programs to capture all the important learning that occurs during the initiative. Design systems and processes to transfer both explicit and implicit knowledge.

- Exorcise superstitious learning from the organization. Institutionalize postmortems on *all* projects. When a project succeeds, find out why. And find out what mistakes were made that *could* have caused it to fail. 

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