Goldin Puts NASA on New Trajectory

Keen political instincts, stamina, and a ruthless management style have helped Dan Goldin lead a revolution at this once-placid agency. But can his plan survive a shrinking budget?

On the eve of the 1994 congressional elections, NASA Administrator Dan Goldin was rushing to a meeting at the White House. But he wasn't too busy to pause at a downtown street corner and make a prediction to a reporter: The Republicans will gain control of Congress. His statement flew in the face of conventional wisdom, but Goldin has never hesitated to offer up his opinions. "I've been traveling all over the country," he said. "People are angry."

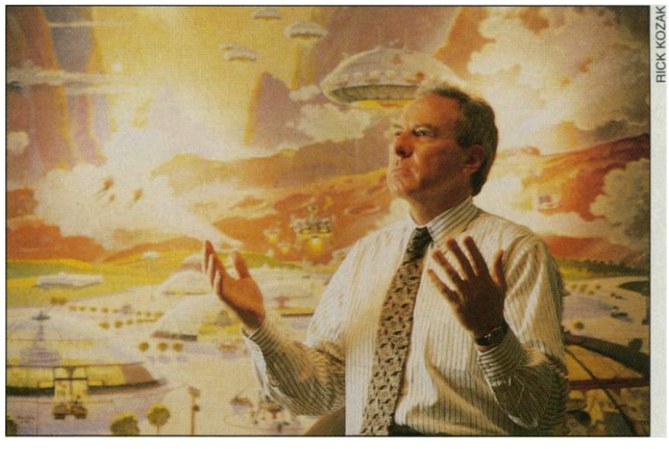
The fact that the head of a federal agency responsible for exploring the heavens could accurately forecast the biggest earthquake to hit the federal legislature in 40 years speaks volumes about Goldin's political instincts. But it's no surprise to those who have watched him survive a change in leadership at both the White House—Goldin is one of only two senior holdovers from the Bush Administration—and in Congress, where his popularity is high. Indeed, his relentless—some say brutal—campaign to remake his agency in the likeness of a modern corporation has won him the support of an unlikely collection of politicians, from Vice President Al Gore to House Speaker Newt Gingrich (R–GA). "He ought to be in politics himself," marvels veteran Representative George Brown (D–CA), ranking member of the House Science Committee, paying him what may be the ultimate Washington compliment.

Goldin can use all the support he can get. His efforts to shake up NASA's management and his much-publicized push for cheaper, faster, and better missions would be hard enough to bring off if his budget were stable. But it's not: It's dropped by 5% in the past 2 years, and it's projected to plunge another 17% by 2000. What will make that squeeze even tighter is the fact that the bulk of NASA's funds are committed to big-ticket items such as operating the shuttle and building the international space station. Even so, Goldin says he is determined to succeed. "I won't give up," he insists.

Rhetoric aside, his track record shows that is no idle promise. Much has changed at NASA since President Bush fired its previous chief, Richard Truly, in February 1992 and asked Goldin to rescue a troubled agency. Goldin has remolded what was once a squabbling confederation of centers with a weak headquarters into a leaner and more disciplined organization. Massive, costly spacecraft are relics of the past; they are rapidly being replaced by more modest missions designed for launch in a few years rather than a decade or more. A permanent laboratory in space, originally designed as a Reagan-era retort to Soviet technological prowess, is today an international space station with Russia as a key partner. And Goldin is not finished. He insists that an organization long dominated by engineers must now serve scientists in their quest for knowledge (see box). "You've got to understand me," he says. "I don't spend my life with the 95% that's good. I spend my life with the 5% that needs some improvement."

Quayle's solution

The NASA that Goldin inherited was a collection of fiefdoms run by former astronauts and guided by a few powerful staffers and congressional delegations from Texas, Alabama, and other states in which the agency has major facilities. The 1986 Challenger disaster tarnished the agency's can-do reputation, but its primary impact was to open up the financial spigot, enabling NASA to fix the shuttle, continue planning a space station, and build a host of scientific spacecraft. NASA's budget doubled in the 7 years following Challenger, peaking at $14.6 billion in 1994.



RICK KOZAK

The vision thing. Goldin's plans for his agency don't include what he calls "feel-good" human missions to the moon or Mars.

Despite the rise in funding, Vice President Dan Quayle and the National Space Council he chaired believed the agency wasn't giving taxpayers more bang for their buck. Bush's 1989 call for a return to the moon and a mission to Mars was ignored after NASA estimated a Mars jaunt alone would cost more than $500 billion. The agency's reputation sank further in the summer of 1991, when mechanical problems delayed several shuttle launches and the $2 billion Hubble Space Telescope was found to have blurred vision. Quayle pressed Bush to fire Truly, but it was nearly a year before the president gave the soft-spoken administrator his walking papers.

Goldin, then a vice president for TRW's space division in Los Angeles, was tipped for the job by Mark Albrecht, director of the Space Council. With his Bronx accent, passion, and intensity, the 51-year-old Goldin stood out from his predecessors, who were drawn from an aerospace community dominated by Southern engineers. Although Goldin was part of that community—he worked at NASA briefly before joining TRW to climb the corporate ladder—his Jewish background, brash manner, and unconventional ideas set him apart from what Goldin gleefully dubs the "pale, male, and stale" coterie at NASA and in industry.

Goldin, aided by George Abbey, a former Space Council staffer who now heads Johnson Space Center in Houston, quickly embraced Quayle's slogan of faster, cheaper, better. Within a month of taking the job in April 1992, Goldin ordered a sweeping review of all the agency's programs. In October he reshuffled Truly's senior management, angering the science community by removing science manager Lennard Fisk and giving him an ill-defined job as chief scientist. Fisk soon left the agency. Goldin began to scale back the expensive Mission to Planet Earth and streamline the agency's bureaucracy, taking swipes at the aerospace industry and scientific community for failing to adapt to new budget realities.

The dramatic changes appealed to Gore, who saw Goldin as a symbol of the new Administration's efforts to reinvent government. (Among senior managers, only Goldin and David Kessler of the Food and Drug Ad-

A New Reason for Being: Science

Science seems to be the only thing NASA Administrator Daniel Goldin wants to talk about these days. In recent weeks he has described what he calls the big questions (see box) to audiences all over the country. NASA's future, he says, should be tied to seeking answers to those questions, rather than fixating on hardware. "What ought to be driving NASA is science," he explains.

The idea is not new. In 1990, for example, a blue-ribbon panel led by Lockheed-Martin Chair Norm Augustine recommended the same approach. But that message has rarely come from the head of an organization steeped in a tradition in which science is a byproduct of engineering rather than an end product. "After the Apollo [moon missions]," Goldin says, "we built this engineering complex that we said science is going to get done in. We were putting the cart before the horse." Now, he vows, NASA's scientific horse will set the pace, and the engineering tools will come along for the ride.

Just how this would work is not yet clear, but Bruce Alberts, president of the National Academy of Sciences, likes the direction in which Goldin is headed. "There is a lot of enthusiasm for what he is saying," says Alberts, who convened a 30 April meeting of senior scientists, at Goldin's request, so the NASA administrator could get feedback. Alberts says the academy's operating arm, the National Research Council (NRC), could help by conducting in-depth studies of fields, ranging from astronomy to biology, that go beyond space research.

Goldin says he hopes scientists will help him develop questions "that any person with an eighth-grade education will understand." This cooperative approach contrasts with statements Goldin made during his first months in office in which he scolded scientists for holding an ivory-tower and elitist view of the world. Since then, Goldin has brought on board several outside academics, including chief scientist France Cordova, a Pennsylvania State University astronomer. His plan to create free-standing institutes linked to academic institutions is also aimed at improving the quality of NASA's research by promoting greater interaction with the mainstream scientific community. And Goldin, a mechanical engineer by training, points proudly to Alberts's best-selling *Biology of the Cell* textbook sitting prominently on his desk as a sign of solidarity with his scientific colleagues.

But Goldin will need more than a college primer to overcome skepticism that he can succeed in creating a scientific framework for his agency. "There is a discrepancy between what he says and what he does," says Lou Lanzerotti, a Lucent Technologies physicist who served on the Augustine panel. "It doesn't compute." Critics point to NASA's emphasis on the space shuttle and, more recently, on the space station as two examples of programs that have limited appeal to the general research community. They also note that funding for the agency's space science efforts is dropping precipitously, although budgets for life, microgravity, and earth sciences remain stable. Goldin insists that NASA can do better space science with less money by building smaller and more high-tech probes, but Republicans grumble that space science is taking a back seat to the agency's Mission to Planet Earth program.

"I'm confused," says Louis Friedman, executive director of the Pasadena, California–based Planetary Society, which promotes NASA's planetary program. "In his heart I know Goldin is a science person rather than a human spaceflight person, but the Administration really picks on the space science budget."

Another Goldin initiative that has rattled the agency's scientific advisers is his proposal to reduce headquarters staff levels in half by next year. They fear the move will hurt the centralized peer review needed to raise the quality of NASA science (*Science*, 26 April, p. 478). "It's a severe problem," says Alberts. "There is no point in doing science if it's not good." Goldin insists he is "absolutely and positively committed to NASA having among the best peer-review systems in the country," but he says he can do it with fewer people. He also promises to steer funds away from senior researchers and big-name universities, because they receive a disproportionate share of NASA's science budget.

Alberts and others agree that Goldin is not just singing the praises of science to capitalize on the current preference for basic science within Congress. "He really has this vision," says Claude Canizares, an astrophysicist who chairs the NRC's Space Studies Board. "He's looking for an inspirational future for NASA. The question is whether the agency buys into it."

–A.L.

GOLDIN'S 4 + 3 SCIENTIFIC OFFENSE

The Big Questions

1. How did galaxies, stars, solar systems, and planetary bodies form?
2. Is life, carbon-based or other, unique to Earth?
3. Can we develop predictive environmental, climate, and resource models to help ensure a high quality of life?
4. Can we develop fast, affordable, and safe aviation technology that preserves the environment?

How to Get There

5. Can we develop affordable tools to answer questions 1–4?
6. How do we communicate the knowledge we gain with the public?
7. How do we improve the space program through international cooperation while protecting U.S. interests?

SOURCE: NASA

ministration survived the transition.) When President Clinton pondered canceling the space station program early in 1993 because of massive cost overruns, Goldin pledged to make it smaller and cheaper. At the same time, he began quietly lobbying for Russian participation. Within months, he helped broker a deal that merged the troubled U.S. and Russian human space-flight programs and revived its support in the White House. "No diplomat, to say nothing of a technical manager, could have done as well," says Brown.

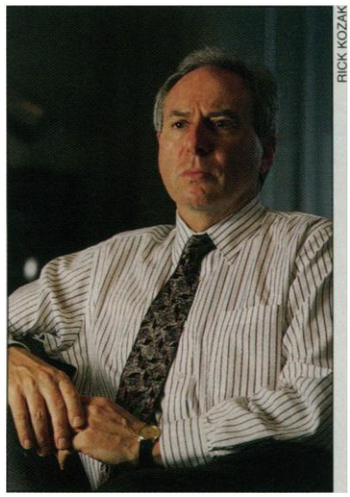
At the same time, Goldin was chipping away at NASA's tradition of building large, expensive spacecraft stuffed with instruments. "No one ever lost their job doing it this way," recalls one astronomer. But those missions had a history of cost and schedule overruns, and Goldin cited the failure of the long-delayed $1 billion Mars Observer probe in 1993 as proof that radical change was necessary. He set up a host of initiatives to seed new missions, at a fraction of the cost, that could be launched in 3 years rather than a decade.

The administrator also tackled the thorny political problem of reforming the centers. Scattered primarily throughout the southern United States, the dozen centers are home to the agency's scientific and technical expertise. But they showed little fealty to headquarters, preferring to compete with one another for projects with the help of their congressional delegations. "It was dysfunctional," Goldin said recently at a meeting of the NASA Advisory Council. By gradually

replacing every center director with handpicked subordinates and establishing contacts in Congress, Goldin broke the centers' formidable power without incurring the wrath of lawmakers.

His plan is to emulate the lean corporate approach now current in industry. To do that, Goldin intends to cut NASA's staff from 25,000 in 1992 to less than 17,500 in 2000 and to turn over day-to-day operations to the centers while headquarters keeps a tight rein on the agency's overall direction. Each center will have to publish the status of its projects on the World Wide Web. "There'll be sunshine where there's been darkness," Goldin says. "The purpose is to bring everything out in the open. ... Everyone is going to see what they're doing." To bolster the reputation of NASA's science, Goldin has proposed transferring much of the research at the centers to independent institutes, although the idea has become bogged down in managerial and legislative problems (*Science*, 17 November 1995, p. 1109).

"I don't spend my life with the 95% that's good. I spend my life with the 5% that needs improvement."



RICK KOZAK

Despot and charmer

Not surprisingly, there is resistance within the agency to these moves. Old NASA hands worry that the changes are undermining the agency's technical base, threatening the safety of programs like the shuttle, and concentrating too much power in the hands of Abbey at Johnson Space Center. And Goldin's way of implementing them has not endeared him to NASA's employees. Such hostility is not new, however. At TRW, Goldin's aggressive moves to downsize his division earned him the moniker Captain Crazy. An unsigned 1992 letter written by a TRW employee and sent to Gore, then a senator handling Goldin's confirmation hearing, described his management style as "despotic, vindictive, and chaotic." NASA officials who have worked with him speak privately of angry outbursts, sudden reversals of decisions, and frequent staff turnover.

The administrator doesn't apologize for his rough edges. "I never strive to win popularity contests," he says. "There are some here at NASA who believe that my job ought to be to defend the NASA budget and employees. I view my job as defending the space program." John Logsdon, a space policy analyst at George Washington University, says Goldin's combative quality is an essential element of his nature. "[World War II General] George Patton was a hero, and he slapped troops," he says. "You can't unbundle the package." But Logsdon adds that the administrator is "a consummate actor. Some of those sharp edges are for effect." The jagged edges are also tempered in part by his acting deputy, Jack Dailey, a retired Marine general who is seen as a much-needed steady hand in the administrator's suite.

Goldin's tough boss image stands in clear contrast to the disarming and charismatic persona he projects. It's an image he works hard to maintain. Asked about rumors that he ordered expensive changes to his new executive suite, he gave a reporter an impromptu tour to prove them untrue. His public affairs office has assembled a collection of flattering quotes from politicians and the media entitled "What They're Saying About NASA's Dan Goldin." But the administrator insists he is not acting out a role. "I believe I am the genuine article," he says.

Like a politician campaigning for re-election, Goldin is constantly visiting lawmakers and their constituents to spread his gospel. During one week in April, for example, Goldin went to Maine—a state where NASA has almost no presence—to visit six schools and speak to the Bangor Chamber of Commerce; met with business leaders and visited schools and universities in the Kansas City area; addressed a conference in Colorado Springs, Colorado, and met with military officials at the nearby U.S. Space Command; and sat for numerous media interviews, including a live radio talk show. By Friday he was back in his office. "He likes to do a state a day," says one visibly exhausted NASA official. "We call these trips death marches."

Goldin believes that the travel, visits, and phone calls are the secret to his success. "I take the time to talk to the [congressional] members. I take the time to talk to the White House. I talk to the industry. I try and get all the inputs so I don't make a decision in a vacuum." His peers agree. "He's willing to get out and talk and listen," says Representative Robert Walker (R–PA), who chairs the Science Committee. "As a result the agency has regained a great deal of credibility on Capitol Hill that it had lost." Representative Jerry Lewis (R–CA), who chairs the panel that appropriates NASA funding, adds that Goldin "is doing a great job at not circling the wagons, unlike some other agencies. He has been very successful in reforming an agency that otherwise would be in big trouble. Without him, I'm not sure it would survive." Skip Johns, associate director of technology at the White House Office of Science and Technology Policy, says that "no other agency administrator is better at doing his homework on [Capitol] Hill."

Tough test

But he has stumbled, too. Last month's sudden announcement that NASA planned to cut by half the number of workers at agency headquarters prompted an outcry from Congress and unhappiness in the White House, which had not been briefed on the plan. "We screwed up," Goldin says in retrospect. "Maybe I should have been a little softer." But he quickly adds, "People think now I'm backing off. I'm not. This is an opportunity for leadership."

Leading NASA is bound to get harder, however. Both the Republican Congress and Democratic White House foresee declining budgets for NASA, which would be hit harder than other civilian research agencies. The space shuttle and space station, both untouchable politically, consume more than half the agency's budget. The annual budget of the Mission to Planet Earth program tops $1 billion a year and is growing, despite Republican attacks. Subtracting those programs from NASA's $13.9 billion budget leaves precious little room for space science missions or technology efforts such as a new and less costly reusable launcher that NASA wants to develop with industry.

So far, Goldin remains a loyal soldier. He has not complained publicly about the budget squeeze, insisting that future projections will be more favorable. Meanwhile, he is pushing his staff to find additional savings. Cutting the size of headquarters, for example, could save as much as $100 million annually, says Goldin—money he would like to spend on science probes rather than paperwork. "We're on a course of continuous improvement," he adds. "Once you start you never stop."

If sheer energy is any measure, Goldin has a good shot at beating the odds in the upcoming budget battles. In fact, such challenges seem to invigorate him. A workaholic who revels in his job, he says he won't be finished until NASA has a more dynamic science program, minorities and women are heavily involved in science and technology, and the American public understands his vision for the agency. Given Goldin's obsession with the 5% that begs improvement, don't expect him to quit soon. "I'm driven by this," he says. "It consumes my life."

–Andrew Lawler