

Reconnaissance Office and received several medals for distinguished service.

Former co-workers describe Mr. Nowinski as a fine engineer and an easy colleague, an unassuming man who took pride in working on secret projects that enhanced American security. They also said he could be insufficiently demanding, a potential weakness for someone running a multibillion-dollar project. Mr. Nowinski did not contest the description in an interview.

His government career had ended abruptly in October 1995, when the C.I.A. fired him for using a government car for personal travel. Mr. Nowinski said he was trying to make the most efficient use of his time when he was swamped with work and had to travel frequently between his home and several government offices in the Washington area.

In 1998, a former C.I.A. colleague, Robert J. Kohler, invited Mr. Nowinski to help Boeing put together its satellite proposal. He was soon living in a rented apartment near the Boeing defense systems offices in Seal Beach, on the outskirts of Los Angeles, working 12 hours a day, 7 days a week on Team 377, the company's secret planning group.

"I never imagined they would compete the business," Mr. Nowinski said. "When Lockheed didn't call, Bob and I figured we'd go with the underdog."

Mr. Kohler recalled that Team 377 requested \$100 million just to draft the proposal; he said Harry Stonecipher, Boeing's president at the time, gave his approval the next day. Before long, more than 300 engineers and other specialists were at work in Seal Beach. If they looked like underdogs, they had history on their side. Mr. Fitzgerald, the reconnaissance office's former deputy director, said the government had traditionally found it hard to resist new bidders on space programs, with their allure of new ideas and lower costs. Indeed, of 18 government space programs re-opened for competitive bidding between 1977 and 2002, all but two ended up changing hands, he said.

Mr. Fitzgerald explained the dynamic this way: "You as the incumbent are probably going to write a realistic proposal because you know what's involved and propose pretty much what you've been doing, since it has been successful. Your competitor, out of ignorance or guile, is going to write probably a more imaginative, creative proposal for which there is almost no backing."

He added, "It's a little like a divorce, and running off with another woman."

The leaders of Team 377 realized that the best hope of impressing the satellite agency was to design a system that was cheaper and better—more technologically

programs and of imagery operations at the National he became head of the agency's satellite development worked on the first electro-optical systems. Eventually, cal engineer, he had joined the agency in 1967 and smaller satellites from his years at the C.I.A. An electrical engineer, he had joined the agency in 1967 and

Mr. Nowinski, 63, was familiar with the concept of As Boeing mobilized, Ed Nowinski seemed the perfect man to pursue the prize.

project for a Rand Corporation study. said Leslie Lewis, a military analyst who reviewed the "Lockheed believed it had this program in the bag."

Marietta (and with it a new name, Lockheed Martin). traditional builder of radar-imaging satellites, Martin What is more, Lockheed had recently acquired the effect, invested more than \$30 billion in its operations.

cessive generations of satellites, the government had, in chise. Over four decades, as the company built suc-

Lockheed all but owned the imagery-satellite franchise. Over four decades, as the company built suc-

ernment officials said. the contract almost as an entitlement, military and gov-

By contrast, the other invited bidder, Lockheed, saw to diversity.

commercial airliner business, the company was trying with the European Airbus consortium threatening its an electro-optical or radar-imaging spy satellite. But

Boeing, famous for making airplanes, had never built an electro-optical or radar-imaging spy satellite. But

of F.I.A. That could be an apt epitaph for Boeing's handling

posals is different from building winning hardware." satellites, said in an interview, "Writing winning pro-

played a leading role in the early development of spy Science and Technology at the C.I.A. in 1963 and

Albert D. Wheelon, who founded the Directorate of

A Company Trying to Diversify

called Future Imagery Architecture.

Even so, in January 1997, the agency invited military companies to a classified briefing about the project now

he had ever seen.

"Agency parlance for cautionary notes— recalled, the board's review "had the most reds and

deputy director from August 2001 until last April, years. As Dennis D. Fitzgerald, the agency's principal

given the expected \$5 billion budget cap for its first five stage, questioned the feasibility of the new approach,

acquisition board, which reviewed programs at an early conceptual thinking to concrete planning, the agency's

In early 1997, as the project began to move from

Congress had set a cap of \$5 billion for the first five years, with spending limited to \$1 billion a year. (It also budgeted \$5 billion more for the life of the project, including multiple satellites.) While the prime contractor could seek additional financing for anticipated costs, the contract would discourage overruns or delays with financial penalties.

Also, the satellite agency, under pressure from Congress to control costs, would no longer have a reserve fund. "From 1961 to 1995, the N.R.O. had never delivered a program that I'm aware of on cost or on schedule," Mr. Fitzgerald said, adding, "But we always had this margin that would allow us to buy our way out of problems."

To underscore the importance of the budget cap, the agency changed its system for scoring contract bids. Previously, price had rarely accounted for more than 25 percent of a company's score. Now it would account for 50 percent.

As Boeing was putting the finishing touches on its proposal, Mr. Kohler said he warned the company that a \$5 billion bid was unrealistic.

"I did a simple calculation," he recalled. "I took what it had cost to build a comparably complex system before, figured in inflation, and realized the project would cost \$4 billion more than the government had planned and Boeing was proposing."

"I said, 'We can't submit that bid,'" Mr. Nowinski rejects the idea that the bid was off base. "We were very meticulous in putting together the proposal," he said. Still, he acknowledged, "It's true there was little if any margin to work with."

Mr. Fitzgerald compared the bidding to liar's poker, a game based on the serial numbers on dollar bills that relies heavily on bluffing and gamesmanship.

"There's a lot of money on the table, and no wants to say that they can't do it," he said. The ethic, he added, is "win the program at any cost and sort it out later. Correct the government's sins and my sins with overruns."

This time around, that would prove impossible.

Winning Bid Is Announced

The National Reconnaissance Office announced its decision on September 3, 1999, after studying the bids for nearly a year. The top brass at Seal Beach gathered in shift sleeves at 9 a.m. in the office of Roger Roberts, head of Boeing's satellite operations. Over the speakerphone,

daring—than anything Lockheed might propose. Having worked closely with Lockheed while at the C.I.A., Mr. Kohler said: "I knew what Lockheed Martin was going to do. We would do things 180 degrees differently."

Multiple Design Challenges

Designing and building a precision-pointing, high-resolution electro-optical satellite—roughly the equivalent of the Hubble Space Telescope—requires melding many engineering disciplines.

The satellite must withstand the explosive force of being rocketed into orbit, then operate flawlessly for years in the unforgiving environment of space. To position itself for picture taking, it requires delicately tuned attitude control and propulsion systems.

The electro-optical system presented an especially formidable challenge. The large, heavy satellites of the past had been effective at limiting the movement and vibrations that might mar picture taking, just as a tripod can eliminate blurred images with hand-held cameras.

Boeing, in effect, sought to replace the tripod with a system that would automatically adjust the image to compensate for any vibration, much as a camcorder does, but on a far grander, more exacting scale.

The team also wanted an optical system that could take wide-angle images, showing large areas on the ground, as well as tightly focused, detailed pictures of small objects. The goal, to use an oversimplified analogy, was a revolutionary zoom lens.

As for the radar-imaging satellite, Boeing designed a relatively simple system with one major exception: to improve image quality, it would produce a far stronger radar signal than any previous satellite had.

Pulling off such complex new technology typically requires extensive testing and work on multiple solutions to especially difficult problems. There is no margin for error—once in orbit, a broken satellite cannot be easily fixed.

Yet the budget for F.I.A. was limited and not very elastic, unlike those for many earlier projects.

"Some programs are slightly underfunded, some are significantly underfunded," said Mr. Young, chairman of one of the panels that examined the project and a former Martin Marietta executive. "F.I.A. was grossly underfunded."