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A STREAM ODYSSEY

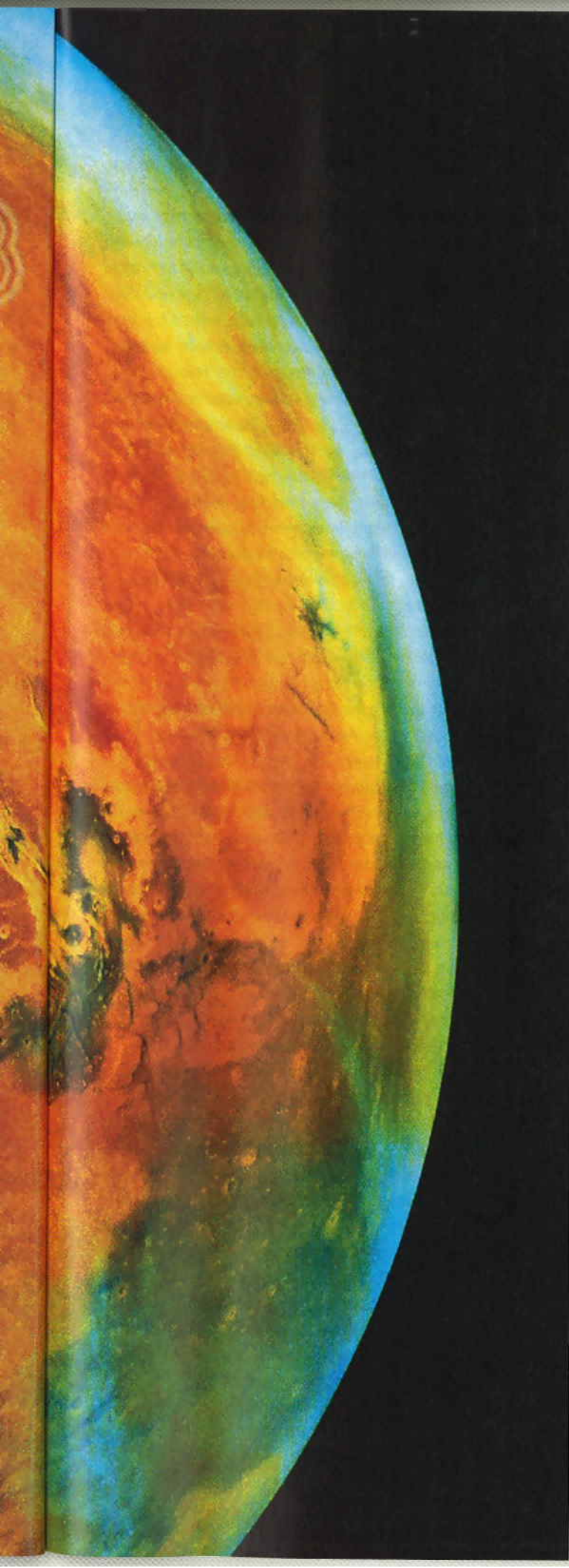
NASA'S GLITCHY INTERNAL COMMUNICATIONS BOTCHED THE MARS CLIMATE ORBITER'S MISSION, BUT OUT OF THAT EXPERIENCE SPROUTED **A SOLUTION** IN THE FORM OF STREAMING TECHNOLOGY.

An astronaut films a space walk. NASA will stream video via satellite from the space shuttle next January.

ON JANUARY 11, NASA CHIEF ADMINISTRATOR Daniel Goldin and chief engineer Brian Keegan entered the auditorium of the government agency's Washington, D.C. headquarters for a streaming videoconference. After screening a pre-recorded interview segment, the webcast went live, and Goldin and Keegan responded directly to staff questions about a failed Mars mission and a report highlighting NASA's communications problems.

Agency engineers encoded the video feed from NASA's Betacam and sent it through the agency's wide area network to more than 300 employees in 13 facilities throughout the United States. "If you don't fail, you don't learn," Goldin argued in the webcast. "NASA is an exploration organization, and we'll never open the frontiers by playing it safe. If you have a 10 out of 10 success rate, you've set mediocre goals." This was the first time Goldin had used webcasting to discuss a controversial agency-wide report with his staff. It was a test case for NASA's use of streaming media. ▶





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The story of Goldin’s embrace of streaming media began a year earlier. On Thursday, September 23, 1999, a NASA spacecraft was about to enter the orbit of Mars when a misunderstanding emerged between flight controllers at the agency’s Jet Propulsion Laboratory (JPL) in Pasadena, Calif., and another team of controllers at Lockheed Martin in Colorado. One team was using metric units of measurement, while the other was using English units. The confusion sent the Mars Climate Orbiter more than 80 kilometers (50 miles) off course, crashing into the surface of the red planet.

Agency investigators spent the next year trying to understand the blunder. The answer lay in the scale and complexity of the organization. NASA has 15 separate centers, spread from Washington, D.C. to White Sands, NM, with different areas of expertise and different computer systems, running hundreds of parallel projects from research and education to administration and exploration. Each center works independently, and a culture of individualism prevails among employees. Multi-center missions for NASA are the exception rather than the rule, and demand a high level of cohesion between separate facilities that do not instinctively interact. In the rush to work together, basic information gets lost, sometimes with disastrous consequences.

NASA's Streaming Architecture

Ames engineer Alan Federman worked with headquarters webmaster Charles Redmond to make sure that the agency's test-case webcast ran smoothly on January 11. NASA delivered 300 streams at 358Kbps to agency facilities throughout the country.

10,000 schools and other formal and informal learning institutions

Ames Research Center

Dryden Flight Research Center

INTERNET

Johnson Space Center

Marshall Space Flight Center

Glenn Research Center

Goddard Space Flight Center

Headquarters

Classroom of the Future (NASA educational program)

Langley Research Center

Wallops Flight Facility

Kennedy Space Center

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Engineers work on the upper stage booster of the Mars Climate Orbiter. Failures in the Mars program led NASA to reconsider its internal communication policy.

