unresolved question in an ambitious effort to denationalize Japan's academic institutions. Moves along these lines grew out of efforts launched in the mid-1990s to slim the country's bureaucracy. The academic community at first resisted the reform push, seeing it primarily as an attempt to cut spending. But it has since warmed to the idea. Independence would in principle give universities a freer hand in structuring programs, setting research priorities, and handling budgets—functions now scrutinized by the education ministry (*Science*, 13 August 1999, p. 997).

Although the die is cast for the overall direction of the reforms, the ministry and its advisory councils will begin hammering out the details of implementation only after the recommendations are finalized. One thorny question is whether the new rules will apply to current employees or only to those hired after the institutions become independent. The consensus of the ministry's labor subcommittee is that it would be best to put existing faculty members on fixed-term contracts and make them earn reappointment.

It is unclear, however, whether the government has the legal right to alter the status of current employees. There are also practical matters to settle, including how to fund pensions for employees put on contract. "There could be a lot of problems during the transition phase," says Nishikawa. Resolving such issues could take "2 years or 3 years or longer," says Naokazu Odani, head of the ministry's university reform office. For many academics looking to break free of Japan's rigid bureaucracy, it may well be worth the wait. **–DENNIS NORMILE**

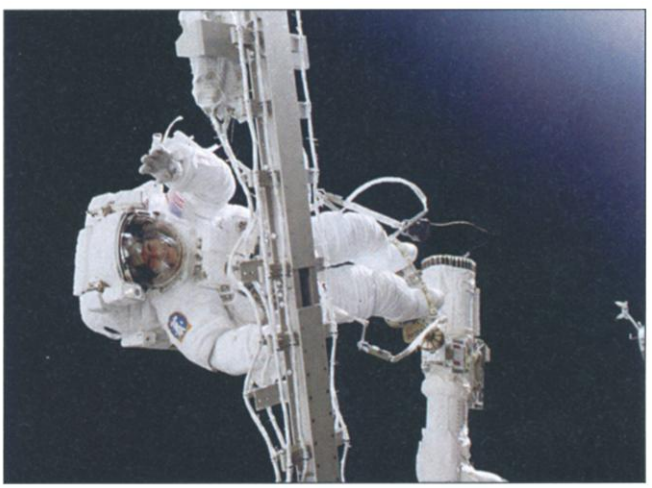
SPACE SCIENCE

NASA Decision Not Suited for Women

NASA has halted work on a $16 million program to develop a space suit designed for smaller women. The decision, which could make it harder for women to make it into space, comes at a time when only one female astronaut is slated to fly aboard the international space station in the next 3 years. Together, these developments raise concerns among some engineers and researchers that biomedical data gathered aboard the orbiting lab will be skewed toward men.

NASA officials blame budget pressures for the recent decision, saying they can't afford the $9 million needed to complete work on the new, smaller suit and that only a small percentage of women astronauts would be affected. But a recent internal report obtained by *Science* urged NASA to continue the program, arguing that a smaller suit would benefit some 20% of the astronaut corps—including smaller men. Critics of the decision, many of whom requested anonymity, also note that NASA in recent years has spent millions on an extra-large space suit and a redesigned Russian Soyuz capsule to accommodate bigger men. "The lack of a small suit precludes lots of women from flying," says Yvonne Brill, a retired engineer and former member of NASA's Aerospace Safety Advisory Panel.

Space suits are complex assemblages of arms, gloves, legs, and boots of varying length held together by a hard upper torso. And they are expensive, thanks to the custom design and batteries of tests required on the ground before flight. That upper torso now comes in three sizes: medium, large, and extra-large. They fit some 90% of all men but only approximately 60% of all females, who tend to have narrower chests and shorter arm spans, according to Paula Hay, deputy program manager at Hamilton Sundstrand, which builds the suits for NASA. The smaller size would have accommodated up to 95% of women, she adds. Almost one-third of the current corps of nearly 100 mission specialists—astronauts who are not pilots—are women.



CREDIT: NASA

Well suited? Anchored to a robotic arm, astronaut Susan Helms works in orbit during a March 2001 shuttle mission. Only one other woman is scheduled for a space station flight through 2004.

Until the late 1990s, NASA offered a different kind of space suit that came in five sizes, including small and extra-small. That model was gradually abandoned for one that allowed astronauts to perform more complex maneuvers, such as building the space station. The large and medium sizes first flew in 1998. The extra-large version, which fits about 20% of all astronauts, was added in 2001, and the smaller version was slated to debut in 2003.

The current suit puts some women at a disadvantage in qualifying tests, because it often is not a good fit. In order to fly, astronauts must demonstrate their maneuverability while in Houston's Johnson Space Center Neutral Buoyancy Lab (NBL), a large swimming pool that mimics zero gravity. Women who performed well during tests using the old suit have had trouble managing the hard upper torso version, according to the internal NASA study, "and therefore cannot perform well in the NBL." Low scores make it hard for astronauts to win coveted slots aboard space flights, says Brill. The small hard upper torso suit would have given smaller women a better fit.

The issue goes beyond gender balance, says Judith Swain, chair of the medicine department at Stanford University in Palo Alto, California, and a member of the National Research Council's space biology panel. "There's a big advantage in flying smaller people," she notes, because they consume fewer resources and take up less room on the cramped space station. "This decision seems a little bit shortsighted." And a 1999 workshop report by the National Space Biomedical Research Institute in Houston strongly urged NASA to increase data-gathering on women, given the differing effects that microgravity likely has on the sexes. The report added that "a space 'glass ceiling' should not exist based on size or gender."

Even with a new suit, however, getting more women into space may be difficult. NASA managers are considering significant cuts to the astronaut corps as another budget-saving measure, a move that some agency officials say could further reduce the number of women astronauts who make it into orbit.

Shannon Lucid, NASA's new chief scientist and a veteran astronaut, declined comment on both matters. Critics of the decision say they may seek out receptive members in Congress, who have repeatedly heard NASA officials describe how more data about women's health in space might lead to advances in solving Earth-bound problems such as osteoporosis. That audience, they note, includes Senator Barbara Mikulski (D–MD), chair of the panel that oversees NASA's budget. NASA officials have left themselves some room to maneuver, however, should the politics get hot. Agency spokesperson James Hartsfield called the decision a "deferral" rather than a cancellation. But with 2.5 more years of work needed to get the small suit ready, any delay decreases opportunities for women. **–ANDREW LAWLER**