budget. "We're prepared to share the pain and make the tough decisions [about planning for 1996]," Lane told *Science*. "But we're still hoping for the best," he added.

At other agencies, the problems extend beyond funding levels. The memo's emphasis on peer review has a real downside for agencies such as the Department of Energy (DOE) and the National Aeronautics and Space Administration (NASA). These agencies fund thousands of scientists and engineers at in-house laboratories without following the type of merit review found at NIH or NSF. Says Gibbons: "It's going to be much more difficult" for DOE and NASA "to institute the kind of peer-review process that's going to be needed" to comply with the Administration's R&D guidelines.

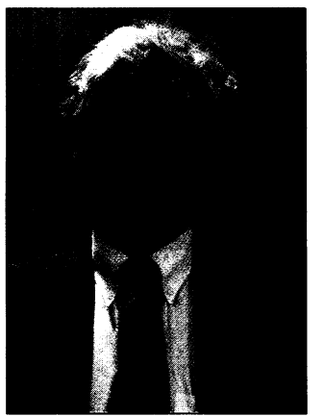
Perhaps DOE is under the most pressure: A commission on the future of DOE's national labs isn't scheduled to complete its work until February, but Gibbons says "I don't think DOE can wait" that long to develop a plan to shift more of its research dollars into competitive, extramural programs. Talks are already underway between OSTP and DOE officials, he added, about speeding up the process. All indications are that these talks could become a bit heated.

–Jeffrey Mervis

SPACE SCIENCE

Europe Lays Plans to Shoot the Moon

PARIS—When it comes to collaborating with the United States, the European Space Agency (ESA) has gotten tired of getting its fingers burned. In 1981, when the budget ax fell on the U.S. National Aeronautics and Space Administration (NASA)'s contribution to the International Solar Polar Mission, ESA's Ulysses probe—now en route to the sun—was left to make the journey without a companion craft. Last year, when the victim was NASA's Comet Rendezvous Asteroid Flyby mission, ESA had to tear up plans to contribute equipment to that probe. And officials at ESA's Paris-based headquarters are once again nervously eyeing developments in Washington, as congressional budget-cutting vultures circle the NASA-led international space station—a project that has already consumed some $850 million of ESA's precious funds. All of which seems to have convinced the Europeans that they can no longer play second fiddle to the United States.



ESA

Taking the lead. ESA science director Roger Bonnet.

Earlier this week, ESA made a dramatic bid for a new leadership role in space exploration. In a plan unveiled to the press in Paris on Monday, ESA officials urged that the next big international collaboration in space science be a European-led program of moon exploration. The plan proposes starting with probes soon after the turn of the century and moving rapidly toward a crewed lunar base that could be in place before 2020. "[A] return to the moon could be an intermediate step between the international space station and a manned Mars program," adds Roger Bonnet, director of ESA's science program.

ESA officials concede that a crewed base could be completed only as part of a major international effort. But they want to establish their leadership credentials quickly and don't intend to wait for an international agreement to pursue the entire program before starting their assault on the moon. "[We] don't want to spend years in meetings," says Jean-Jacques Dordain, ESA's associate director for strategy, planning, and international policy.

Indeed, the first component of the ESA plan—a lunar lander costing around $400 million that would test the possibility of doing astronomy from the moon as well as new technologies for extracting oxygen from the lunar soil—will be presented to ministers from ESA's member states next year. If they approve funding for the project, says Dordain, the lander could be launched as early as 2001. A possible successor, a $300-million remote-sensing lunar orbiter, is among five proposals competing for funding from within ESA's existing space science budget and could be launched in 2003. Later, a projected series of robotic stations and observatories would culminate in a crewed base.

Many scientists are convinced that a presence on the moon would open exciting new research opportunities. "There is unanimous agreement that the lunar surface is the ideal site for astronomical observation," says Pierre Léna, an astronomer at the Paris Observatory and one of 150 scientists and engineers from the major space-faring nations who gathered in the Swiss resort of Beatenberg this week to discuss ESA's proposal. The moon's low seismic activity, Léna says, makes it a good platform for interferometry—the technique of merging signals from detectors placed at varying distances apart to give much higher resolution images of distant objects than are possible using a traditional telescope. And radioastronomers, by making observations from the far side of the moon, would escape the radio interference they contend with on Earth. Then there is the appeal of making a more complete study of the moon itself. Past lunar probes and crewed missions explored only 14% of its surface, leaving unsolved such major scientific mysteries as whether the moon and Earth originated separately or were torn apart in a primordial cataclysm.

For Bonnet, moreover, the lunar program offers a chance to cement ESA's growing reputation as a sponsor of top-quality space science (*Science*, 30 July 1993, p. 540). "The moon initiative is just the kind of visionary idea we need," says Kenneth Pounds, a space scientist and chief executive of the U.K. Particle Physics and Astronomy Research Council. But Bonnet notes that ESA's member governments will be at least as interested in the potential industrial spin-offs from the program as its scientific content. And he expects to encounter some skepticism. "It will be a hard job to sell this to the ministers."

That job may be easier if ESA officials can win support from Russia and Japan. Despite Russia's current economic problems, says physicist Hans Balsiger of the University of Bern in Switzerland, who headed an earlier moon exploration feasibility study for ESA, "the Russians still have a huge capability for launching things." And Tsutomu Iwata, who heads the spacecraft lab at Japan's National Space Development Agency—which has already begun working on its own lunar exploration program—told *Science* that Japan is "very interested" in collaborating with ESA.

Eventually, ESA would also like to gain support from NASA. But Carl Pilcher, a NASA official who heads its Mission from Planet Earth office, offers only modest encouragement: "It's very clear from a budgetary standpoint that NASA is not prepared to make a large financial investment. But...we could be involved if our dollar investment was not large."

Either way, the Europeans want nothing like the old style of relationship with NASA, in which they have often felt like second-class citizens. The Americans must "learn how to really collaborate and take other opinions seriously," says Balsiger. And in launching its bid for leadership in lunar exploration on the eve of the 25th anniversary of NASA's high point, the Apollo 11 moon landing, ESA's timing could hardly be more symbolic.

–Michael Balter

Michael Balter is a science writer in Paris.