If all goes according to plan, the X-MP will be delivered to the Illinois center in August and become accessible by next January. The center will receive about $45 million from NSF and at least $30 million from other sources, including $15–20 million from the state government. Smarr is euphoric: "I want this to be the primary place on the planet for making computers work for science over the next decade or two."

From ORDVAC to HAL. Illinois has a long history in computers. It built ORDVAC, a machine based on John von Neumann's computer design for Princeton just after World War II; ORDVAC became operational before the Princeton computer. Later, Illinois gave birth to the ILLIAC series, the last being the ILLIAC IV, used at NASA's Ames Research Laboratory from 1972 until it was taken out of service in 1982. "HAL," the talking computer in the Arthur C. Clarke–Stanley Kubrick movie, "2001: A Space Odyssey," was said to have been "born" in Urbana. More recently, on 4 February, DOE and NSF announced grants totaling $9 million to the U of I Center for Supercomputing Research and Development, headed by David Kuck. The R&D center seeks to build an experimental supercomputer based on Kuck's ideas for multiprocessing.

The Princeton center is to be known as the John von Neumann Center, after the Hungarian-born mathematician whose sequential information processing idea is the basis for almost all of today's computers. It will be managed by Steven A. Orszag through the Consortium for Scientific Computing, a collection of 12 universities that includes Brown, Harvard, MIT, NYU, Princeton, Rutgers and the Institute for Advanced Study. Its director is Albert Brenner, who has agreed to leave Fermilab. Its machine, a Cyber 205, will be delivered this fall, then upgraded to a multiprocessor supercomputer called ETA-10, currently under development by ETA Systems for full use in March 1987. NSF will give the center about $75 million. Another $48 million will come from members of the consortium, the state of New Jersey and ETA Systems. Part of the $123 million will be spent for several 1.544-megabit circuits, including a single fiber-optics communication link between participating universities.

The crown jewel of the San Diego center will be an X-MP to be delivered next January. It will be located in a new building on the university campus and managed by GA Technologies. The center will receive some $65 million from NSF and $35 million from such other sources as Cray Research, along with $1 million per year from the state of California. According to its director, Sidney Karin, the center will be "up and running" early next year, linking 19 universities and research institutions by satellite and broadband communications. Members of the San Diego consortium include Caltech, the National Optical Astronomy Observatories, Stanford, UCLA, the Scripps Institution of Oceanography and the state universities of California at Berkeley, Hawaii, Maryland, Michigan, Utah, Washington and Wisconsin.

IBM and FPS. The Cornell facility, to be known as the Center for Theory and Simulation in Science and Engineering, is clearly different from the others. Though it will be supported by a grant of approximately $25 million from NSF over the next five years, it expects broad participation from industrial firms. Thus, IBM is contributing a 3084 QX mainframe computer, which will be combined with a number of FPS 164 and 264 array processors made by Floating Point Systems of Portland, Oregon. Eventually, says Wilson, the center's director, he expects to acquire a novel prototype of a highly parallel supercomputer.

Wilson claims his center will have "a profound impact on industry." It may develop into a US counterpart of Japan's Institute for New Generation Computer Technology (or ICOT, when translated from the Japanese), which seeks to be first with a fifth-generation machine. Equally important, it could pioneer more adventurous use of commercial hardware, says Wilson, through a comprehensive attack on the problems of parallel processors. Wilson and Cornell officials already have approached some *Fortune* 500 companies to take part in the project. General Electric has already made known its intention to join. "Our research requirements for supercomputing are not big enough yet to justify having one of our own," says Roland M. Schmitt, GE's senior vice-president for corporate R&D (and chairman of the National Science Board, which sets policy for NSF). "But access to the Cornell center should prove a benefit to us." One caveat for private companies: Corporations using the Cornell center will be prohibited from proprietary research.

For their part, though, scientists are already queuing up for computing time at the centers. At the University of Illinois, meteorologist Robert B. Wilhelmson plans to study severe storms that whip up tornadoes and windbursts that endanger aircraft. Lawrence Klein, Nobel Prize-winning economist at the University of Pennsylvania, wants supercomputer time to build a comprehensive model of the world economy. Saul A. Teukolsky and Stuart L. Shapiro at Cornell propose to simulate the collapse of star clusters that form massive black holes. While these and other uses of supercomputers are going on, researchers will be working alongside Wilson at Cornell and Kuck at Illinois to develop even more powerful supercomputer architectures and new software. —IG

Reagan lauds SDI; Shultz scolds scientists

From mid-February to the end of March, President Reagan demonstrated his mastery as an amiable political leader before a diversity of assemblages of scientists and engineers. At first, on 12 February, after lunch in the White House Gold Room, the President spoke briefly to some 100 prominent scientists that one of his aides thought to identify with the title "New Pioneers." Reagan praised them, 39 Nobel laureates included, for "revolutionizing our lives." He then urged them to forsake "a fatalistic acceptance" of today's nuclear-arms impasse and not to "start thinking small now" about his proposed space defense against ballistic missiles. On 29 March The President received the Robert Goddard Award from the National Space Club after lunch in a Washington hotel. He took the occasion to promote once again his Strategic Defense Initiative, which he admitted has been labeled "Star Wars." "But it isn't about war," he said. "It's about peace. It isn't about retaliation; it's about prevention. It isn't about fear; it's about hope. And in that struggle, if you'll pardon my stealing a film line—the force is with us." Later he said: "Let history record that in our day America's best scientific minds sought to develop technology that helped mankind ease away from the nuclear parapet. Let us move on to a happier chapter in the history of man. And I would think any scientist would be proud to help turn that page."

Similar themes were voiced by Secretary of State George P. Shultz—with one major difference. Invited to address scientists, businessmen and government officials after dinner on 6 March in the Great Hall of the National Academy of Sciences, Shultz was introduced by NAS President Frank Press as "the first Secretary of State to think seriously" about the relationship of science and the nation's foreign policy. Hearing no objections to that description, Shultz proceeded to bite at the hands that fed him.

"On a wide variety of complex issues," said Shultz, "the American people look to scientists as an important

source of information and guidance. In a nation like ours, where knowledge is valued and the search for truth is considered among the noblest of human endeavors, the scientist naturally and properly commands great respect. With that respect, however, comes responsibility.

On brilliance. "Too often in recent years we have seen scientists with well-deserved reputations for creative achievement and intellectual brilliance speaking out on behalf of political ideas that unfortunately are neither responsible nor particularly brilliant."

Shultz observed that "it is not surprising that scientists will have strong views on such technically complex matters as nuclear weapons, arms control and national defense. But the core issues in dispute here are really not technical, but political and moral. Scientists should not expect their words to have special authority in nonscientific areas where they are, in fact, laymen. Scientists are not specialists in the field of world politics, or history, or social policy or military doctrine. As citizens of a free society, they have every right to take part in public debate. But they have no special claim to infallibility."

This was said softly, somewhat diffidently, but with conviction, for, as one of his aides indicated afterward, the reproach of scientists for expressing viewpoints at odds with official positions on political and social issues had White House approval. "In the Oval Office this is compared with a baseball hero who boosts a brand of breakfast food," said the aide. "A ballplayer may be tops at what he does, but he's not an expert on human nutrition."

Much of Shultz's speech filled in details of remarks Reagan has made before similar groups. Even the words had a familiar ring. Shultz accordingly chided his audience for their pessimism—for a "mood, more one of fear than of hope" about, for instance, the limits to growth that some scientists issued warnings about in the 1960s and 1970s. "The revolutions in science and technology have opened up seemingly limitless possibilities for transforming our world," said Shultz. "With each new breakthrough, however, come new and difficult dilemmas. For while we may seek ways to change the world around us, there is also much we would like to preserve. Our civilization is not based on material things. Our culture, our moral values and our political ideals are treasures that we would not sacrifice even for the most amazing scientific miracle.

On morals. "Breakthroughs in biological engineering, for instance, raise fundamental moral questions about man's proper role in the creation and alteration of life, even as they offer new hope to cure disease, produce food and broaden our understanding of the origins of life.... We need to ensure that the revolution in communications does not infringe on our right to privacy, even while recognizing the enormous benefits of improved communication for education and for bringing the world closer together. This is the human condition: The creativity that is one part of our nature poses constant challenges to the morality that is another part of our nature...."

One of the most striking of today's scientific and technological dilemmas, according to Shultz, is "the issue of strategic defense. Here the great challenge to us is not simply to achieve scientific and engineering breakthroughs. As real a difficulty is to come to grips with what Einstein called our modes of thinking.... Adapting our ways of thinking is never an easy process. The vehemence of some of the criticism of the President's Strategic Defense Initiative seems to come less from the debate over technical feasibility—which future research will settle one way or another in an objective manner—than from the passionate defense of orthodox doctrine in the face of changing strategic realities. We are proceeding with SDI research because we see a positive and, indeed, revolutionary potential: Defensive measures may become available that could render obsolete the threat of an offensive first strike. A new strategic equilibrium based on defensive technologies and sharply reduced offensive deployments is likely to be the most stable and secure arrangement of all."

Another complicated dilemma vexed Shultz: "We maintain a science and technology relationship with the Soviet Union ... even though we must work to ensure that the technologies we share with the Soviets cannot be used to threaten Western security.... The Soviet Union has for decades sought to gain access, through one means or another, to the technological miracles taking place throughout the free world.... We seek an open world, where technological advances and knowhow can cross borders freely. We welcome cooperation with the Soviet Union in science and technology. And yet in the world as it exists today, the West has no choice but to take precautions with technologies that have military applications. Cooperation with our allies is essential. Countries that receive sensitive technologies from the United States must maintain the proper controls to prevent them from falling into the hands of our adversaries.

"Scientists can help us think through this difficult problem. What technologies can be safely transferred? How do we safeguard against the transfer of technologies that have dual uses? Where do we strike the balance?"

These questions were not answered by members of the audience in the four-minute question-and-answer period following Shultz's speech. Nor were there questions or comments on the Secretary's disapproval of scientists who oppose government policies. —IG

At last, a new deputy director for NSF

President Reagan has nominated John H. Moore, an economist who is associate director of the Hoover Institution at Stanford, California, as deputy director of the National Science Foundation. The post has been vacant for more than two years, ever since the resignation of Donald Langenberg, now chancellor of the University of Illinois's Chicago Circle campus. Langenberg was one of three top NSF officials suddenly asked to resign in 1982 when Reagan named Edward A. Knapp, a Los Alamos physicist, to head the agency. Some scientists and Congressmen charged at the time that the action was politically motivated—a situation considered without precedent in NSF history. Questioned about the matter at his confirmation hearings in the Senate, Knapp insisted he had the right to choose his own team (PHYSICS TODAY, July 1983, page 60).

Last year Reagan picked Erich Bloch, an engineer who was then a vice-president at IBM, to fill Langenberg's position. But when Knapp resigned last summer to return to research at Los Alamos, Bloch was elevated to the top job (PHYSICS TODAY, July, page 59).

Moore was a research chemist at Procter & Gamble Co from 1959 to 1963 after earning a BS in chemical engineering and an MBA from the University of Michigan. His PhD in economics came in 1966 from the University of Virginia, where he taught the subject from 1966 to 1977. After teaching at the University of Miami and Emory University, in 1981 he joined the Hoover Institution, a conservative think-tank on the Stanford campus.

Since 1982, Moore has served as a member of the National Science Board, the policymaking body for NSF. As such he is expected to win Senate confirmation, possibly without hearings, despite concerns about his political views. Moore is not the first Science Board member to be appointed to the staff at NSF. In 1972, H. Guyford Stever, then president of Carnegie-Mellon University and a board member since 1970, became NSF director in the Nixon administration. —IG □