

fessor of mechanical engineering, received a 3-year, \$800,000 NSF grant that offered him the carrot of more money than the usual NSF grant and the stick of having to produce, within 3 years, something of potential value to industry. Kramer, who ran the NSF program (called STRATMAN, for the Strategic Manufacturing Initiative) before returning to George Washington University last winter, was intrigued by Sachs' vision of making ceramic parts layer by layer in hours via computer, rather than months by hand. The idea, based on the technology used by ink-jet printers, has immediate applications for injection molding dies, as well as the potential to fundamentally alter machine-tool manufacturing. The STRATMAN grant, renewed in 1992, convinced 11 companies to sign on, and Sachs drew from that group to seek funding from TRP. Last fall, the program came through with a \$3.1 million grant to a con-

sortium consisting of Sachs' team and seven companies to scale up the process.

That preparation was an essential ingredient in his success, he believes. "Starting from scratch would have been impossible," he says, "because the 2 to 3 years it would take to come up with a physical product just wouldn't cut it for TRP. Now we're able to put parts into people's hands almost immediately, and we can offer a combination of tantalizing near-term results and the long-term prospect of changing the way people do business."

As these programs grow in popularity, some academic scientists have questioned whether the work meets the high standards set by agencies that traditionally fund the bulk of university research. Not to worry, says C. Grant Willson, a professor of chemistry and chemical engineering at the University of Texas, Austin, and principal investigator of two ATP grants while an IBM fel-

low at the Almaden Research Center and manager of its division of polymer science research. "The review that I went through was more rigorous than any I've seen," says Willson, who has received funding and reviewed grant proposals from NSF, ARPA, and other federal agencies.

It is too soon to know whether programs like TRP and ATP can live up to that kind of enthusiasm and give U.S. industry the high-tech shot in the arm the Clinton Administration expects from them. (Ironically, Willson left IBM last fall after 17 years, disheartened by what he characterizes as the company's increasing emphasis on short-term software products over long-term research.) But it is not too early to recognize that they represent a golden opportunity to help academic scientists with ideas that might make a difference in the marketplace.

—Jeffrey Mervis

NATIONAL INSTITUTES OF HEALTH

Report Calls for Smaller Clinical Center

The Clinical Center at the National Institutes of Health (NIH)—the world's largest research hospital—is twice as big as it needs to be, a panel of scientists examining NIH's \$1 billion intramural research program has concluded. NIH officials have long been arguing for funds to replace the 42-year-old hospital, which now has a capacity of 500 beds. A new Clinical Center is expected to cost about \$1.5 billion.

The recommendation to reduce the size of the Clinical Center, *Science* has learned, is a key feature of a draft report by an external advisory group scheduled to be made public next month. The report is part of a far-ranging review of NIH's intramural program that Congress requested last summer. Specifically, the House subcommittee that funds NIH questioned whether the division of labor between the intramural program—which receives 11% of NIH's budget and funds research at 24 institutes, centers, and divisions—and the extramural program that supports investigators across the country was "well thought out." The legislators instructed the NIH director to review the role, size, and cost of the intramural program as "a central part" of the 1995 budget process. A report from an internal NIH fact-finding committee preceded the work of the external advisers.

Testifying on 17 March before the Senate appropriations subcommittee that funds NIH, NIH Director Harold Varmus said he

was still reviewing the outside panel's report, which he described as "address[ing] a number of concerns about maintaining the vitality of the intramural program through recruitment, training, and evaluation processes." He said the Clinical Center "is in a state of increasing decay and should be rejuvenated."

In addition to being the hub of the intramural program, the Clinical Center became a focus of the report because it's "a big-ticket

item," says Michael Gottesman, acting deputy NIH director for intramural research and cochair of the intramural fact-finding committee. And the panel's conclusion that NIH no longer required a hospital with a capacity of 500 beds, says Gottesman, acknowledges significant changes over the years in clinical medicine. "We don't need a fixed number of beds nearly as high as in the past," he says. The center's occupancy rate for fiscal year 1993 was 53%.

Gottesman says the occupancy rate is low in part because the center, like other hospitals, has been putting more emphasis on outpatient care as a way to reduce costs. Over the years, lab work also has replaced many studies that once required human subjects, suggests William Kelley, dean of the medical school at the University of Pennsylvania and an NIH alumnus. But Kelley cautions that the tide is turning toward clinical research again, as results from the human genome project and advances in

molecular biology are leading to a "tremendous explosion" of new experimental drugs and biologicals.

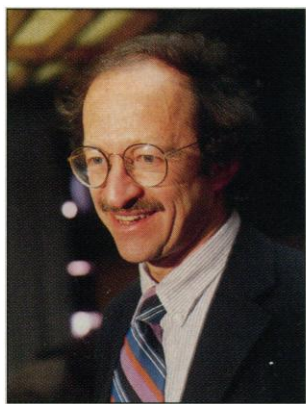
NIH officials have been trying for years to convince Congress of the need for a new facility to replace the aging Clinical Center complex, which houses the hospital and about 40% of the research labs at NIH's Bethesda campus. "The Clinical Center Complex is in serious need of major corrective action to resolve its facilities' deficiencies," the U.S. Army Corps of Engineers concluded in a 1991 report spelling out how the utility systems have "deteriorated beyond reasonable repair" and "violate codes and regulations."

Although the intramural fact-finding committee noted that the price tag for a new facility is steep—between \$1.4 billion and \$1.6 billion—it argued in a report to the external advisers that there is no good alternative. "If you were to renovate the building, you'd end up with a state-of-the-art 1952 building," says Gottesman. "I'm not sure our modern hospital should be based on a 1952 building." Although a smaller hospital, perhaps with only 250 beds, would certainly be less expensive to operate, Gottesman says it would not be that much cheaper to build than one with twice the capacity.

The report of the panel—cochaired by Paul Marx of Memorial Sloan-Kettering Cancer Center and Gail Cassell of the University of Alabama at Birmingham, is expected to be released in early April. Varmus has promised to discuss its details during a round of hearings later in the month before the House appropriations committee that requested the review.

—Jon Cohen

With reporting by Robert Service.



Vital signs. Varmus must heal an ailing hospital.