hear about this university."

Another frequent gripe—besides the unforgiving climate—is that Galveston is, well, a small town in Texas. For Vinetz, it didn't turn out to be the hell he expected; but senior researchers do concede that some people from the East and West coasts absolutely refuse to live here. "In job interviews, I always try to be up-front about it. This is not the center of the cosmos, and there's not a lot to do," says Barrett. "You can work, you can work, or you can get in your car and drive to Houston." But most newly arrived Galvestonians, including UTMB president John Stobo, say they have no regrets about moving here; they like to point out the city's good points, such as considerable historic charm and affordable housing. Stobo, a Massachusetts native and a former vice dean of Johns Hopkins University School of Medicine, has even taken to wearing cowboy boots, which he enjoys showing off. "Once they settle in, most people come to like Galveston," he assures.

And Galveston is trying to keep them coming. UTMB acknowledges that several parts of its infectious diseases profile could be beefed up; for instance some "card-carrying epidemiologists" would be very welcome, says Stanley Lemon, who came here in 1997 to head the department of microbiology and immunology. Lemon studies the molecular biology of hepatitis C, but says he would also like to answer basic epidemiological questions, such as why it infects more Mexican Americans than Caucasians. UTMB is also interested in stepping up surveillance for emerging infections along the Mexican border, says Lemon. Last year, there was a large outbreak of dengue in Texas, and a girl died—the first U.S. casualty from the disease in over 3 decades. "That's a signal of what we can expect," says Lemon. Walker adds that the group also would like to strengthen its efforts in vaccine development and bioinformatics.

With new deadly pathogens popping up almost every year, there's certainly no dearth of study material. And new molecular techniques have made it possible to study and fight them right down to the molecular level, says Walker. "That was my dream, that was what I was hoping would happen," he adds. "It's sort of fun to see so many people involved in doing it." —MARTIN ENSERINK

Information Technology Takes a Different Tack

Challenged by a White House committee to change its ways, the National Science Foundation is looking for far-out ideas in computer science

"Excellent," raved one reviewer about a preproposal from James Allen, a computer scientist at the University of Rochester in New York. But Allen says another dismissed it as "impossible."

Normally, such wildly conflicting reactions would doom a grant application submitted to the National Science Foundation (NSF). But not this time. In fact, the skepticism may have helped: An NSF official, intrigued by the wide variation, plucked Allen's preproposal from the discard pile and gave him the green light to seek up to $3 million over 3 years as part of the agency's new information technology (IT) program.

NSF isn't breaking out of its shell on a whim. By taking more risks than usual, officials hope to encourage researchers to submit proposals that are likely to be more innovative than those the agency traditionally supports. Here's how program manager Michael Lesk describes what he's looking for: "If somebody not in your research group but familiar with your published papers could predict your proposal, perhaps you should rethink it."

As lead agency for a 5-year, $5 billion federal IT program, NSF hopes its boldness will rub off on the other players. And some researchers think that such a fresh, frisky approach would work well in NSF's other programs, ranging from exploring the early universe to plumbing the ocean depths. "The IT program is heading in the right direction," says computer scientist Jonathan Smith of the University of Pennsylvania, Philadelphia. "The question is how fast an agency that is very set in its ways can morph."

Category	Budget (in millions)	No. of preproposals	No. of finalists	No. of awards
Large grants ($500,000 to $3 million/year)	$63	941	200	~30
Small grants (Under $500,000/year)	$27	not sought	1156	~130

Crowded field. High interest will mean a low success rate for NSF's IT program.

NSF officials are not averse to morphing, but they say it is up to each discipline to decide whether to adopt the more freewheeling approach being followed by IT program managers. If the reaction to the IT program is any guide, the community is ready: Computer scientists submitted more than 2000 proposals for the $90 million program, making it one of the largest competitions ever run by NSF's Directorate for Computer and Information Science and Engineering (CISE). Allen's idea—an interdisciplinary research center to study the mechanics of human speech and to create computers that can carry on conversations—was one of 200 that made the first cut; he'll know this summer whether it will be funded. "It's energized the community," says CISE director Ruzena Bajcsy. "Anybody who is anybody in the discipline has applied."

The program's shakedown cruise hasn't been trouble-free, however. NSF officials fret that they are seeing too few innovative ideas from researchers, who perhaps haven't heard—or don't believe in—the IT program's new tune. They've also scrambled to recruit reviewers, as so many computer scientists are already involved in the competition. Researchers, on the other hand, worry that the program's low—less than 10%—overall success rate will scare away entrants next year. To increase the number of future winners, they are pushing Congress to double the program's budget in 2001, despite skepticism from some lawmakers.

Overcoming doubts

Whether or not Congress agrees, researchers say NSF deserves credit for grasping an opportunity to do things differently. That opening was created by the President's Information Technology Advisory Committee (PITAC), a high-profile panel packed with computer company CEOs and prominent academics. Last year, it issued a report aimed at recreating the federal funding climate of the 1970s and 1980s that produced the Internet and other computing revolu-

SOURCE: NSF

tions. It called for a boost in federal spending on information technology by a total of $4.7 billion by 2005 (*Science*, 21 August 1998, p. 1125) and argued that basic research be reinvigorated through larger and longer grants to universities, which have been hard hit by the loss of talent to new dotcoms and the computer industry. To foster innovation, it recommended giving one federal agency the lead in gambling on high-risk concepts with potentially high payoffs.

The Defense Advanced Research Projects Agency (DARPA) has traditionally played that catalytic role in information technology. Among its hits, for example, were the basic studies that led to networked computers and e-mail (*Science*, 3 September 1999, p. 1476). But with DARPA under increasing pressure to focus on military needs, PITAC decided that NSF, with a broader portfolio that covers the natural and social sciences, would be better able to lead the federal government's IT resurgence. However, PITAC urged the agency to shed its cautious reputation and adopt a more aggressive, DARPA-like style. The key to that approach is putting professional staff, not consensus-driven peer-review panels, in the driver's seat on funding decisions.

"PITAC was quizzical because NSF has a reputation for funding incremental proposals," says CISE executive director George Strawn, who supported the move to dust off little-used NSF rules that allow staff to play a larger role in picking grant winners. PITAC also worried that NSF's cautious reputation could hamstring any IT initiative. Researchers have been "trained to think that, unless half the work is already done, don't submit to NSF," notes Penn's Smith, a CISE adviser.

Congress gave the agency's IT budget a 45% boost to kick off the new program, and Strawn, Lesk, and Bajcsy took the revolutionary fervor to heart. CISE's first solicitation listed not just the seven areas that PITAC said needed more research—from writing more reliable software to understanding the social implications of the IT boom—but also a "revolutionary computing" category that included Lesk's litmus test for identifying the kinds of "highly innovative" proposals the agency was looking for.

Rochester's Allen believes that his proposal, which he says "throws caution to the wind," certainly fills the bill. His nine-member team, which includes three researchers not on Rochester's faculty, hopes to take advantage of new eye-tracking technologies, for instance, that show that speakers tend to look at the objects or people they are talking about. Such physical clues could be valuable to a computer trying to understand a conversation's context. The team also wants to study "disfluencies," the "uhms" and "you knows" that seem to be little more than verbal refuse but may actually provide silicon-based ears with valuable information about the speaker's level of uncertainty or state of mind. If such research pans out, it could "radically change the way spoken dialogue systems operate," says Allen, a member of CISE's advisory board.

But revolutions can take time. Despite the outpouring of proposals, Lesk says it appears that many researchers still haven't picked up on NSF's new style. "I'm not seeing as many innovative proposals as I'd like," Lesk told advisory board members earlier this month.

Long odds

All the finalists know that the chances of realizing their dreams are small. Bajcsy expects to be able to fund fewer than 4% of the initiative's more than 200 larger proposals, and just 12% of the 1156 smaller requests, which came in by 14 February. And dazzling scientific promise isn't the only criterion. Unlike her DARPA colleagues in the past, Bajcsy must also fulfill NSF's social mission, which includes everything from helping subpar schools improve their science departments to helping minorities and the poor leap the digital divide. But the community seems to have confidence in her judgment. "One of the most exciting things about this is that Ruzena will be able to make some of the final decisions, and she has excellent taste," says Penn's Smith.

Whoever makes the winners list, "we're going to disappoint a lot of people," says Lesk, including more than 100 researchers who submitted proposals that earned an "excellent" rating from at least one reviewer. Among the high-ranked losers are ideas for large-scale ecological simulations of urban sprawl, better databases of human organs available to biomedical researchers, and social and economic analyses of electronic commerce. Bajcsy hopes another federal agency will find funds for these and other proposals, but she's made limited progress so far. The much bigger National Institutes of Health, for instance, is toying with its own biocomputing initiative (*Science*, 11 June 1999, p. 1742) and so far has nibbled on only one idea, a joint computing initiative in neuroscience. The low proposal success rate also shows Congress that "there is more excellent science out there than we will be able to fund this year," says Bajcsy, who sees that demand as an argument for keeping IT research on PITAC's recommended 5-year upward funding slope.

Key lawmakers seem supportive, if only because they are loath to offend potential sources of campaign contributions in the high-tech industry, which has largely backed the PITAC recommendations. The House, for instance, recently passed a bill sponsored by Science Committee chair James Sensenbrenner (R–WI) that endorses PITAC's call for significant increases in federal IT spending. It is uncertain, however, if the Senate will follow suit. The Senate Budget Committee, for instance, recently concluded that "the need for significant [government] spending on IT ... seems long past."

CREDIT: RICK KOZAK

IT trio. (Left to right) Ruzena Bajcsy, Michael Lesk, and George Strawn are taking a more hands-on approach to NSF's new information technology research program.

For researchers in other fields, an even bigger question is whether the IT program's management style will spread to other NSF programs. NSF director Rita Colwell has repeatedly said that—if she had the money—she'd like to have every program office in the foundation dole out the larger, longer grants offered by the IT program. In the meantime, each NSF directorate has considerable latitude to run its programs as it sees fit. Although the IT program "reflects community input and desire," says NSF spokesperson Mary Hanson, "no one [proposal review] model fits all of the range of disciplines ... represented by NSF."

However, success breeds success. If Lesk and others can show positive results with the IT program, other NSF managers may also be tempted to take advantage of what Strawn calls "capabilities we probably haven't used enough in the past."

–DAVID MALAKOFF

SOURCE: NSF