GOVERNMENT

HEALTH IT

THE MAGAZINE OF PUBLIC/PRIVATE HEALTH CARE CONVERGENCE

MARCH 2008 • VOLUME 3 NUMBER 2

What nurses want

Nurses are demanding that developers design clinical IT for health care's front line

PAGE 22

WHAT HEALTH GRIDS COULD DO

P. 16

ORANGE COUNTY'S DIGITAL SAFETY NET

P. 26

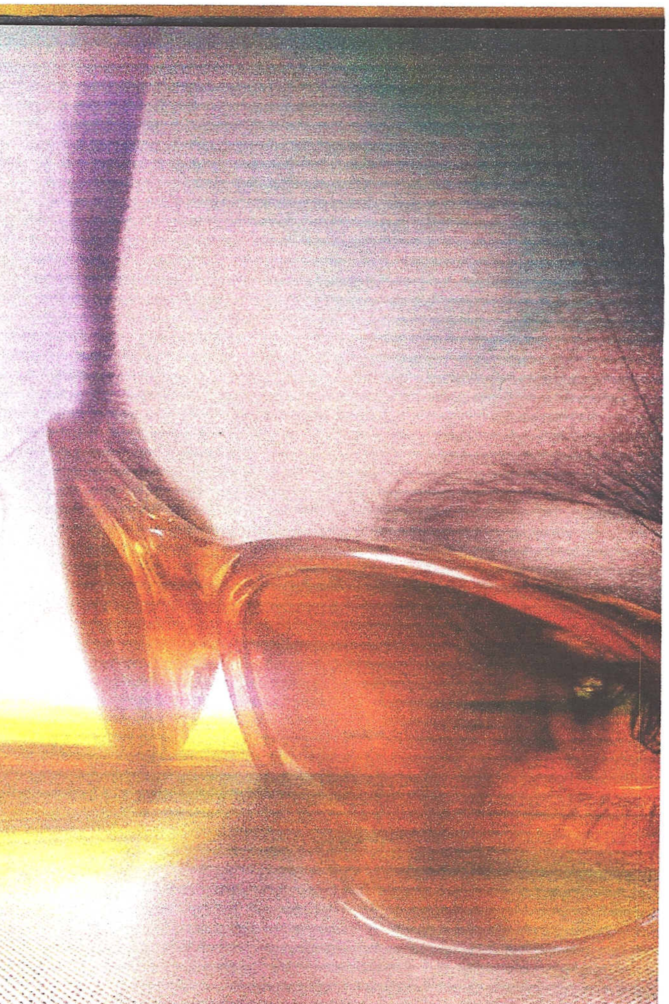
PARTNERS' CRAZY IDEA: 100% HEALTH IT ADOPTION

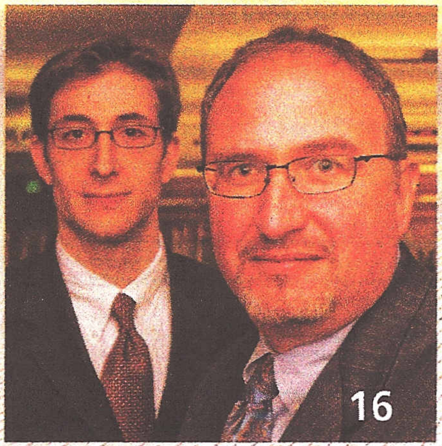
P. 28

Pamela Cipriano, University of Virginia Health System

1105 MEDIA

Contents





COVER CREDIT: ZAID HAMID

GRIDLOCK

A NATIONAL HEALTH GRID COULD HELP CURB EPIDEMICS, BU

BY WILLIAM MATTHEWS

When an outbreak of severe acute respiratory syndrome erupted in Taiwan in 2003, the local health care system was quickly overwhelmed. Hundreds of infected patients crowded the island nation's hospitals. As the high fever and dry cough of early SARS subsided, fluid began to fill the victims' lungs and doctors resorted to daily chest X-rays to monitor their patients' condition.

Soon, diagnosticians were inundated with X-ray images. But the danger of spreading SARS was so acute that doctors and other medical professionals who were in the hospitals when the epidemic began were quarantined there. And specialists on the outside were barred from entering.

The quarantined professionals needed help — not just in interpreting X-rays but in prescribing treatment for a growing population of patients.

Assistance came from an unexpected quarter: Taiwan's National Center for High-Performance Computing.

When SARS struck, the center was in the final stages of establishing a computer node that would connect it to the U.S. Argonne National Laboratory's Access Grid. The grid was designed for virtual workshops, collaborative education, seminars and online conferences. But it was immediately obvious that the Access Grid could also help doctors deal with the epidemic.

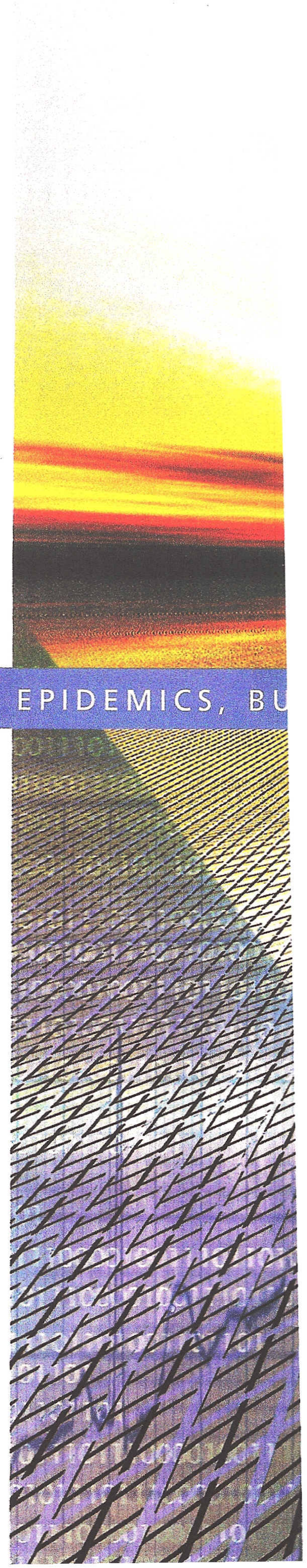
It gave the quarantined doctors a way to share high-resolution digital X-rays with outside diagnosticians and collaborate on diagnoses and treatment plans with colleagues outside the hospitals and even outside the country.

The new grid node was a lifesaver. It enabled collaboration and communication in the midst of a medical crisis in a way that had never before been possible, said Kenneth Hall, a health grid expert at consulting firm BearingPoint.

The ad hoc SARS grid gave Hall and other health grid advocates an intriguing glimpse of the benefits the technology has to offer. The possibilities seem endless.

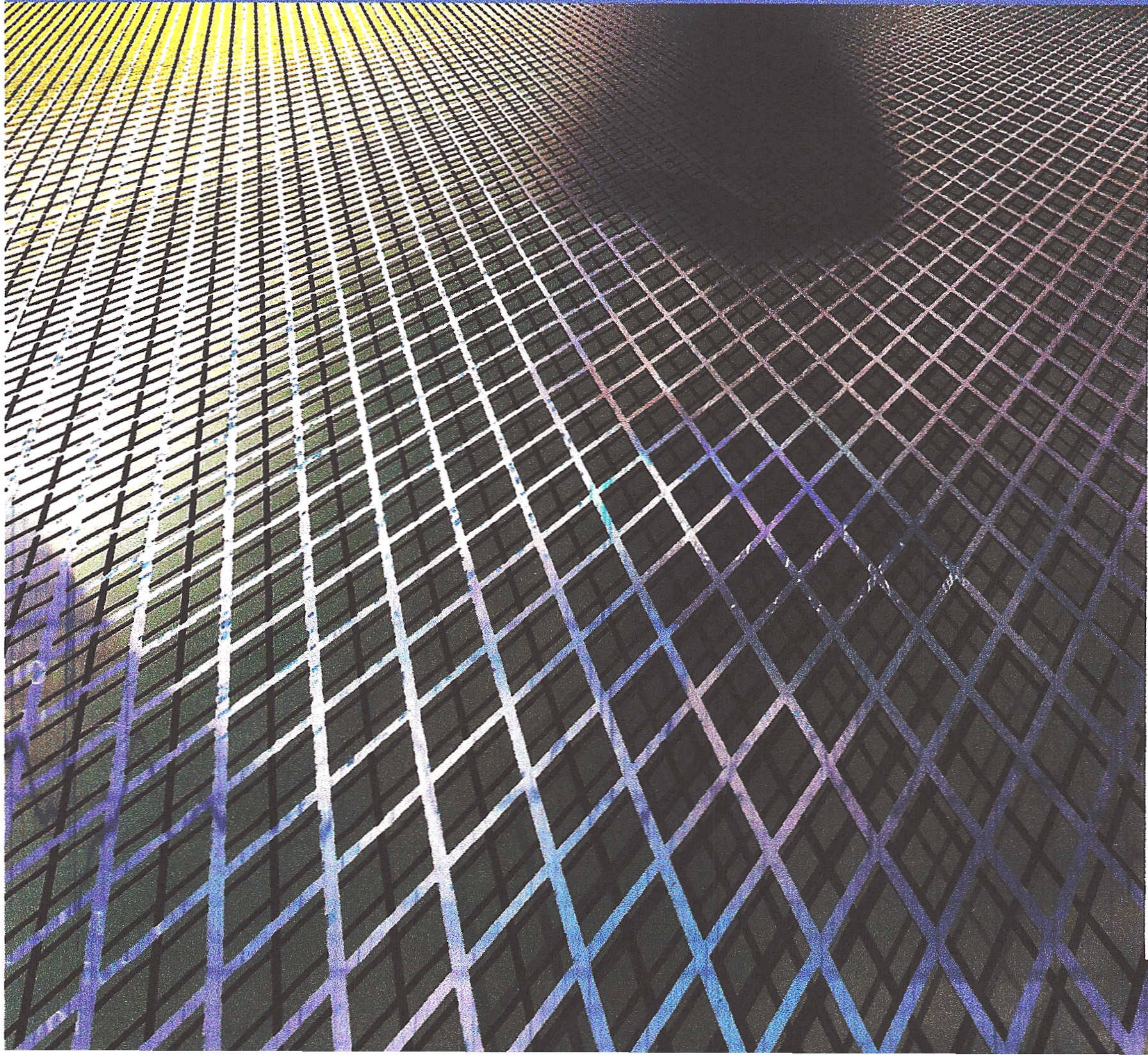
The power of grids

A health grid makes it possible for patients with chronic conditions to wear biosensors that continuously monitor for signs of distress and alert doctors and hospitals when such situations occur.



KIMBERLY CONWAY

IVACY FEARS AND STANDARDS INERTIA HAVE SLOWED PROGRESS



Choosing the best grid features

Proponents of a national health grid say it should combine the capabilities of three types of grids:

- **Computational grids,** which use the collective power of many small computers to perform simulations and analyze, visualize and store data.
- **Data grids,** which make information available for software that mines and analyzes data.
- **Collaborative grids,** which enable geographically dispersed users to work together by sharing data and tools.

— William Matthews

Computers linked to a grid could monitor disease reports as they enter databases nationwide and detect emerging epidemics long before they would become apparent to doctors or public health workers. By compiling detailed disease weather maps, grid-connected computers could predict the likely spread of illnesses and suggest strategies for blocking them.

Doctors at remote locations could consult online with experts when confronted with difficult cases. And researchers scattered across the country could collaborate via shared databases and software tools.

Sensors connected to the grid could detect so-called weaponized organisms, such as anthrax; alert authorities; and trigger database searches to identify specific strains of the organisms, perhaps even revealing their origin.

And the collective computing power of hundreds of computers could make possible the use of innovations such as virtual cadavers. Cheaper and more plentiful than their organic counterparts, virtual cadavers would be valuable for teaching and rehearsing surgeries, said William Fellows, a principal analyst and grid specialist at the 451 Group, a technology industry analysis firm.

New tools fuel collaboration

From his office in Atlanta, Dr. Tom Savel fine-tunes concepts for a nationwide health grid. The acting associate director for science at the Centers for Disease Control and Prevention's National Center for Public Health Informatics envisions an electronic web of doctors, hospitals, public health departments, federal health agencies, universities, researchers and pharmaceutical companies.

Amazingly, the technology to connect all those entities already exists, Savel said. At this point, it's a matter of creating the grid and convincing medical professionals to use it.

In 2006, the Army's Telemedicine and Advanced Technology Research Center assembled a team of university researchers to determine what it would take to develop a national health grid and what such a grid might yield.

In a report released last November, the team concluded that

The building blocks of a national grid

Although the United States could be years away from a national health grid, some of the building blocks are already in place in the form of smaller, less complex, special-purpose computing grids.

As early grids mature, advocates say they could point the way or even become the foundation of a national health grid. Here are some examples.

- **Biomedical Informatics Research Network:** This federally funded grid links two dozen universities and research institutes so biomedical scientists and clinical researchers can share data and collaborate on projects.
- **Cancer Biomedical Informatics Grid:** The National Cancer Institute launched the grid in 2004 to improve cancer treatment by enabling researchers, physicians and institutions to share data and research tools.
- **FightAIDS@Home:** Participants download and install free software on their computers, and FightAIDS@Home uses the computers' idle time to run models that test new drug treatments for HIV. Developers say it is the first biomedical distributed-computing project. The Olson Laboratory at the Scripps Research Institute runs it.
- **Medical Imaging and Computing for Unified Information Sharing:** Developed at the University of Southern California's Information Sciences Institute, MEDICUS uses grid technology to enable hospitals, clinics and doctors to exchange medical information and images.
- **Johnson & Johnson:** Pharmaceutical companies have been some of the earliest adopters of grid technology. "The most advanced of these has been Johnson & Johnson," said William Fellows, a principal analyst and grid specialist at the 451 Group. In mid-2007, Johnson & Johnson was running more than 15 applications on 2,000 computers to analyze drugs.
- **NC Bioportal Project:** This three-year-old Web portal trains North Carolina students and helps researchers. It taps the bioinformatics, genomics and computing resources of North Carolina's Renaissance Computing Institute, three universities and a community college.
- **Public Health Information Network:** Although it is not a grid, PHIN was created to promote the development of health grids. Participants propose standards and help define functional and technical requirements for exchanging information electronically. The Centers for Disease Control and Prevention runs it.

— William Matthews

some of the building blocks for a health grid already exist. Specifically, electronic health records and small-scale grid technologies are fueling increased interdisciplinary collaboration.

Expanded into a national health grid, those technologies could "transform the biomedical sector into a functional knowledge society" in much the same way that "the original Advanced Research Projects Agency Network (ARPAnet) transformed networks to become today's Internet," the report states.

But the team also expressed concern that "U.S. researchers do not have the requisite training, facilities, tools and infrastructure to adequately manage data generated from biomedical activities."

Familiar stumbling blocks

"It's not going to happen in our lifetime," said Douglas Goldstein, president of Medical Alliances and the author of several books on health informatics and the use of electronic tools to improve health care.

"In the macro sense, there are areas of progress and interconnectedness," Goldstein said, but nothing approaching the Internet-like reach and comprehensiveness of a national health grid. "That's very far down the road."

The idea has been around for a decade or longer. But there are lots of reasons why a national health grid hasn't sprung to life. Interoperability — or the lack thereof — is a big factor.

Standards are not in place to make data universally usable. Many semantic differences remain, rendering data unintelligible between databases and unusable by many analytical tools.

"We need a lot of work on standards," said Dr. Leslie Lenert, director of the National Center for Public Health Informatics and Savel's boss, adding that they are the key to allowing systems to interoperate. And interoperability is the essence of a grid.

Cost is another discouraging factor. The European Union, which is engaged in a much more organized effort to create a European health grid than the United States is for a U.S. grid, is devoting 5 billion euros — more than $7 billion — to the undertaking, Hall said. Experts don't foresee a similar allocation of funds in the United States.

And for now, at least, there is "a lack of a compelling case that everything has to be connected," Goldstein said. Until there is a persuasive reason for businesses to invest the millions of dollars needed to set up the components of the grid, it's just not going to happen, he added.

Daunting challenge

Another factor slowing progress is the size of the undertaking. "People are daunted by the scope of it," said Deb Levine, executive director and founder of Internet Sexuality Information Services, a Web site devoted to sex education and disease prevention.

"How many different kinds of diseases are there?" she asked. "How many different specialists? How do you create the library directory where you enter what you want to know" and get the right answers back? How will data be categorized?

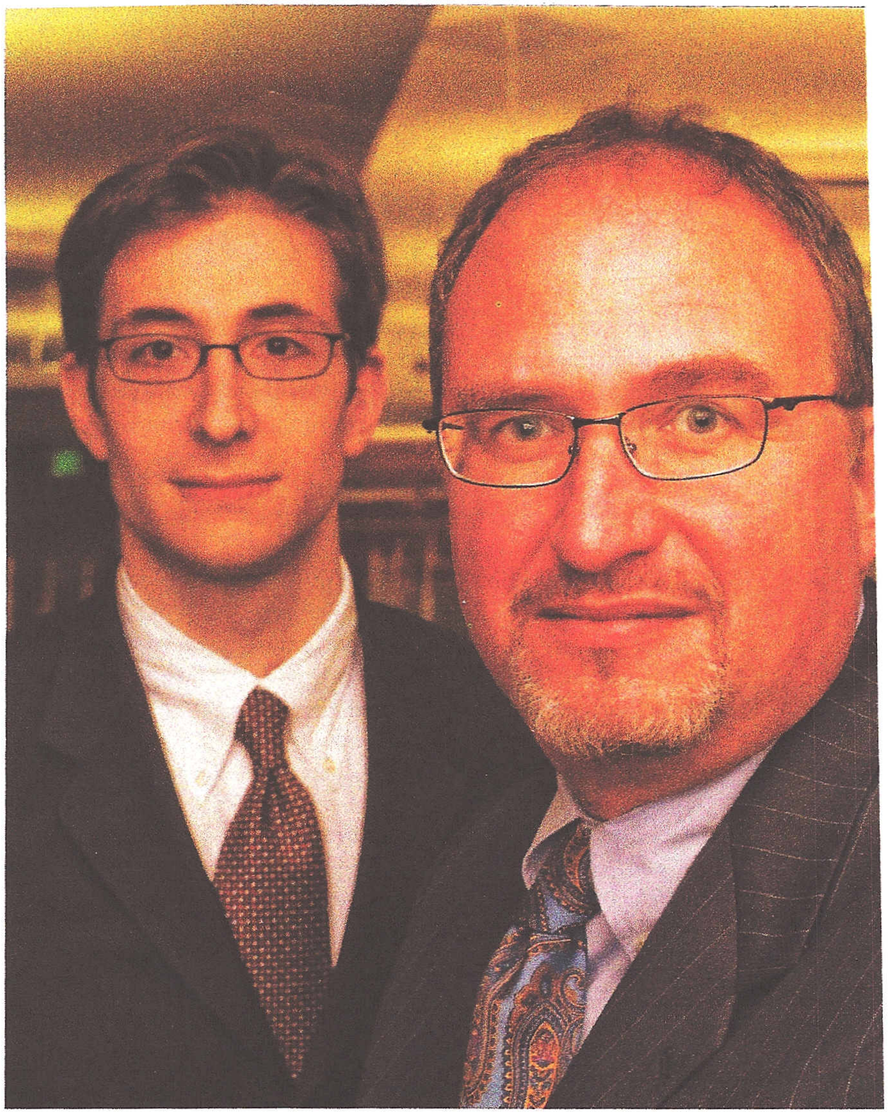
"The technology is quite available," Levine said. But the rules for tying all the pieces together do not yet exist.

However, if a health grid had been in place several years ago, it might have alerted epidemiologists a lot earlier to a syphilis outbreak in San Francisco, she said.

For syphilis, public health officials had long focused on the American South. So nobody noticed when the number of cases among gay men in San Francisco suddenly started climbing.

It took two years for specialists to recognize the outbreak, Levine said. By then, it had spread beyond San Francisco. Had infection data been on a grid, the rising number of cases could have been spotted earlier and perhaps even flagged automatically.

"There ought to be ways health care professionals can share information with each other much faster," she said.



Dr. Tom Savel (left) and Dr. Leslie Lenert of the National Center for Public Health Informatics say the components of a nationwide health grid exist but experts are still working on the standards necessary to connect them.

Privacy and politics

Lenert said a key step toward better information sharing would be assigning a national medical identifier to each patient. That's been a goal of many public health officials for at least 15 years.

Some experts see a medical identifier as the starting point for a comprehensive database of digital medical records that would accompany patients throughout their lives.

Proponents say health identifiers would make medical records immediately available to doctors no matter where a patient became ill. Furthermore, they would reduce paperwork, improve disease tracking, identify the most cost-effective treatments and facilitate drug research.

But some critics say medical identifiers and electronic databases are serious threats to privacy. They worry that hackers could access records to steal identities, insurance companies could use the information to deny coverage, or others could disseminate or abuse personal information.

In 1996, Congress passed legislation to create medical identifiers, but the outcry from privacy advocates halted the effort.

Polls have shown that Americans overwhelmingly oppose government-mandated medical identifiers. Now, "there's a congressional injunction against working on any national patient identifier," Lenert said.

The lack of political will to create medical identifiers "prevents us from merging records across networks," he said. So when it comes to building a national health grid, "we're definitely culturally not there, but if we could just get to point-to-point data exchange, we would be doing quite well."

Data is everywhere

But even simple data exchanges sometimes prove problematic. According to a white paper written for HealthGrid and Cisco Systems in 2004, "Many hospitals are reluctant to let the information flow outside the hospital bounds."

It's not just hospitals. Entire states have balked at sharing data, Lenert said.

In North Carolina, lawmakers had to pass legislation before state hospitals would transmit real-time data on biological agents to CDC in neighboring Georgia, he said.

Other states refused data transfers altogether. Ironically, that might have aided grid development because such blockages prompted CDC to find ways to circumvent data transfers and analyze information where it resides, which is how a health grid is supposed to work.

With grids, the physical location of data is irrelevant; essentially, it's everywhere. And the ability to use it, share it and collaborate on research makes the data immensely more valuable.

In a 2007 proposal, Savel outlined a national health grid that would function like this: "A local public health epidemiologist in Attica, N.Y., may use the same [statistical tool] that a CDC epidemiologist uses in Atlanta, each supplying different sets of data yet using the same tool. A researcher at the University of Washington may run a query against public health data located within Washington, Oregon and Idaho to develop a tuberculosis-outbreak simulation within these three states. Her research could be shared through the public health access grid with other researchers at other institutions throughout the country."

> **"All of this is less a technical challenge than an organizational and cultural challenge."**
>
> WILLIAM FELLOWS, 451 GROUP

"Today, grid-related activities in the health care space represent some of the most innovative drivers for progress in knowledge-based ubiquitous and transparent computing," Savel said.

Cancer grid leads the way

Today's grids — including a number devoted to health — are smaller, more narrowly focused and far more limited than the multifunctional, wide-reaching but still conceptual national health grid.

One of the best existing grids is the National Cancer Institute's four-year-old cancer Biomedical Informatics Grid (caBIG). It makes enormous amounts of data on cancer available electronically to doctors, researchers and patients.

It also provides researchers with data-analysis tools and a way to collaborate with colleagues.

In effect, NCI has created a World Wide Web of cancer research, according to the Army's telemedicine team. And caBIG could be an important segment of a national health grid.

Pharmaceutical companies could also contribute. They were among the earliest adopters of grid technology and have taken advantage of the power of thousands of linked computers to dramatically speed development times for new drugs.

For such companies, "the rationale was simple," Fellows wrote in a 2007 report. "The incredibly parallel nature of drug discovery work meant that analysis could be done far more quickly and potentially more cheaply. Hence, many pharmaceutical companies have a grid of hundreds or thousands of nodes — often PCs and shared hardware — running a few applications."

It can take 10 years and more than $1 billion to bring a new drug to market, Fellows said. But using computing grids can speed that by a factor of two, three or even more, he said. Consequently, new drugs can be developed and marketed — and profits pocketed — substantially faster.

"It is estimated that every day a pharmaceutical company can save in bringing a new drug to market could be worth up to $60 million," Fellows said.

But where monetary incentives are less obvious, the attitude toward grid technology has been markedly less enthusiastic.

"All of this is less a technical challenge than an organizational and cultural challenge," Fellows said. Data ownership, integration of complex data resources, privacy, funding — "somebody's got to figure out how to pull this stuff together," he said. ■