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LARRY SMARR ON THE SHAPE OF THE GRID IN 2003

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By Alan Beck, Editor-in-Chief

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GRIDtoday recently conducted an exclusive interview with Cal(IT)²'s (California Institute for Telecommunications and Information Technology) Director Larry Smarr about his expectations for the evolution of grid technologies in the upcoming year. Smarr noted that he believed 2003 would be a critical watershed in Grid development.

"We are at a crossroads now," Smarr said. "I coined the term "metacomputing" in 1988 to indicate the integrated utilization of a variety of distributed computing resources, and later worked with Ian Foster and Carl Kesselman to organize the first grid meeting. There is a vibrant grid community today with a great many tools in the Grid toolbox already, but a key component is still missing: What is their ultimate mission for this grid infrastructure? I believe we will begin to seriously answer that question in 2003."

Smarr believes that National Science Foundation (NSF) leadership will probably emerge as a key -- perhaps the key -- force unifying and standardizing the Grid, as the NSF spends billions of over the next decade on its large scale shared science and engineering facilities.

Each of these facilities, whether supporting particle physics or ecological monitoring will require a high performance grid infrastructure coupling specialized observing devices with tens of thousands of end user laboratories.

Smarr observed that the foundations for this work have been laid throughout virtually every scientific discipline where highly distributed instrumentation and storage are being brought into play.

"The extensive use of such resources is new and so far each discipline has created its own distributed cyber infrastructure," he said.

"But up to now there is not an underlying plan for a common infrastructure to support multiple disciplines. I hope that in the spring the NSF will begin to organize wide-ranging meetings to definitively forge a universal grid

architecture -- and then they will take steps to actually build it. This will require a new level of dialogue between many different disciplines and computer science and engineering"

Smarr sees the key challenges in this effort as threefold: research, prototyping, and deployment.

Research will require new resources for the computer science community to study system integration issues at department or campus level scale. Prototyping on a limited national scale may well be best done by the existing PACI program together with some of the NSF's Information Technology Research grants and its Science and Technology or Engineering Research Centers.

Deployment and production needs to be run by Internet2-like organizations.

"Make no mistake -- we are talking about a vast program, probably larger than any NSF has ever undertaken" he noted. "System issues are immense, as are scaled build-outs and security concerns. To tackle such projects, horizontal discussions across disciplines on a new scale are necessary."

"There is an excellent chance that organizations beside the NSF will share in the grid leadership. For example, few know that that the NIH (National Institutes of Health) via its NCCR (National Center for Research and Resources) has provided funding for building out its twenty campus BIRN (Biomedical Information Research Network).

This is a good model for other data intensive sciences, since BIRN allows for a powerful array of distributed medical technologies and data systems to operate together, with Internet2 providing the networking. DoE (the Dept. of Energy), NASA (National Aeronautics and Space Administration, and the DoD (Department of Defense) are also in this game in a big way. Ideally, we would also see an increased technical dialogue across agencies as we did in the HPCC program a decade ago"

"A primary obstacle to pulling the grid together is that we have become used to Grids -- and their communities -- operating in a demo mode. This has been very beneficial to building up enthusiasm for the grid, but it is not the robust, 24/7 grid that will actually breathe life into this technology. The Global Grid Forum, for instance, has achieved a great deal in providing a unifying forum for the discussion of important grid research issues. However, we must understand that research and deployment are different games played by different organizations and people.."

"The entire grid community must arrive at a new level of maturity—moving beyond demos to 24/7 production," Smarr emphasized.

"The technological hardening required means that new roles must be found for both people and institutions. Right now the major IT and telecom vendors find all of this very interesting, but -- as was the case with the Internet -- they don't yet believe it. All of this will change quickly once we have some national-scale worked examples. Unfortunately, the United States is falling behind Europe in building out production grids to support scientific research."

Smarr stated that we probably haven't arrived at just the right underlying Grid environment yet, one in which systems can be both persistent and universal.

This will only happen once the leaders of the major science experiments get down and dirty with the computer science community. The principal funding agencies must speed up their role in facilitating an internal dialogue between disciplines first. Smarr observed:

"That crucial dialogue will involve not just supercomputer users but our entire scientific leadership."

For more information, see <http://www.calit2.net/>

About Larry Smarr

In 1985 Larry Smarr was named the founding Director of the National Center for Supercomputing Applications (NCSA) at the University of Illinois.

In October, 1997, he also became the Director of the National Computational Science Alliance, comprised of over fifty universities, government labs, and corporations linked with NCSA in a national-scale virtual enterprise to prototype the information infrastructure of the 21st Century.

During the fifteen years that Dr. Smarr directed NCSA, the center made major contributions to the development of the Internet, the Web, the grid, and scientific visualization.

In August 2000, moved to La Jolla, CA. where he became a professor of the Jacobs School's Department of Computer Science and Engineering at the University of California, San Diego.

Shortly thereafter he became the founding Institute Director of the California Institute for Telecommunications and Information Technology (Cal(IT)²), which brings together over two hundred faculty from UCSD and UC Irvine with over fifty industrial partners to research the future development of the Internet.

In 2002 he was named the Harry E. Gruber Professor of Computer Science and Information Technologies.

Smarr was a member of the President's Information Technology Advisory Committee and is currently on the Advisory Committee to the Director, NIH and the NASA Advisory Council.

His views on the future of the Internet, supercomputers, and computational science have been quoted widely in publications including the New York Times, Wall Street Journal, Time, Newsweek, Fortune, Business Week, Red Herring, Nature and Science.

Smarr is a Member of the National Academy of Engineering, and a Fellow of the American Physical Society and of the American Academy of Arts and Sciences.

In 1990 he received the Franklin Institute's Delmer S. Fahrney Gold Medal for Leadership in Science or Technology. He co-authored with William Kaufmann III, the book, Supercomputing and the Transformation of Science.