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## NERSC remembers its roots as it celebrates 25th anniversary

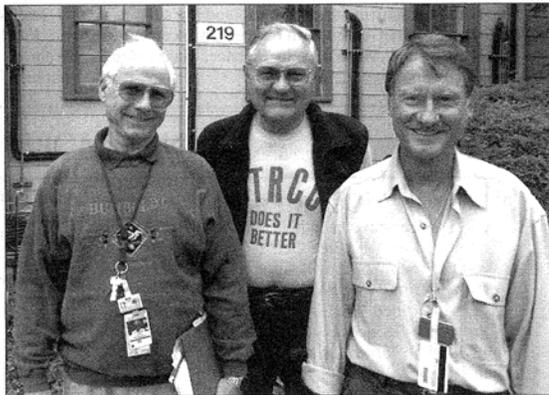
By Jon Bashor

LLNL PUBLIC INFORMATION

And then there was one. Now that Computation's John Fitzgerald has retired (at the end of August), only Dieter Fuss remains from a group of four managers who helped invent the concept of a national supercomputer center.

That center, known today as the National Energy Research Scientific Computing Center, marked its 25th anniversary this summer. Although NERSC moved to Lawrence Berkeley National Laboratory in 1996, its roots as the nation's first unclassified national supercomputing center are deeply embedded at LLNL.

Through the years, NERSC helped pioneer many of the computing practices taken for granted today. These include remote access by thousands of users, high-performance data storage and retrieval, providing on-line documentation and around-the-clock support for users. The center also spawned development of the



ROY KALTSCHMIDT, LAWRENCE BERKELEY NATIONAL LABORATORY

John Fitzgerald (left), Hans Bruijnes (center) and Dieter Fuss (right) are all on the team which founded NERSC's predecessor in 1974. They are standing in front of Bldg. 219, the ancestral home of NERSC.

Energy Sciences Network, or ESnet, the high-performance network that today links more than 30 DOE research sites.

When the center, originally called the Controlled Thermonuclear Research Computer Center, was officially formed in 1974, Fitzgerald was the program manager and Fuss was the programming supervisor. Hans Bruijnes, who retired in 1990, was the deputy director and John Killen, who suffered a debilitating stroke in 1989, was the director.

"The people who put together the proposal for LLNL were Hans and Dieter — then the rest of us showed up," Fitzgerald recalled recently. Livermore was chosen as the site for the new center, beating out proposals from Los Alamos National Laboratory, New York University, Princeton Plasma Physics Laboratory and Oak Ridge National Laboratory.

The idea, Fitzgerald said, was that if magnetic fusion were to advance, researchers needed the same kind of computing horsepower then available only to weapons designers. "We added a new capacity for people doing fusion modeling simulations," Fuss added.

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The center began providing cycles in July 1974, using a cast-off Control Data Corp. 6600 computer. Access was provided at 110 baud via four dial-up modems. "The CDC 6600 was in the autumn of its years, but it got us started until the plan we developed could be put into place," Fuss said.

Within a year, the center was home to a Control Data Corp. 7600, the same kind of supercomputer used by the weapons program.

Along with this upgrade in computing power, the new center was also providing users with remote access. Following the pattern of Remote Job Entry Terminals, or RJETS, already in place at LLNL, the center provided a similar terminal for researchers at the Princeton Plasma Physics Lab. The RJET consisted of a PDP-11 computer, four terminals, a printer and a data card reader and went on line in March 1975.

The center provided similar local computing equipment to Oak Ridge, Los Alamos and Livermore labs, as well as to the General Atomics research center in San Diego.

"These sites were not accustomed to inter-lab communications," Fitzgerald said. "There wasn't a system or tradition in place — we had to invent it. The delivery of high-performance computing resources to a distributed community was a brand new idea."

Called User Service Centers, these centers provided fully integrated, powerful resources for local computing, as well as immediate access to the main computer.

The center changed its name to the National Magnetic Fusion Energy Computer Center in 1976-77 and took steps to acquire a Cray-1 supercomputer, the first one delivered to LLNL. In those days, Bruijnes notes, the computers weren't delivered with software — each center had to develop its own.

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—John Fitzgerald”

To take advantage of the Cray-1's capabilities, the center undertook a major software project to convert the 7600 operating system (LTSS or Livermore Time Sharing System), utilities and libraries to the new CRAY-1. The resulting system was called the Cray Time Sharing System (CTSS) and allowed interactive use of the CRAY-1. CTSS was later adopted by six other computer centers.

Over the years, additional supercomputers such as the Cray-2 and Cray X-MP were installed at the center. Each time, the staff worked diligently behind the scenes so that researchers could seamlessly move their jobs from one computer to the next.

"We provided the same environment from the application programmer's point of view," Fuss said. "They could run or move their code easily from computer X to computer Y."

"As we moved from one machine to another, we had the operating systems ready by the time the vendor delivered the machine," Bruijnes said. "We usually had them up and running in four or five days."

Also to help users, the center provided extensive on-line documentation, then a rarity.

"It was equal to today's Web," Fuss said.

During the 1980s, the center broadened its research mission to support other programs within DOE's Office of Energy Research. In 1989, the name was changed to the National Energy Research Supercomputer Center.

Also during the 1980s, the National Science Foundation also decided to establish a group of supercomputer centers to support its researchers. One of the successful proposals was submitted by Sid Karin, who had been a fusion researcher at General Atomics and a user of the Livermore center. Karin, who today heads the NSF's San Diego Supercomputer Center, drew heavily on the Livermore center's experience in hardware, facilities and network protocols.

"NERSC has long been a model for other institutions wishing to establish supercomputing centers," said C. William McCurdy, who co-founded the Ohio Supercomputer Center in 1988 and became director of NERSC in 1991. McCurdy, a physical chemist who today heads the Computing Sciences Directorate at Berkeley Lab, adds "The story of NERSC is really that of modern computational science in the U.S. From pioneering large-scale simulations to developing the early time-sharing systems for supercomputer, much of the action has always been in this center."

Fuss said that one of NERSC's major contributions has been to help prove the validity of computer simulations as "real" science. Initially, he said, there was skepticism that computer-based research would ever rival theoretical or experimental science. Today, he said, it's standard procedure to generate simulations before conducting an experiment.

"One thing the center can be truly proud of is that we were recognized as being the first to do something that has become really important to this country, both in computing and networking," Fitzgerald said. "It's nice to have been involved with an organization that pulled off this achievement."