Finding a home for magnetic information technology research

As computer users demand faster access to data and more economical means of storing information, researchers are striving to come up with ways of packing more data onto magnetic disks, drums and tapes (SN: 7/17/82, p.41). However, magnetic recording technology in the United States is hampered by a lack of long-term, basic studies of the recording process, some critics fear. Others point to the shortage of properly educated people to do magnetics research at universities or in industry. The result has been a steady erosion of the U.S. lead in digital magnetic recording (the lead in audio and video magnetic recording was lost years before).

These and related issues were the focus of a recent workshop, sponsored by the National Science Foundation (NSF), which examined the plight of magnetics research at U.S. universities. For many of the 30 or so participants, the workshop was also a lesson in lobbying: how to persuade the government to fund basic research in a multidisciplinary field that doesn't neatly fit conventional categories and that is actively pursued at only a handful of universities.

Mark H. Kryder of Carnegie-Mellon University (CMU) in Pittsburgh illustrated the extent of the problem. He estimated that U.S. universities each year produce about 12 students with graduate degrees in magnetics, while industry requirements for qualified researchers, at companies like Memorex, IBM and Eastman Kodak, exceed 100. Meanwhile, the market for magnetic information technology is growing by 35 percent annually, he said. In fact, the magnetic data storage market alone, worth about $12 billion in 1982, is larger than the total market for semiconductors. Ironically, a much larger number of universities have well-funded, extensive semiconductor research programs compared with the small efforts in magnetics, said another workshop participant.

Two universities, the University of California at San Diego (SN: 4/16/83, p. 248) and CMU, have been successful in attracting substantial industry support for new, major magnetics technology research centers. However, smaller programs like those at Purdue University in West Lafayette, Ind., and the University of Minnesota in Minneapolis have a much harder time attracting funds. Most universities do not even teach courses on the type of magnetics involved in recording.

The magnetics research dilemma is typical of newly developing research areas that span several disciplines and support, at least initially, only a small number of researchers. NSF has difficulty in finding reviewers for research proposals, and researchers are not sure where to apply for funds and whether their proposals will get a fair hearing.

Norman Kaplin, an NSF official, pointed out that because magnetic information technology has à very small base of academic support, NSF receives few proposals for magnetics research. Therefore, it is not worth setting aside funds for this area, he said. However, several workshop participants were quick to say that the lack of funds specifically allocated to magnetics research was a factor that kept more people from entering the field.

"NSF is passive," Kaplin said. "We have to react to what are perceived needs." The adversarial research funding process represents many competing interests, he said. "You must win the battle of ideas with your colleagues." That means persuading more people to take magnetics research seriously.

Angel G. Jordan, CMU's provost, agreed in part. "The lobbying has to be done by us," he said. He argued, however that NSF has made special efforts in the past to encourage other research fields, like robotics, that don't have a home in one specific discipline.

Magnetic recording research is one area that requires a variety of skills. It was suggested at the workshop that NSF could issue a program announcement aimed at magnetics research but phrased so that it elicits responses from people who never considered magnetics research before. For example, mechanical engineers are needed for designing high-speed disk drives, materials scientists for studying corrosion problems on surfaces coated with thin films, chemists for investigating methods of dispersing fine metallic particles in polymers. There are also many fundamental questions on how magnetic particles in thin films interact.

Although the researchers gathered at the workshop did not receive any assurance of increased NSF support, one NSF official said, "By conducting this workshop, we are recognizing this area as important." The report that summarizes this workshop's discussions will be one shot in the continuing battle for funds.

— I. Peterson

TDRS satellite on station at last

A satellite that the National Aeronautics and Space Administration (NASA) calls the biggest, most complex, most expensive communications satellite ever launched reached its assigned orbit on June 29 — more than 12 weeks after it was launched.

The first Tracking and Data Relay Satellite (TDRS-1), inaugurating a series planned to replace the network of ground stations that currently track many earth-orbiting satellites, was set in space April 4 during the sixth flight of the space shuttle (SN: 4/16/83, p. 244). From there, an Air Force rocket called the Inertial Upper Stage (IUS) was supposed to send it on up to a circular orbit 22,236 miles high, where the satellite's orbital speed would keep it fixed over the same spot on the earth. However, the rocket's second stage malfunctioned, leaving TDRS-1 in an elliptical path that carried it as low as 12,600 miles.

NASA's solution was to raise the orbit by repeatedly firing the satellite's tiny attitude-control jets, originally intended only to keep it properly oriented. And this week, after 39 separate "burns" of the jets (some were cut short because of overheating), TDRS-1 reached its destination.

The final burn, which raised the orbit's low point the last 23 miles, was ordered by NASA administrator James M. Beggs at a ceremony at the agency's Goddard Space Flight Center. Said Goddard Director Noel W. Hinners, "This is one of the significant space achievements of the year that goes along with Challenger making its first flight and Sally Ride being the first [American] woman in space."

It sounds like rather a big deal for merely bringing a communications satellite on line, but a lot has been riding on TDRS-1. The idea of replacing the ground stations with satellites has been in the works for years, and a key role for TDRS-1 will be to handle part of the vast data flow from Spacelab, the European Space Agency research module due to fly on the ninth shuttle mission. In addition, TDRS-1 carries a communications channel that NASA hopes will help reestablish contact with the sophisticated "thematic mapper" instrument aboard the earth-monitoring Landsat 4, whose other channel (the one accessible to the ground stations) went dead a few months ago. Tests with Landsat 4 are now planned for late next month.

But TDRS-1's deployment difficulties have affected more than just the satellite itself. The problem with the Air Force's IUS rocket is still being studied, and NASA has thus delayed the launch of TDRS-2 from the eighth shuttle mission in August until at least flight 12 next March or April. This in turn has affected plans for Spacelab, requiring much of its data to be recorded onboard rather than transmitted directly to earth, since the mission had been designed on the assumption that both TDRSs would be available. This has caused the rescheduling of many experiments, such as a synthetic-aperture radar whose high data-rate must be transmitted "live," meaning that the instrument can be operated only when the one TDRS is within range. The Defense Department, meanwhile, has cancelled plans to deploy an IUS-boosted satellite of its own late this year from shuttle flight 10, leaving NASA planners uncertain about that flight's ultimate disposition.

—J. Eberhart