Tech Transfer

Martha L. Buddecke

Tech transfer, like "high tech," has become one of the buzz words of the 1980s. It is now used, particularly by those in government, to promote new programs, defend old ones, and get on the bandwagon of U.S. "competitiveness"—another buzz word. It is time to ask: What is technology transfer and why do we need it?

The technology transfer discussion began not so long ago, at the beginning of this decade, as congressional leaders began to realize that America was losing its technological edge and that an overwhelming percentage of our research efforts were going to national defense, into technology that was basically isolated from American companies and the marketplace. The federal government has 388 labs spending a total of $61.4 billion a year and employing 250,000. This effort accounted for 32% of all research and development in the United States in 1983. The 1987 figures quoted above represent a 15% increase over the 1986 budget of $53.2 billion, nearly three times the 4% increase proposed for the federal budget as a whole.

Research and development priorities are shifting. Spending for health research, for example, is down from 11% in 1985 to 9% in 1987. The most dramatic change has occurred in national defense, which has grown from 68% of the total in 1985 to 74% in the 1987 budget. These figures cover a vast range of federal laboratories. Some are small and single purpose in nature, and are designed to address a specific problem, such as water pollution. Others are aimed at a larger field of research, such as agriculture, and serve a particular segment of the American public. All these labs can be sources of "tech transfer," the exchange of technology research and development information from federal research lab to the private sector. Most of these labs are Government-Owned, Government-Operated, called GOGOs. Perhaps the most significant potential source of technology, however, is also the most difficult to tap—the large, multipurpose national laboratories under the U.S. Department of Energy. These are owned by the government but operated by private contractors, or GOCOs.

These laboratories are huge, with budgets ranging up to $1 billion annually, and they are managed in different ways—some by universities, some by private industrial companies. They have differed historically from other federal agencies in the way their patent and licensing procedures have been handled. Nearly all Department of Defense research and development contractors can elect to own the patents on inventions made under a DOD-funded contract, with the government retaining a royalty free right of use. At DOD and DOE laboratories, the government usually retains title to patents on lab inventions, relying on licensing to accomplish technology transfer.

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The results of government patent licensing programs have been disappointing. Less than 5% of the government's approximately 28,000 patents have been licensed. This record may result from:

1. The large percentage of government R&D which is defense oriented and not applicable to commercial markets;
2. Government's practice of licensing on a non-exclusive basis; and
3. Many of these patents being written to protect government procurement interests, not to make technology available for commercial purposes. Only 1% of the Navy's patents are licensed, for example, whereas 13% of Agriculture Department patents are licensed.

The Department of Energy has the authority to waive the rights to patents, a right given it beginning with the Atomic Energy Act. The waiver process, however, has come under attack because it is done on a case-by-case basis, and usually involves lengthy delays. Small start-up companies cannot afford to wait for these waivers, primarily because their viability in the market often depends on getting new technology into production before it can be marketed by their competitors, including foreign companies. In addition, their financing will not allow long delays before products are sold and income generated. These factors make it difficult, if not impossible, to begin new companies with DOE lab technology.

A provision of the 1986 Defense Authorization Act may make it even more difficult to obtain waivers. DOE must consider the impact of a technology on national security, its impact on sensitive technology, and the potential adverse effect on the DOE weapons labs. The latter provision could be used as rationale to deny almost all waivers.

The policies that make lab technology either government property or public property make such technology a virtual no-man's land. Although these policies are intended to make publicly funded technology available to all, they instead make it impossible for anyone to develop. A company cannot afford to spend the dollars necessary to develop and market new technology if it can then be undersold by a second company selling the same technology because there are no patenting and licensing restrictions. Industry needs exclusivity in order to develop markets for new technology.

"Tech transfer," the relatively new effort to bring technology out of government labs and transfer it to the private sector, began in 1980 with passage of the Stevenson-Wydler and Bayh-Dole Acts. Fueled by fears of declining national technology leadership, Stevenson-Wydler made technology transfer a mission of all national labs and required that these labs set aside 0.5% of their budgets for technology transfer activities. This act also attempted to encourage the development of technology by creating technology "centers" organized around tech transfer. This portion of the act was never funded, however, so it was ineffective in stimulating R&D.

The Bayh-Dole Act gave small businesses and nonprofit operators of GOCO labs the right to elect title to federally funded inventions. GOCO labs operated by for-profit firms, even though operated on a no-fee basis, were excluded from Bayh-Dole, as were the weapons-related and naval nuclear propulsion programs of the Department of Energy. This exclusion was prompted to some extent by congressional concerns that one company, the lab operator, might use federally funded research for private profit, to the exclusion of other industrial or public interests.

A Presidential memo of 1983 directed federal agencies to extend the Bayh-Dole Act to all contractors, but still restricted labs like Sandia and Oak Ridge to the restrictions written in Bayh-Dole, and 1984 amendments to the act continued the exclusions of weapons-related program from the provisions of Bayh-Dole.

Is tech transfer needed? Not only does the government spend more than the private sector on research and development, but its dollars are spent so as to encourage a broad spectrum of research activities which have made the United States the world leader in many areas of science. The strengths of these national laboratories are

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numerous, but largely unrecognized in the industrial world. They include:

1. Freedom to create, with only broad restrictions on subject matter;
2. Almost unlimited financial resources;
3. Access to the best minds, nationwide, and the money to pay them well;
4. Quality control as an overriding discipline; and
5. Focus, a concentration of effort on a few areas of research.

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What they do NOT have is large numbers of finished products ready to be exploited, and the entrepreneurial expertise and drive to develop their technology into products or processes which will enhance the marketplace.

Can the U.S. afford to waste ANY technology that could be used for commercial benefit? The answer, increasingly, is "No!" The next question is: How can we use this technological research for the benefit of private industry, without losing the mission that has made our national labs what they are—incomparable centers of science.

Some suggestions are being made. We could:

1. Make the Bayh-Dole Act apply to all federal labs;
2. De-centralize patenting and licensing procedures, so that each lab could handle its own patenting;
3. Develop de-classified areas and programs in each lab where graduate students, visiting professors, and industry researchers could work;
4. Strengthen the interaction with outside researchers by incorporating it in a long-range technology transfer plan; and
5. Allow royalties from patents and licenses to flow back to each lab for use in its programs.

The establishment of outside organizations for the commercialization of technology, such as New Mexico's Rio Grande Technology Foundation and the Tennessee Technology Center, has become another approach to bridging the gap between laboratory, university, and industry research organizations. The current tech transfer discussion, however, seems to focus on the details and arrangements that should be made to facilitate technology transfer, not on the central issues involved.

Perhaps a new framework is needed, to raise the level of discussion from one of objectives and means to one of goals. What is our goal in urging technology transfer?

Do we need a new national policy on ALL federally supported research? Should we adopt some of the policies that have been successful through the National Institutes of Health, or should we use some of the methods used by NASA?

Do national security concerns override national *interests*? Are we protecting our technology from *ourselves* as much as we are from other countries? For example, when the decision is made not to patent unclassified government technology, the researcher is then free to publish it, and thereby make it available to any company from any country.

In particular, do DOE labs still exhibit the isolationist mentality that grew up around them because of World War II and the weapons they were developing? Does that mentality cause them to hide behind national security as an argument against opening their technology to American industry?

Have territorial barriers between laboratory, university, industry, and the scientific community (represented by such organizations as the National Academy of Science) become so great that national cooperation on technology development is impossible?

These are some of the questions that have occurred to those who are involved on a day-to-day basis in encouraging tech transfer from the national labs. No doubt there are others.

What does all this mean to the Materials Research Society and its members? You can become involved in the debate. Among your members are all the participants—universities, laboratories, private industry. You have a vested interest in these questions. You should learn the issues, listen to your colleagues in other organizations, and develop Society positions which will shape the course of this debate and could lead to the formation of new national policy.

Keeping federally sponsored research in isolation may be a policy we can no longer afford.

The Materials Research Society, above all other professional scientific organizations, should become a focal point, because materials research is now recognized as central to the American future. How we manage the research and development of new materials will shape our future success as a nation. Tech transfer has become a buzz word, but the idea behind it has not. Keeping federally sponsored research in isolation may be a policy we can no longer afford.

Martha L. Buddecke has been working on technology transfer issues for about five years. On Senator Domenici's staff she helped form both New Mexico Technet and the Rio Grande Technology Foundation. Now a staff consultant to Technet, she is actively engaged in demonstrating how Technet can be used to further tech transfer from the labs to private industry.

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