by John Rowell

Burning Bridges

The Wall Street Journal of Monday, May 22, 1995 is remarkable, not only because it confirms the experience of many of us who call ourselves industrial scientists, but also because it raises questions about the validity of an assumption that forms the basis for post cold-war science and technology policy. Three articles in the issue are of particular interest.

The first two, on page B1, share a common heading "Corporate research: How much is it worth?" The first article, "Baby Bells find it hard to put price on Bellcore," describes the difficulties Bellcore is having in separating itself from the control of the seven regional Bell operating companies (RBOCs). The seven RBOCs are part of the communications industry, a rapidly growing and technologically intensive industry with annual revenues of $87 billion. The underlying message to this story is that this $90-billion high-tech industry will not, in future, support any generic or pre-competitive research. If they wished to do so, it would certainly be cheaper to do it in the consortium mode at Bellcore. Some of the RBOCs have established their own engineering centers, but it is a stretch to regard any of the work being carried out there as research.

The implication of the second article, "Top labs shift research goals to fast payoffs," is perhaps even more serious, in that a similar story is told for six different industries. It shows the R&D spending, over the five-year period 1990 to 1994, for companies that have traditionally employed physicists (among other disciplines).

The companies are AT&T, GE, IBM, Kodak, Texaco and Xerox. In 1990, AT&T seems to show a small net increase in R&D funding, but a 17% decline from 1991. From 1990, the other five show decreases of 6% (Xerox), 30% (GE and Texaco), 40% (IBM) and 43% (Kodak). These companies, however, carry out R&D across a much broader front than what we might call hardware research, or that based on the disciplines of chemistry, materials science, physics and electrical engineering. Because many of them in the last decade have emphasized software R&D over hardware R&D, the decline in industrial funding for hardware R&D must exceed 50% in most of the six companies.

Even the nature of the R&D that remains might be questioned. There is a philosophical question of how fast payoffs can be, while still having the work defined as research, rather than problem-solving, development or engineering related to products.

The third article, on page A3, is entitled "Republicans to unveil House proposal for dismantling Commerce Department." To quote the third paragraph, "The hit list [for immediate elimination] includes the Economic Development Administration, which provides some $500 million in grants for economic development in poor areas; the Advanced Technology Program, a $431-million grant program for research in electronics and materials; and the Minority Business Development Agency, a $44-million program to help minority companies."

Taken in the context of other similar news from Washington over the past six months, the post-cold-war science-and-technology strategy of the new Congress seems to be as follows. There are good words for the basic research carried out in universities, as being valuable in the long term and worthy of support. Any program that directly encourages industrial research, however, or the applied research that bridges the gap between university research and the development needs of each specific industry, is slated for extinction.

The logic behind this plan seems to be the assumption that, under the right economic conditions, industry will support such research itself. Surely the May 22 issue of The Wall Street Journal provides evidence that this assumption is simply not true. None of the RBOCS nor the six companies mentioned, which in total have revenues of $350 billion, has increased its hardware research budget since 1990, and the RBOCs have essentially eliminated it. What change in economic conditions could make them reverse these trends? What will make them think of the long term when they are focused only on the short term? Perhaps the assumption is that small companies will be able to carry out the R&D that is not being done by large companies.

There is a critical phase in the support of R&D in a small company. R&D costs are paid initially by the venture capital that created the company, followed perhaps by a public stock offering. But at that stage of a company's growth, the technology is still likely to be immature. It is adequate to allow some early products, but much R&D remains to be done. Eventually, as the revenues of the company increase and it becomes profitable, R&D will be supported. If the government withdraws its support for R&D, as pursued for example in small companies under the Advanced Technology Program, the results will be grim indeed.

The work that is being cut back by industry and that will receive much less support from Washington is precisely the work that forms the critical link between U.S. businesses and universities. It is the work carried out by industrial researchers who speak the same language of science as their collaborators in universities. Once they are gone (and they will be if not funded), university professors will face the task of explaining the details and relevance of their work to industry managers with MBAs.

It is a naive and erroneous assumption that no federal funding is required to build bridges between the university laboratory and the production floor of industry. ■

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