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EDITORIAL

Evolution of Industrial Research

Pressures of global competition have caused large U.S. companies to make significant changes in conduct of research and development. Their actions will affect those departments of universities attempting to channel research toward industrial applications. These topics and many more were examined at a symposium entitled "Reinventing the Research University" held at the University of California at Los Angeles on 22 and 23 June 1994. Among the distinguished participants was Dr. Alexander MacLachlan, a former senior vice president and chief technical officer of the DuPont Company. He provided insights concerning industrial research and development (R&D) and industry's expectations and needs relative to universities.

At DuPont, MacLachlan had a role in a stressful restructuring of R&D. He is also a participant in the Industrial Research Institute (IRI). Many of its 260 major industrial firms have also undergone restructuring. In his presentation MacLachlan spoke mainly of experiences at DuPont. However, he pointed out that circumstances at his company were typical of many others. In the years following World War II the rest of the world was not fully competitive. Tremendous technology opportunities abounded. But today all technology-based companies face "a fierce and unforgiving global competitive market." If they do not adjust to it, they disappear.

In the early 1900s DuPont set up one of the first industrial research organizations. In addition, in 1926 the company established a group to do basic understanding research. The science effort quickly focused on synthetic polymers and led to synthetic rubber, nylon, teflon, and other products. After World War II, businesses based on synthetic polymers grew rapidly. The availability of cash from expanding sales permitted expansion into other fields. However, in the mid-1960s top management began to notice that the number of new polymer families had diminished sharply and profit margins were dropping. In response the company attempted to diversify into new higher value markets. Within a few years DuPont scientists, engineers, and business heads generated over 70 new ventures. But with the company's core polymer business meeting ever stiffer price competition, supplies of cash became limited. As time passed, DuPont found it necessary to curtail its diversification and related R&D. It placed more emphasis on strengthening its existing large and valuable polymer and other chemical businesses.

The changed policies for R&D at DuPont have led to diminished hiring of technically trained people. MacLachlan stated that DuPont is unlikely in the future to return to the very high levels of hiring Ph.D.'s of the last 40 years. He further stated that diminished hiring of Ph.D.'s will also be true for virtually all technology-based industries.

A decrease in DuPont's internal R&D devoted to new business ventures does not signify a lack of interest in new knowledge and technology. The company is expanding its reach for outside sources of these essentials. At present the favored ways to acquire new technologies are from other companies through joint ventures, contracts, or other business relationships. Other sources are universities and research institutes here or in other parts of the world. Government laboratories are also a potential source.

DuPont is most comfortable in dealing with other companies. It has joint ventures with dozens of companies all over the world. DuPont is less comfortable in its relations with universities. Many people in industry have concerns about possible damage to the main mission of universities—the production of quality graduates. A principal obstacle to university-industry collaboration is contention about intellectual property rights. Members of the IRI cite that as the number-one barrier. MacLachlan stated that if patent rights and financial parameters cannot be resolved within a reasonable time frame, then industry will not be able to consider the university in question as a suitable partner. There is also a conflict between industry's need for secrecy and the university's urge to publish.

Some of MacLachlan's comments about university-industry relations were positive. DuPont has had highly pleasing experiences with Polymer Centers of Excellence at several universities. The company was able to develop rapidly substitutes for ozone-depleting chemicals because of help of university colleagues. University researchers are now taking full responsibility for R&D devoted to some of DuPont's mature businesses. DuPont is undergoing internal restructuring; it is also restructuring its relationships with universities.

Philip H. Abelson