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General Sarnoff and Generic Research

General David Sarnoff is reputed to have said that 50 percent of invention is knowing what to invent. At one of his talks specifying what needed inventing, he is supposed to have remarked to the listening RCA researchers, "I've done my 50 percent, now it's your turn!" There is much of this philosophy in former Secretary of Transportation Brock Adams's proposal asking for the "reinvention of the automobile." To accomplish this feat, he proposed a $100 million a year generic research program financed jointly by industry and government, and performed in academic laboratories specifically established for the task.

Such targeted, or generic, research can be productive when the state of knowledge is ripe, but more often targeting represents wishful thinking. Yet bills have been introduced by Senator Adlai Stevenson and Congressman George Brown to implement the idea of generic research centers which would conduct fundamental and interdisciplinary research on topics thought to be relevant to desired applications, among them automotive transportation. The President's message on industrial innovation contains similar initiatives. The State of the Union message mentions a 10-year, $1 billion proposal for research on automotive fuel efficiency, a program presumably related to the Administration's Cooperative Automotive Research Program (CARP), son of Adams's idea.

These proposals represent an overt attempt to steer commercial technology into what are seen as "desirable" paths. Indeed, if one examines industrial research closely, it is hardly distinguishable from generic research. Industrial laboratories typically focus on interdisciplinary areas that underlie the objectives of the firm. This has long been the operational mode of great industrial laboratories, although their managements do not usually go as far as General Sarnoff in demanding specific inventions.

Is it feasible for government to use the industrial, interdisciplinary paradigm to augment ongoing industrial research? Not significantly. To be successful, industrial research must be part of a larger whole, which incorporates development, often involving highly organized project work; engineering design, including means for manufacturing and quality control; securing financial support; and marketing the result in accord with consumer preferences. There is no reliable technique for connecting generic research done in academic or independent centers to this larger whole. Another difficulty is the mismatch in timing between the demands of the patron and the maturation of research institutions. It has taken decades for the Bell and IBM laboratories to achieve their preeminent state. Patience and resolve over at least a decade are required. Government cannot have that staying power because of changing political, social, and economic factors.

Nevertheless, there may be a few cases where federally inspired generic research could be productive. But these instances will be overwhelmed by the number of failures. The minimum requirement for generic research to be successful is that it have enthusiastic industrial involvement, fine leadership and management, and excellent research people. Such a conjunction will be rare. CARP and other massive proposals do not recognize these requirements. Neither does that of the American Council of Education for 10 to 15 federally funded, university-based research centers.

Even modest beginnings in these directions would be dangerous if they substitute for effective federal programs to encourage more fundamental industrial research and closer academic-industrial research relations. It is dangerous, too, if it diverts academic researchers from their disciplinary research toward specific problem solving where they have limited competence. Unfortunately, these are the likely outcomes unless generic research proposals become part of a larger effort to encourage innovative research in places of excellence where there is effective coupling to development, manufacturing, finance, and marketing.—EDWARD E. DAVID, JR., *President, Exxon Research and Engineering Company, Florham Park, New Jersey 07932*