

SCIENCE

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EDITORIAL

Science, Technology, and National Goals

President Clinton has promised to create more jobs and to improve this country's competitiveness. Various mechanisms are likely to be tried, including efforts to couple the research universities more closely to industry and to establish priorities in federal support of research. Two issues of *The Bridge*, a publication of the National Academy of Engineering, contain articles bearing on these matters. Some major points from two of the articles are presented below.

Harold T. Shapiro,* president of Princeton University, stated that discussion of the impact of universities on economic development has not been distinguished by its care or thoughtfulness. "The debate is...long on wishful thinking regarding the potential impact of new science and technology on economic growth, and short on credible analysis of...factors capable of driving a country to a position of economic leadership." Noting the gap between rich and poor countries, he asked, "Is the material affluence of certain countries due to their nationality, diligence, intelligence, natural abilities in science and technology, and hard work, or some other set of factors?"

Shapiro noted that technical progress has been one of the most potent forces in our history and that science and technology will continue to be of vital importance to the health of our society. A relatively advanced capacity in science and technology may be a necessary but not sufficient condition for productivity and economic leadership. Technological progress in advanced countries depends on many cultural and environmental factors, including public policy, political stability, values and attitudes (the relative prestige of such activities as economic production versus political activities), and attitudes toward risk and openness or resistance to change.

Shapiro stated, "...we have failed...not in science and advanced training but elsewhere in our national life...the critical issue for our country is which of the major elements has been lacking in more recent years and what this portends for the future." Two factors contributing to a decline in U.S. competitiveness that Shapiro did not explicitly mention are increasing inclinations to litigate and to regulate. These have affected the cost and quality of health care and discouraged expenditures for industrial research and development.

Shapiro expressed doubts about the wisdom of transforming the university research function toward a more market-oriented direction. He stated, "What may be required—in certain selected circumstances—is not a new market orientation of university-based research but a restructured set of relationships between a subset of university-based researchers, industry-based researchers, and the government....Finally even if a greater market orientation were thought necessary, it is not clear that there is an appropriate set of market signals for universities to respond to."

Comments by Ralph Gomory,† president of the Alfred B. Sloan Foundation, follow. Gomory has had extensive experience in facilitating interactions of basic research, applied research, development, and production. Commenting on setting priorities for scientific work, he stated that the task was difficult only "...if we do not have clear goals. If we don't know where we are going, it is hard to have a sensible discussion about the fastest way to get there." Surveying the current scene, Gomory stated that support of basic research, especially the individual investigator, has been enormously successful and by far the most successful of government's roles. Despite the success, the attractiveness of a scientific career has deteriorated. Gomory noted the current travail that many scientists are enduring at research universities. He suggested, "We could have a goal of being world class in most major scientific fields while at the same time providing a decent life for those who pursue basic research."

Gomory expressed the position that ability to compete globally requires more than science, advanced technology, and innovations. He states, "To date quality, speed, and manufacturing have been the real strength of the competition.... We need to set a goal—the goal of contributing to American industrial competitiveness through science and technology. We then need, in close cooperation with industry, to discover what science and technology programs will contribute to giving us competitive industry. We need to work back from the competitiveness goal rather than forward from the latest scientific event."

Philip H. Abelson

*H. T. Shapiro, *The Bridge* 14, 13 (1992).

†R. E. Gomory, *ibid.* 22, 18 (1992)