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CONVERSION AT THE NSF?

The winds of change are blowing through the nation's science establishment, inducing shivers of apprehension. Walter Massey, director of the National Science Foundation, announced last summer that NSF is reviewing its future direction. Massey recognizes that over the past two decades, it has become far more likely that advances in fundamental science and engineering research will lead to near-term commercial applications and that public support for science increasingly requires that research be relevant to the nation's economic performance--displacing the past implied connection between research and the technological imperatives of superpower rivalry.

Academia is resisting this change. Within a month of Massey's announcement, a number of professors, deans, and university presidents expressed to me their horror at his ideas. They argue, with considerable merit, that the current basis of NSF support for university-based research has been extraordinarily productive. According to this traditional view, undirected basic research support provided by the NSF is the goose that lays the golden eggs. In due course, they say, such research breeds technological advances: support individual physicists and you will eventually get lasers.

I detect in my colleagues' opposition a fear of change. For three decades NSF has made decisions on research funding along disciplinary lines. University researchers have learned that recognition and promotion come most easily to those who do not deviate from the center of the disciplinary road. The rule has been "publish in your discipline or perish."A major change in the way NSF provides support would require a redefinition of research success, and this prospect frightens many who have become comfortable with the current system.

But a strict disciplinary focus has weaknesses. It offers researchers little incentive to consider the connections of their work with other disciplines and does not encourage the exploration of practical potential. Research collaborations between chemists and physicists or between chemists and chemical engineers are rare. And science and engineering faculty still turn up their noses at colleagues who work closely with industry--despite the intellectual and practical rewards that such collaboration can bring.

This narrow focus can sap a discipline's vitality. In my own field--chemistry--most researchers confine their studies within orthodox boundaries of organic, inorganic, and physical chemistry. They fill journals with research that I occasionally sense is leading nowhere. The field would be more relevant and exciting if chemists sought to link aggressively their work with that of other disciplines, such as materials science, biology, and chemical engineering.

Massey recommends that NSF integrate traditional and nontraditional types of research funding. NSF would support individual investigators within conventionally defined fields, but in ways that reduce the barriers between disciplines, encourage greater interaction between universities and industry, and emphasize the research's impact on the nation's economy. These changes would presumably be accomplished through greater emphasis on interdisciplinary research centers.

Massey's preference is based on the notion that a great deal of basic research can be applied relatively easily, and that the public deserves to enjoy the benefits of research as quickly as possible. He cites the opinion of Frank Press, president of the National Academy of Sciences. This "new reality," says Press, will entail a more "direct connection between fundamental science and engineering and their commercial applications."

Although many of the NSF activities ought to target some sort of economic benefit, we cannot abandon that portion of basic research that does not easily or quickly translate to useful technology. There remain some important intellectual endeavors--pure mathematics, astronomy, and high-energy physics, for example--that should be allowed to continue as before. They cannot and should not be forced into conforming to a new strategy of economic relevance. Massey should also resist the irresistible bureaucratic urge to use NSF's new strategy to justify higher budgets and set up false expectations in Congress about the certainty of resulting economic benefits. Most importantly, the danger exists that political forces will push NSF to lower its standards of technical merit in funding interdisciplinary work at engineering centers. Quality must not be compromised.

Still, change should be invigorating. Universities have traditionally had two fundamental purposes: to educate students and create knowledge. We are now presented with the opportunity to add a third objective of applying this knowledge to the real world. Past practice is not necessarily the best guide for future achievement.

Photo: John M. Deutch (L. BARRY HETHERINGTON)

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