editorial

Vertical communication and industrial policy

Innovation is discovery acting through implementation. Without scientific discovery, or without motion down a path of implementation, there is no innovation. Recognizing the dual need for discovery and implementation, the American community of physicists has long dedicated itself to both the advancement and the diffusion of the knowledge of physics. And it is diffusion through industrial innovation that I'd like to address here.

Physics is a science that prolifically spawns applied disciplines. As new societies dealing with applications arise, there is a wistful feeling of regret in the minds of those who seek the continued unity of physics. We long, perhaps, for the days when *Physical Review* was one volume, and when APS meetings could be held in college lecture halls. Yet despite its increased size, APS still offers well-run meetings enabling an interchange of ideas among research physicists in different specialties. That "horizontal communication" is important, and is performed well by APS.

But the industrial research physicist also needs "vertical communication," to transfer research results to technologists and engineers. Their activities are essential to the economic implementation of these discoveries in a competitive customer-oriented economy. In industry, much of that vertical communication takes place within a company, or between supplier and user companies' technical staffs. But at the leading edge of new physics, a great deal of essential transfer of knowledge takes place at open forums (after appropriate steps are taken to ensure proprietary protection through the patent process).

Last year the APS Council formed the APS Industrial Task Force and asked it to investigate ways in which APS could better serve its industrial constituency. The task force observed that many competing organizations—some of them AIP Member Societies, but many of them not—meet the dynamic needs of professional physicists better than does APS. In particular, they respond better to a changing demand for "downstream movement" of physics into technology and engineering. The task force suggested a "permissive" approach that would allow APS members in industry to respond to their own dynamic needs in a supportive APS environment. We applauded the "topical groups" mechanism and suggested several additional actions.

The task force observed that representation on APS committees and divisions is disproportionately from universities and government labs. Of 114 total members of divisional executive committees, only 13 are from industry—and of these, seven are from Bell Labs. Only one small high-tech company is represented, despite the importance of smaller companies to the American economy. For example, job creation comes primarily from smaller firms: A sample of 42 technologically based firms from the *Fortune* 500 shows that the largest 14 *reduced* employment by 176 000 (or 5.5%) between 1978 and 1984; the middle 14 increased by 132 000 (14%); and the smallest 14 increased by 104 000 (40%).

The particle-physics, plasma-physics, nuclear-physics and astronomy communities influence government policy through separate bodies (HEPAP, NSAC and so forth) composed almost entirely of physicists. But government policy for industrially important fields of physics is influenced primarily through societies (such as the Institute of Electrical and Electronic Engineers, the Optical Society of America and the Acoustical Society of America) composed only partially of physicists. There exists no forum specifically for physicists to address industrial policy subjects such as balanced research support, tax credits, international communication and the antitrust aspects of collaborative research.

This fall the APS Council will follow up on the completed task force activities by holding a small meeting of industrial physicists with officers of the APS to discuss how APS can better serve the industrial community. Personally, I feel that the dialog must grow beyond this. Through our companies, through technologically oriented societies and through positioning our own physics societies best to represent us, we industrial physicists must take the time to formulate and represent the legitimate needs of physics in future industrial policy.

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