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Applied Science

One of the most significant trends of this century is an increasingly close relation among science, technology, and society. Central to this interaction are the big mission-oriented industrial or governmental laboratories. Many of these laboratories conduct excellent basic research while pursuing goals highly relevant to the needs of society. They are able to tackle problems involving physical, biological, and social sciences and complex engineering considerations.

In the mission-oriented laboratories it is feasible to bring together all the needed expertise and to achieve fruitful interaction. This is accomplished through both formal and informal channels, and the latter are often very effective. For example, in the Bell Telephone Laboratories, intercommunication among physicists, who participate widely in interdisciplinary activities, serves to supplement the formal modes of information transfer.

When basic research in the physical sciences is accomplished at the universities, the path to application is a difficult one, with many inherent delays. The communication of ideas by way of the scientific literature to those who might apply them is slow and inefficient. In the mission-oriented laboratories such barriers to application need not exist.

Many scientists are at their best when working with a sense of urgency. A combination of the desire to know and the need to know can provide a double motivating force. Thus, in some laboratories the scientist enjoys the traditional stimulus that the basic researcher feels, including the approval of his peers, while also having the satisfying knowledge that his contribution has been relevant to a great social need.

Recently, the National Academy of Sciences has prepared a report on applied science and technological progress.* An important aspect of the effort is a discussion of the mission-oriented laboratories. The report lists a number of the characteristics of the research environment that facilitate transfer of new scientific results to useful applications.

1) The key individuals in the research organizations are fully aware of and sympathetic to the principal goals of the organization, but at the same time the research mission is defined in broad enough terms so that it retains its validity as circumstances and the state of technology change.

2) People within the organization are willing to move between fundamental research and work more closely concerned with applications, and also are willing to change specialities or scientific disciplines. The artificial barriers that sometimes exist between disciplines and between fundamental work and applications are at a minimum.

3) The organization is quick to recognize new ideas and to fund work based on them, at least up to the point where the feasibility and desirability of a larger commitment can be assessed.

4) At each organizational level the individual has some freedom in redeploying the resources at his disposal without extensive review by higher authority.

5) There is full communication through all stages of the research and development process, from original research to ultimate application.

Because of their great achievements the mission-oriented laboratories are likely to fill expanding roles. Some existing laboratories may be asked to change their emphasis from physical technology to work on social and environmental problems. New establishments may be created to deal with aspects of the many social problems that are facing the nation. Mission-oriented laboratories have made great contributions to the well-being of this country. They represent a successful means of bringing to bear on difficult problems the best of our intellectual resources.—PHILIP H. ABELSON

* *Applied Science and Technological Progress*, a report to the Committee on Science and Astronautics, U.S. House of Representatives, by the National Academy of Sciences.