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**COVER** Athapaskan wooden plaque mask. The mask "was created to tell the story of a woman who went to pick blueberries. But rather than collecting the fruit she danced with her basket, pretending to be industrious. The mask has many features similar to those employed by Bering Sea Eskimos and of religious significance to them. These include a down-turned mouth and chin tattoos, symbols of females; a pair of goggles, an indication of a supernatural quality; and hoops and feathers, references to celestial bodies. The symmetry of the mask is typical of Athapaskan workmanship as are the woman's red cheek spots." [University Museum Anvik NA 5822b; collected by L. Dimoski; accessioned 1917. Height 31.9 centimeters excluding feathers. From *Raven's Journey*, reviewed on page 1005]

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## Evolution and Growth at NSF

The National Science Foundation is in the process of change. New initiatives, if successful, will result in continuing increases in NSF's budget and in its role in science, engineering, academia, and industry.

The NSF is demonstrating new flexibility in its experiments with Engineering Research Centers and the proposed Science Centers. At its inception and for nearly 30 years, the policy of NSF was to support basic research but little else. The rationale and defense to Congress was that out of basic research would inevitably come practical applications. There were few mechanisms for rapid transfer of knowledge from campus to industry. When results of research were published in the open literature, they were as available to the Japanese and others as to the Americans.

Not long after its establishment in the early 1950s, NSF budgets benefited from anxiety about Russian competitiveness brought on by Sputnik. But after that spurt, increases were slow. In the meantime, the National Institutes of Health were also growing from modest beginnings. The NIH budget is now about \$6 billion, and for most of the past 30 years, it has had three to four times as much funds as NSF. The difference between the two agencies is in large part due to the wisdom of James Shannon, who was director at NIH from 1955 to 1968. He realized that basic research is important, but that improvement of medical practice was essential if basic research were to enjoy liberal funding. The policies he established have been followed.

During those earlier three decades, there were differences in the political climate in which the two agencies operated. Most everyone is in favor of better health. In the earlier days, fostering industrial competitiveness hardly seemed necessary.

The circumstances have changed. There is growing concern about our trade balances and loss of jobs. Some 200 members of Congress have formed a caucus on industrial competitiveness. President Reagan, in his State of the Union message, advocated a doubling of the NSF budget during the next 5 years. Political fads come and go in Washington. But lack of competitiveness is not a fad, and it will not disappear short of 10 years, if ever. All in all, NSF director Erich Bloch is on firm ground when he seeks means of improving the effectiveness of transfer of knowledge from campus to industry. His position was strengthened by responses to a request for proposals from universities to establish Engineering Research Centers. In the first two competitions, NSF received 244 proposals from 114 engineering schools requesting a total of \$3.5 billion in support. There was also substantial interest on the part of industry in fostering this type of industry-university interaction.

Six of the centers were authorized in 1985, with five more in 1986. Two or three more will be established in 1987. The total contribution from NSF will be about \$35 million, a tiny fraction of the total NSF budget.

It is too early to judge the effectiveness of the centers in creating and transferring knowledge and technology and in engineering education. However, a reading of two volumes describing the centers issued by the National Academy Press leaves the impression that the funds for the experimental Engineering Research Centers are money very well spent. Much of the research being conducted involves advanced computer and materials sciences. The efforts tend to be cross-disciplinary and choices of goals tend to involve inputs from industry.

Performance of the various centers is likely to be uneven. Their efforts will be conducted to advance different areas of technology. The academic climates and university administrations will vary. Perhaps most important will be the skill of leadership in defining worthwhile goals and in fostering enthusiasm, cooperation, and drive of collaborators to achieve those goals. Progress at the various centers will be monitored closely by NSF and advisory groups. The intent is to learn from experience and to modify procedures if that seems desirable.

Erich Bloch is determined to increase the effectiveness of cooperation between universities and industry in the effort to achieve better industrial competitiveness. He is a man with vision and a mission who is operating in circumstances that will enable him to have considerable impact.—PHILIP H. ABELSON