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## An R & D Delivery System

The federal government has funded and consumed a fabulous amount of research for its own needs—radar, inertial guidance, proximity fuses, ballistic missiles, antiballistic missiles, "beating the Russians to the moon," and on and on and on. The emphasis has been on federal use. The National Aeronautics and Space Administration speaks of agency users, not citizen users.

At the same time the citizens are saying, "If we can put a man on the moon, we can do this or that." They will not be put off by the alibi, "That is a different subject." We must solve their problems as well.

In his editorial\*, Bisplinghoff makes a potent point that federal research should be and is now aiming more at citizens' needs, and he goes on to say, "It is not at all clear that funneling federal R & D funds through existing federal institutions will come within a country mile of accomplishing the intended purpose."

I agree wholeheartedly—it will not. Fortunately, there is a family of state institutions with a federal connection that do come within that "country mile of accomplishing the intended purpose" of research for citizens' needs. They do so because they are not federal. I refer, of course, to the Agricultural Experiment Station system.

The first experiment stations were set up a century ago by states to solve problems of farmers, the largest group of citizens at the time. Soon the hoped-for solutions began to come—better varieties, better fertilizers, control of disease, and better nutrition. Soon city people found that the stations helped to feed them. The economic return on the investment in research was high.

By the time the first 13 state experiment stations were in operation, Congress decided that here was a useful system through which to funnel federal R & D funds with the aim of solving citizens' problems. The Hatch Act was passed, and there is now an Agricultural Experiment Station in every state.

By now the stations have solved reasonably well the problem of cooperating with the industries that produce our food. And they have a delivery system that has functioned for nearly a century. Being spread over the nation and directed from the grass roots, stations know citizens' needs and how they vary over the country. Therefore a federal agency does not direct them, but Congress funds them and thus spreads its scientific bets across the nation. Since no Washington committee can possibly think of all the angles or numbers that might win, the decisions must be and are made locally.

A basic policy is steady money. Congress funds the stations on a regular basis, not on the feast-or-famine basis of individual grants. That means that if a fire flares up it can be quenched before people go hungry, as the corn blight epidemic of 1970 plainly showed. In cooperation with industry, the system put out that fire in 2 years. Had the system depended on contracts and grants, the red tape would hardly have been unrolled in that time.

While doing work with practical applications, the stations can do profound research too, as several Nobel prizes and memberships in the National Academy of Sciences prove. Vitamins and hybrid corn testify to the value of the stations. So, too, do dicumarol, streptomycin, and biological control of pests.

Bisplinghoff is correct: the stakes are large, they are getting larger, and the hour is late. Fortunately, in its research for our groceries the country has developed a system that can make discoveries, can translate them into solutions for the public and private sectors, and can deliver the results.

Perhaps the Agricultural Experiment Station system is a first approximation to examine as we seek greater economic return on our federal R & D investment.—JAMES G. HORSFALL, *Director Emeritus, Connecticut Agricultural Experiment Station, New Haven 06504*

\*R. L. Bisplinghoff, "Federal R & D—Outmoded Management Policies," *Science*, 12 December 1975.