

initiates major programs requiring a heavy investment of scientific and engineering talent. (2) In implementing its programs it purchases a major share of the nation's research and development effort, and of its end products. (3) It directly employs many scientists and engineers. In addition, the federal government is the largest supplier of information about scientists and engineers, and about the activities, such as research and development, in which they engage.

As the initiator of major national programs, over the past 15 years the government has determined the deployment of hundreds of thousands of scientists and engineers. Its decision to invest heavily in the development of missiles and of other advanced weapons systems, and more recently its decision to carry through the manned lunar project by 1970, are together largely responsible for the high proportion of scientists and engineers now engaged more or less directly in national security and space efforts.

Through contracts and grants, the government has an indirect but powerful influence on the utilization of a large fraction of the nation's scientific and engineering manpower employed by industry and the universities. This influence is exerted by the government in its definitions of work to be funded, its selection of the institutions where the work will be done and the individuals who will do it, in the conditions it writes into contracts and grants under which work will be performed, and in the skill and intelligence with which the work is supervised by government scientists, engineers, and administrators.

Finally, the government directly employs more than 120 thousand scientists and engineers, of whom one third are engaged in research and development.

The following series of recommendations is intended to help the government improve its performance in each of these roles.

THE GOVERNMENT AS AN INITIATOR OF MAJOR PROGRAMS

1. Before the government reaches a decision to undertake a great technological program (e.g., the lunar landing or the supersonic transport projects), it should make a careful assessment of the impact of the decision on the deployment and utilization of scientists and engineers.

In view of the way in which certain government decisions have radically altered the pattern of deployment of scientists and engineers in recent years, it might be supposed that major decisions had been preceded by careful studies of their probable impact on the market for scientific and engineering manpower, and, more broadly, of their effect on the general direction of scientific and technological effort in the United States. Yet, so far as we can learn, no adequate studies of the impact of these decisions were in fact made before the decisions were taken. Indeed, meaningful studies probably could not have been made, partly because the information on which to base them was not available.

Common sense suggests that there should be a careful calculation of the requirements for scientific and engineering manpower that will flow from each major decision of the federal government. When these requirements are large, the government should make an estimate of what the resulting redeployment of the nation's manpower is likely to cost in money and in scientific and engineering manpower diverted from other objectives.

Such calculations and estimates are difficult to obtain. At the present time, many different units of the federal government are involved in the collection, analysis, and publication of information on scientific and technical personnel. Even though considerable progress has been made toward the coordination of these disparate activities, officials at the top levels of the government still lack the kind of coordinated information they need if they are to assess accurately the impact their decisions are likely to have on the deployment and utilization of scientific and engineering manpower.

2. Responsibility should be assigned to a unit within the Executive Office of the President for (a) stimulating and coordinating planning by federal departments and agencies with respect to scientific and engineering manpower; (b) promoting research, both inside and outside government, that is likely to facilitate such planning and the solution of manpower problems; and (c) taking the lead in developing an integrated program for the continuing collection and analysis of information, relevant for operating and policy purposes, on scientific and engineering manpower. While the Committee does not recommend a specific location for this unit in the Executive Office, it notes the feasibility of placing it in the Office of Science and Technology.