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## Difficult Decisions

If you can't do everything you want to do, how do you decide what to do? For an individual, such decisions are comparatively easy—a washing machine instead of a Deepfreeze or both in some order of priority: a washing machine this year, a Deepfreeze next year. For the individual scientist a similar system of choice must prevail; he gives one experiment priority over another.

The decisions become more difficult to make in assigning experiments for large and expensive equipment. More people want to schedule experiments for a big synchrotron or a nuclear pile than time permits. Who is to decide how to allocate experiments? One solution would be to build enough synchrotrons and nuclear piles so that all worthy projects could be carried out promptly. But decisions of this kind have to be made at the national level. Shall we build this additional equipment or an oceanographic vessel? Or a radiotelescope?

Perhaps no scientific activity poses these questions in clearer form than does the exploration of space. The lead time for planning experiments and the vehicles to launch them is several years. The equipment is expensive, and it can be used only for one group of experiments. It is as though an oceanographic vessel would be able to set up only one buoy equipped with numerous instruments and would then explode: one ship, one set of experiments.

The decisions in this field have had to be made by the National Aeronautics and Space Administration (NASA). No perfect mechanism for decision making exists, but NASA has worked in close liaison with the National Academy of Sciences—National Research Council's Space Science Board and the President's Science Advisory Committee, as well as with panels of scientists from outside the government.

One of the major decisions that had to be made early was whether or not to launch a crash program to overtake Russia in the brute force competition in spatial weight lifting. NASA decided instead to develop a well-balanced scientific program and has recently laid out a ten-year schedule to accomplish its aims, which will include the development of high-thrust vehicles.

Although most of the projects seem to most scientists to be in good balance, one in particular is criticized. This is the Mercury or man-in-orbit project, which has been given a top priority. The argument against this undertaking is that the yield of scientific information from a man in low orbit will probably be less than that attainable by substituting for a man and his supplies an equivalent weight of instruments. Here is a prime example of a difficult decision. Granted that the immediate scientific results of launching a manned satellite will not be as great as those obtainable by other means, is this the overriding consideration? The NASA decision can be defended on two grounds. Sooner or later man is going to go deep into space—say, to the moon or Mars—where he can contribute much to the scientific results, and exploratory flights over short periods of time are essential first steps. Furthermore, the United States does not exist in a political vacuum; it cannot afford to lag far behind the Soviet Union in getting a man into orbit.

That all decisions made in so vast an enterprise as the exploration and exploitation of space will satisfy everyone is obviously too much to hope for. That in the first two years of its existence NASA has done as well as it has in balancing all factors—political, psychological and scientific—is ground for congratulations.—G.DuS.