Some day the problems of weight and safety may be solved to the point of making nuclear power practical for flight in one form or another.

In the meantime, a great research effort is going into the so-called "exotic" fuels, to provide efficient power for supersonic and possibly hypersonic flight in outer space, through the use of either liquid or solid propellents.

Again in the Space Age, man's ability to fly ever higher and faster is dependent on the availability of new sources of power.

The third factor we must consider is the need for new materials. Having mastered the sonic barrier -- although there is still much to be learned about that strange phenomenon -- we face the thermal barrier, which as you all know is the speed of flight at which high temperatures affect airframe skins and structures adversely. In addition there is the great problem of finding materials which will withstand and contain the hot gases produced by the new sources of power.

Many research attacks are being made on these problems, including experiments on a wide variety of surface coatings on what might be called conventional metals; on new alloys using rare metals and on various combinations of metals with ceramic materials. Satisfactory answers are essential if the engineer is to further widen the horizon of space flight.

In summary then, we find that the scientist must be encouraged to continue in his role of contributing to the growth of new knowledge, discovering new sources of power, and inventing new materials.

The engineer, however, has several equally important responsibilities -- one is to identify and interpret his own needs to the scientist, in order to stimulate research in useful directions; another is to exercise creative imagination in putting scientific discoveries to use. Since he cannot do everything, he must be selective in his projects, and here a correct evaluation of the time factor is of supreme importance.

From a defence standpoint, considering the very long lead time required for the development, production and deployment of a complex weapons system -- usually from 7 to 10 years or even more -- there is little merit in spending the national wealth on a project which matures too late, or is obviously obsolescent in the face of probable enemy threats.

Let me explain for a moment what I mean when I refer to a "complex weapons system".