NEW ENGLAND'S STAKE IN THE SPACE PROGRAM

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At a Conference on the Peaceful Uses of Space, I will have to beg your forgiveness by beginning my brief commentary with a military recollection. It was just a little less than 10 years ago that I went to a specially called conference in the higher levels of the Pentagon on the subject of "What can the military services do in the way of helping out the International Geophysical Year?" One suggestion, for example, was that we might put some sort of a modest satellite in orbit—and that should surprise the Russians!

The Army and Navy together developed a program with the Navy doing what we people in the missile business were still inclined to call the warhead, although it was really the scientific package, and with the Army undertaking to hook together a Redstone and a Sergeant missile, as a first and second stage, respectively. It was thought that a ball weighing somewhere from 6 to 20 pounds could be put in a near-Earth orbit. As for the Air Force, we had a program out in Los Angeles to do something about the Atlas missile. We volunteered to pull three Atlas missiles off the production line at some time to use as first stages—it being calculated that the same little ball could be put in a lunar orbit or at least loop once around the Moon in an Earth orbit. That seems like quite a long while ago when Dr. William Pickering is talking about stabilizing one of his spaceships by using flippers sensitive to the pressure of light—it was a shorter time than 10 years ago really because we did not actually start until 6 years ago.

The future of a great deal of our technology as well as our national prestige now rests on our position in space. President Kennedy's magnificent phrase, "Space is the new ocean, and we must sail upon it," is given flesh-and-blood reality by people like Wernher von Braun.

Dr. von Braun, incidentally, was in New Mexico the first time I went there, after World War II in 1947, at White Sands where some German V–2's were being shot off—more or less to see how they worked. The thing I have recalled most about my visit is not the actual shooting of the V–2. It was a test stand for rockets which the local lieutenant colonel pointed out very proudly was designed to withstand a million-pound thrust rocket test—this was not very difficult to do because they were going to thrust upward and push down toward the rock. That was in 1947. In 1958, 11 years later, Lyndon B. Johnson, then a senator, issued a report from the Senate urging the development of the million-pound rocket.

A few words of regional interest seem appropriate here. We, all of us, go along continuously aware, subliminally aware, perhaps, of the fact that the effective groupings in society begin with the individual and progressively increase to include the family, tribe, town, city, State, and Nation. We are all aware that this politically economic grouping has grown to something even supernational. How many of us think, though, of the particular importance of groupings in the deeply science-based technological effort of the sort we are discussing here? Of course innovation comes from the minds and conceptions of gifted individuals, but it also comes from the efforts of groups. The things that the Bell Telephone Laboratories do, for example, could not be done in college laboratories and much less by individuals; even in such a loose democracy as Harvard University things happen because there is a faculty club where people meet and interact.

New England has historically excelled in the nurturing of creative individuals. We have not done as well as we could in capitalizing on the ideas created

here. Modern rocketry was really born here, but then it went away—as a matter of fact, it went all the way to Germany. And, since we are discussing flying bodies, we might add that aeronautical engineering—as opposed to the cut-and-try method of making airplanes and seeing if they would stay up—was born here, too. The first course in any university treating this subject as a discipline was initiated at MIT by Jerry Hunsaker, still here on Beacon Hill. Incidentally, he served for many years as chairman of NACA, the predecessor of NASA.

The techniques of radar which, with a bit of a head start from Britain, were developed in the World War II radiation laboratory here formed the background for one aspect of today's guidance and navigation problem, inertial guidance which was also developed in New England. The elements of the spaceship, at least the initial innovations on our shores, all started right here in New England, but the aeronautics industry, the guidance industry, and the navigation industry are not centered around here.

Some other things went away too. Technicolor was born here and moved to Hollywood. We cannot say that that sort of thing would not happen today—that we are alert to getting on top of opportunities. The one individual invention that made modern high-speed data processing—really modern and really high speed—was born right here a few years ago, but the center of the data-processing industry is not here, either. The important point is that we have opportunities from propinquity with the enormous individual talent in our region—we have a very highly intellectual atmosphere in this area. We have opportunities for translating and transferring these new ideas into useful end results. We certainly have opportunities beyond any that we have exercised. What we need to do is to match our genius, really, in innovations and technology with the sort of innovations in management that will make it possible for this community to make its really best effort.

This is only in part regionally selfish because the total strength of the Nation is the strength of the individual parts, and in this technology the translation from idea to basic research to applied science to implementation is so very important that it must be done quickly. Such translation is achieved so much more easily in groups, and, since we have such a grouping, we owe it to the country to do the best we can with it.

Dr. Killian suggested that the best course for New England was to do what comes naturally—that is, innovation: he may have coined the phrase *the innovation industry.*

Congressman Daddario raised the flag against complacency which I, also, would aim specifically at this region. One aspect of the New England genius of our highly competitive industry is that organizing them is a little bit like organizing fly fishermen. Or, to state it another way, in the context of our greatest strength there do lie elements of weakness that very much deserve our attention. General Gavin remarked that we should regard the NASA Center here as an incentive and not as competition.

Dr. Seamans showed a chart which had 18 dots on it for NASA installations—the *one* dot in New England happens to be Frank Phillips and his Procurement Office. In light of the oncoming overwhelmingly obvious fact that electronics and the things that center around the arts that we identify with electronics are going to be the tail that wags the system's dog in the space business, with this Electronics Center we have a basis for a new model of planning. The great strength of the universities of New England as well as industry also strengthens the foundation for our important role in space science.

Dr. Seamans spoke of inadequate planning being one of the difficulties in the program. It has been said on occasion that no well-organized body ever makes a small mistake. The U.S. Government is not a small body, and it is, in some respects, organized. So we are in danger of making big mistakes in the ground work we lay today. Why was it 11 years from the hopeful construction of a million-pound test stand at White Sands until a mandate from the Senate started development of a million-pound thrust rocket? Why was it even 3 years from the time when the United States recognized that it needed to put something in orbit for the International Geophysical Year until an orbiting package was developed? Even so, it took the shock of the Russians' Sputniks to really put us to work. We do make big mistakes when we make them. With this strength and with the introduction of NASA's Electronics Center here we have the basis for the truly "deep-diving" intellectual effort needed in planning that will get the right course of action laid out.

In conclusion, we New Englanders wish to express our gratitude to our excellent panel chairmen: Messrs. Knowles, Holmes, Harrington, Goett, and Bauer. We

offer a sort of a personal thanks to Dr. Kirschner and Dr. Stroud for noting some of the applications of results that have already come out of our space program in geodetic measurements and meteorology.

We especially thank Mr. Parker for his reminder that $40 million worth of communications satellites might get $400 million of capacity measured in terms of cables, and that $4 or $5 million worth of weather satellites give a scan of over more than half a million square miles as compared to 200 miles scan from a ship in the Pacific, where our weather comes from.

Our gratitude also to Messrs. Gilruth, Shea, Pickering, Dressler, Naugle, and Miller for enlightening us on the programs of NASA. Thanks, too, to Mr. Phillips for his friendly chiding which has always, in my experience, been accurate and, thus far, friendly. We especially thank Dr. Newell for his very perceptive remarks about the role of universities.

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