FLORIDA'S PLACE IN NASA'S PROGRAM

by

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The great Chinese philosopher, Lao-Tse, said, "... the wise man looks into space, and does not regard the small as too little, nor the great as too big; for he knows there is no limit to dimensions."

This nation has dedicated itself to investigation of space on a vast scale which will employ large sums of money and much technical and scientific manpower.

The scale and pace of this effort are such that it is no longer adequate to explain it as a response to intellectual challenge or to say that man has always wanted "to see the other side of the mountain." Not only the wise man, but also the ordinary citizen of this and other States should look more closely into the substantive values of our space effort. The interest of the Florida State Chamber of Commerce in the NASA program is therefore most welcome and I appreciate very much the opportunity to discuss it with you today.

But I should like to examine these values with you, not only as citizens of Florida but also of the United States, and beyond that as citizens of a world community which is dangerously divided and yet can be spanned in minutes. It is on all three levels, the local, the national, and the international that this country's space program should make sense to you.

Very briefly, NASA is a civilian agency whose Administrator reports directly to the President. It is charged by the Congress with responsibility for all space research and exploration which is not peculiarly military in character. But the civilian and defense agencies must coordinate their efforts and they do so.

NASA employs some 19000 persons in a headquarters establishment and ten (existing or planned) field centers distributed across the country. Its budget has grown from some $300 million in 1958 to over $1.6 billion for the current fiscal year. And this figure could more than double next year.

NASA's program falls into four principal categories:

- First is space science, the objectives of which are to investigate the earth and its atmosphere and the influence of the sun upon them; to study the nature and history of the earth, the planets and interplanetary space of the solar system, and the universe; to search for the presence of life outside the earth; and to obtain information of the space environment which is needed for the design of spacecraft to explore the solar system by instruments and by man himself.

- Second are the applications of space science, the experimental development of satellite systems to the point of proving their feasibility for use in weather research and operations, in communications, and perhaps other applications to follow, including the utilization of space technology wherever applicable to industry.

- Third is advanced technology in which NASA conducts research into future aeronautical and space technology, including structures, materials, aerodynamics, propulsion, fuels and so on.

- Fourth and last is manned flight, the programs aimed at placing man in space, determining his usefulness there, and bringing him back, first after very brief and short excursions into space, then after more protracted and distant flights. In a recent policy statement the National Academy of Sciences strongly emphasized that planning for scientific exploration of the moon and planets must at once be developed on the premise that man will participate. Man can contribute critical elements of scientific judgment and discrimination in conducting the scientific exploration of these bodies which can never be fully supplied by his instruments, however complex and sophisticated they may become. The goal of sending man to explore the moon and return him safely to earth, first and before the end of this decade, has now been set as a major national objective.

This, in a very small capsule, is the NASA program. To you as Floridians, its values are clear.

The practical effect of dollars expended for operations at the Atlantic Missile Range, a national range used both by NASA and the Department of Defense, are evident in the mushrooming growth of the Cape Canaveral area. Today, over 4,000 people are employed at Canaveral in NASA space flight operations and programs and something in the neighborhood of $150 million is being expended there this year.

But all of this pales into insignificance beside the vast expansion of the Atlantic Missile Range which is now planned to provide NASA the launching and test facilities necessary for the huge new rocket boosters required for the lunar and planetary missions of the future. Just two weeks ago, the Corps of Engineers, acting on behalf of NASA, purchased the first new ocean front land north of Cape Canaveral. Ultimately, some 70 to 80 thousand acres must be acquired for launching pads and other facilities. This program will very greatly increase the present size and invested value of Cape Canaveral.

Ultimately, several additional thousands of people will be employed in this vast complex and new capital costs alone of land and facilities will be about $885 million.

There are other direct benefits. In fiscal year 1961, Florida State University was one of the ten nonprofit organizations receiving the largest share of NASA research grant awards. The industry of the state received 48 direct awards totalling over $5 million. In the current year, the natural processes of NASA business have continued to bring Florida direct and indirect benefits. Take the announcements of contracts by NASA in a typical month -- last July. A firm in Sarasota received $50,000 for systems integration and support services for an experiment involving energetic particles. The Air Force Systems Command received $135,000 from NASA for logistical support at Canaveral and $200,000 for Project Mercury modifications, much of these funds to be expended here. In another recent month, the University of Florida received an award to conduct tests simulating flight conditions to determine nonradiation effects of a biosciences mission.

In short, Florida has benefitted and will continue to benefit from very sizeable influxes of funds through industrial contracting, land acquisition and operational expenditures involving the wages of thousands of people. Such local benefits, of course, occur not only here but wherever space activities are located, as in the Newport News, Va., area, in Cleveland, on the West Coast, and soon in Texas, Louisiana and Mississippi where new facilities are to be established.

These benefits extend to your universities, bringing them into the mainstream of the newest technology, stimulating and helping them to strengthen their facilities and their research capabilities. Other business and industrial communities have long since learned the value of such competence.

Finally, I suspect that one should not underestimate the stimulus to your young people by reason of their proximity to the excitement of space operations and research. This must be one place in the country where it may actually be possible to give young people the feeling that academic preparation and scientific competence may really be almost as important and exciting as baseball.

I should like now to help you look at the space program as a citizen, not of your local state now, but of the United States as a nation.

During the past sixty years our western civilization has been dominated by the influence of major developments in science and technology. As the frontiers of the unknown have been pushed back, the character of technical discovery and development have changed in important ways. Major technical developments are not often made now by gifted tinkerers, mechanical geniuses, working in garages and basements. Breakthroughs are increasingly made by application of very advanced knowledge drawn from the reservoirs.

created by basic research. The tinkerer has given way to large teams, heavily endowed with expensive equipment, dedicated to achieving pre-set goals. The nation that would stay in the lead in a civilization essentially technological in nature, must invest heavily in the education, training, financing, and equipping of such teams -- and it must provide adequate goals for them.

This nation's space program is already contributing and will contribute substantially to our reservoir of basic knowledge. And to achieve this new knowledge we shall have the very healthy need to press our technological know-how to the limit. We shall have to learn how to achieve new precision and accuracy, improved systems of remote control, further miniaturization and weight-saving, new materials and techniques to withstand temperature extremes and rapid temperature changes, new and better methods for sterilization, decontamination and detection of life, improved design for light and flexible structures, and for equipment survival after impact, new photographic techniques and resolution, still more efficient data processing and retrieval, new systems of measurement, the development of closed systems including human factors, new fuels and power sources, and so on.

The national investment in space exploration is already producing new materials -- metals, alloys, fabrics and compounds -- as well as techniques and instrumentation which have gone into commercial production and other use. More than 3200 space-related products have been developed in the United States, coming from the 5000 companies and research outfits now engaged in missile and space work. (For examples, too numerous to list, I would refer you to an early study by the House of Representatives Committee on Science and Astronautics entitled "The Practical Values of Space Exploration".)

But in all of this, we are competing with other alert and competent nations, some of them hostile. A national goal is required. A scale of effort and a schedule must be imposed upon us for, without them, we may be too little and too late.

That goal, the scale and the schedule, have been provided for their motivating and integrating value -- and to assure that we shall not be second in what may well be a matter of survival. President Kennedy, in a special message to the Congress on urgent national needs, established the manned exploration of space as a national goal in these words: "I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth.

No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish. We propose to accelerate development of the appropriate lunar spacecraft. We propose to develop alternate liquid and solid fuel boosters, much larger than any now being developed, until certain what is superior. We propose additional funds for other engine development and for unmanned explorations--explorations which are particularly important for .... the survival of the man who first makes this daring flight. But in a very real sense, it will not be one man going to the moon--if we make this judgment affirmatively, it will be an entire nation. For all of us must work to put him there."

Setting this goal has the highly important function of accelerating the development of space science and technology, motivating the scientists and engineers engaged in this effort to move forward with urgency, and integrating their efforts in a way that cannot be accomplished by a disconnected series of research investigations. The real value is not in man setting foot on the moon but rather in the great national effort to develop the science and technology which is required to achieve this goal.

In the words of NASA's Deputy Administrator, Dr. Hugh L. Dryden, remember too that the billions of dollars required in this effort are not spent on the moon; they are spent in the factories, workshops, and laboratories of our people for salaries and for new materials and supplies which in turn represent income to others. Moreover, these developments at the frontiers of science and technology are transferable to other applications in our industrial society. The development of space science and technology strengthens our whole industrial base and serves as insurance against technological obsolescence. Our universities, a vital national resource, must and will be stimulated to provide the increased flow of experimental imagination and technical competence the nation requires. A major NASA program is under development for this purpose.

Space technology, like the other great technologies, can be applied to military systems, and we must be well advanced in this technology to avoid its possible exploitation against us. The national enterprise involved in the goal of manned lunar landing and return within the decade is an activity of critical impact on the future of this nation as an industrial and military power, and as a leader of the free world.

Much has already been said of the great practical benefits of weather and communications satellites which NASA is pressing forward so they may be available for early operational use. The Chief of the US Weather Bureau considers the weather satellite the most significant development in meteorology of all time--perhaps of greater importance than the invention of the barometer itself. NASA's three TIROS satellites have taken tens of thousands of fine photographs of the cloud cover of the earth. The value of these pictures to weather forecasting has exceeded all expectations. For the first time in history man has been able to perceive cloud patterns visually on a global scale and to obtain information from many sections of the world where weather information was previously nonexistent.

One example may be of particular interest to you. Hurricane Esther was first discovered by means of a TIROS photograph at 3:10 pm on September 10th. Reception and analysis of the picture was completed by 6:00 pm. By telephone the National Meteorological Center at Suitland, Maryland, was notified that satellite photographs had provided a good fix on the position of Hurricane Debbie and had turned up a suspicious vortex of clouds in the mid-Atlantic. This was to become Esther. At 7:00 pm the Hurricane Warning Center in Miami was informed.

The storm was again photographed on September 11 and on September 12 was close enough for aircraft reconnaissance. Thus, warnings at least two days ahead of the usual date were obtained. TIROS pictures showing Esther's position were obtained each day during its life.

The TIROS satellites will be followed by a more advanced version commencing in 1962. We feel we are well along the way toward achieving for the first time the ability to make virtually continuous observations of weather phenomena over the entire globe. It is perhaps sufficient to say that a recent report by the House Committee on Science and Astronautics states that "An improvement of only 10 percent in accuracy (of weather forecasting) could result in savings totaling hundreds of millions of dollars annually to farmers, builders, airlines, shipping, the tourist trade, and many other enterprises."

The use of satellites for worldwide communication looks equally promising. One expert in the communications industry states that a single satellite, costing about $40,000,000 to place in a 22,300-mile orbit, could accommodate as much traffic as a $500,000,000 cable system.

The potentialities are enormous and promise a virtual revolution in the fields of worldwide telephone, telegraph, and television transmission. For the first time there is hope of worldwide television and the economical transmission of a large amount of information in many forms.

Apart from these goals and benefits, you, as citizens, have an interest in the conduct of national programs. To avoid waste and duplication, the NASA complex was assembled from existing laboratories and teams. Only now are major new centers being established to prepare for the massive lunar effort. Similarly, NASA decided at the outset not to duplicate existing launch facilities. The Atlantic and Pacific Missile Ranges have been used jointly as a national resource. Extensive use has been made of Department of Defense contracting and contracting monitoring services, again to avoid duplication.

Existing missile systems have been used wherever possible for NASA space missions so as to avoid new development costs. The help of the Services has been sought and generously given in many aspects of the manned flight program, as in the recovery of Mercury capsules at sea. Now, as we face the development of new

superboosters, we are again turning to DOD, to utilize existing management competence, asking them to handle the solid booster development for us while we devote ourselves to other technology until such time as the best single avenue becomes apparent.

In sum, the NASA space program represents a thoroughly responsible national effort which promises a very high yield for this nation in vitalizing and advancing its technological strength on a broad front, benefitting industry, the universities, the consumer, drawing upon them all for their indispensable competency, and, above all, establishing a necessary national posture in a hostile and competitive world.

In the few minutes remaining, let us look at space from an international viewpoint. Recognizing that what is concealed is feared, it is important for us to conduct our program as openly as is consistent with national security. Recognizing also that this nation has benefitted immensely in the past from the contributions of foreign scientists, often driven here by persecution elsewhere, we must remain receptive to such contributions. With such considerations in mind, the Congress has directed that NASA conduct the national space program in cooperation with other nations.

This we have done in virtually all aspects of the NASA program. Satellites are being prepared by Canadian and British scientists at their own expense for launching here next year at our expense. Thus, we shall in effect obtain satellites of interest to us at no cost to us while the UK and Canada will gain launchings at no cost to them. Similarly, we are engaged in scientific programs with more than half-a-dozen other countries using small sounding rockets in which we often provide the payloads or the rockets while the cooperating country provides the other. We enjoy the participation of foreign technicians in the operation of most of our tracking and communications stations overseas. Several host countries actually defray the cost of such operations. Roughly two dozen countries are carrying on special weather observations synchronized with passes of our weather satellites. Apart from the direct benefit to them, they share the great load of analyzing the vast data from both conventional and satellite sources.

Next year, when we begin intercontinental testing of communications satellites, we shall be communicating cooperatively with ground terminals in England, France and Germany built at considerable expense by those countries. Finally, to assist any country to develop its competence and increase its contributions in the field of space research, we have set up training programs in our centers and universities.

In all of this, we have anticipated and followed the President's dictum that we help those who want to help themselves. We have sent no dollars abroad to support cooperative programs. Instead, we have made contributions of equipment where the other side has also been willing to commit resources of its own. We are training foreign technicians whose sponsors are serious enough about space research to pay their travel and subsistence.

A very rough "guesstimate" of the foreign contributions to cooperative programs of direct interest to us might put the total for 1961 and 1962 at some $18 million. This, I submit, is a program which makes good sense. Moreover, it contributes to understanding among the scientific communities of different nations in an atmosphere of self-respect. It is important to this nation that such international contacts be kept alive, that generous and enlightened/technical leadership be maintained, and that the channels be kept open for possibly valuable contributions from abroad.

While we have had very little success so far in persuading the Soviet Union to enter into cooperative enterprises in space research with us, it is clearly important that we maintain the kind of program framework and the posture which would permit some appropriate first step.

In this brief time, I have tried to indicate the local, the national and the international considerations which make it good sense and a good investment for this country to pursue major space goals. It has been necessary to omit the truly fascinating and exciting content of the NASA program, the projects for examining sections of the moon's surface or for retrieving and measuring any evidence of life on the surface of Venus or Mars, and many others. All this, I hope you will pursue for yourselves. I am grateful indeed for your interest and for this opportunity to put the case for space before you.