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The United States Congress
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A Congressional View of Returns from the Space Program

Scientists and engineers and their professional societies must play a major part in rejustification of funding support and to the forming and shaping of national policy.

I CONSIDER IT an honor and a privilege to deliver this speech to the joint convention of the American Society of Photogrammetry and the American Council of Surveying and Mapping. It is always a special pleasure to talk to professional technical societies because so much of my work in the Congress has been related to sciences and technology. My House Committee on Science and Astronautics has just begun its annual review of the National Aeronautics and Space Administration budget. I am convinced that space technology is closely tied to other areas of science. In fact, the committee appoints a panel of prominent scientists and engineers which meets with us annually to discuss urgent national issues. At the most recent symposium, about a month ago, views on urban problems were presented. The systems approach is beginning to be useful in these complex issues. This year the committee has taken on the new responsibility of reviewing the National Science Foundation Program and authorizing its budget for Fiscal Year 1970. The relevance of even the most basic research is being demonstrated.

But today I plan to focus most of my attention on the National Aeronautics and Space Administration (NASA) and the space program—and how it serves to satisfy certain national goals. I know that all of you are generally familiar with our space program and its goals, particularly the manned flights in the Mercury, Gemini and Apollo programs, and the wonderful success that they have had. Somewhat less well known but equally valuable are the unmanned scientific programs which include the Mariners, Explorers, Biosatellites, etc., to name only a few. One program, that I know most of you are interested in, is the series of geodetic satellites. The importance of this area is emphasized by the fact that the first U. S. satellite, Vanguard 1, was essentially a geodetic satellite. Some members of the audience have probably been directly involved in the preparation of moon maps using data from the Surveyor and Lunar Orbiter pictures—and know how important these data are to you. However, many people who do not have a direct contact with the program are unaware of its many benefits. I'm often asked, "What is the value of the space program? What benefits are we getting from it? Is it worth the money that we are investing in it? What are we taking away from other important national problems in the way of financial support or scientific talent that could be used to a much greater advantage

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elsewhere?" These are straightforward questions that need a reply but they cannot be answered simply.

THERE HAS BEEN a lot of discussion and many words written in support or derogation of why the U. S. should have a space program. A great deal of what is said naturally depends on the interests of the person or organization advocating a particular course of action and why this particular course is in the best interest of the Nation. Much depends on what we mean by *the best interests of the Nation.* Does it mean "pay-as-you-go"?—investment in the future?—a better life for more people?—progress toward a peaceful world? These are goals which are not easily quantified. Each of these questions is important, but the weighting factor that you associate with each one is quite arbitrary depending on your point of view.

The most obvious approach by many people is to compare the economic return to the dollar investment. This is certainly a valid measure, whether the return is for this generation, or the next—or even further into the future. One thing that is frequently overlooked in this regard is that the future of our country and our society cannot be a pleasant prospect unless science flourishes.

Past civilizations have stressed science; for example, Egyptian astronomy and engineering, Grecian mathematics and logical deduction, and Chinese gunpowder and rockets. Japan has emerged as a modern powerful nation with the introduction of new technology. To use a term from thermodynamics, this is an irreversible process; retreat to a more agricultural or pastoral economy and a less technological system is impossible expecially in view of the world population growth.

THIS BRINGS ME back to an earlier issue that I raised: What does one mean by *space program payoffs and benefits?* Some appear as direct benefits; for example, communication satellites reduce the cost of long range communication, bring into range otherwise inaccessible areas, and increase the number of available channels. Meteorological satellites yield general weather prediction, severe storm prediction, and possibly, later, control of the weather. Although it is not possible to attach an exact assessment of economic value to such programs, they seem to have a much more positive than negative influence on, not only the U. S., but all of the countries of the world.

An even more forceful program for immediate and continuing returns in the way of direct benefits to our economy is the ERTS, the Earth Resources Technology Satellite. The concept has been around for several years. It has had inputs from many sources, NASA and the Department of the Interior making major contributions. These satellites will make it possible to examine what resources we have and how they might be used best now and in

About Congressman Miller

The Honorable George P. Miller has served continuously in Congress since 1945 and is currently chairman of the Committee on Science and Astronautics. During his distinguished Congressional career he has served on the Committee on Merchant Marine and Fisheries where he was chairman of the Subcommittee on Oceanography. He was appointed to the Special Select Committee on Government Research during the 88th Congress. He has served on the Board of Visitors of the Coast Guard Academy and has twice filled the position of Chairman of the Board. In 1962 Congressman Miller was appointed to represent the House of Representatives as Special Advisor to the U. S. Ambassador to the United Nations for the Peaceful Uses of Outer Space.

The Robert H. Goddard Memorial Trophy, presented to the individual whose efforts represent the greatest achievement to advance space flight programs contributed to United States leadership in astronautics, was awarded to Congressman Miller in 1962 with the citation, "his sustained leadership in the formulation and execution of National policy contributing immeasurably to the remarkable accomplishments of the United States space effort."

Congressman Miller was graduated from Saint Marys College in California with the degree B.S. in Civil Engineering, and in 1962 he was awarded an honorary Doctor of Science degree by his alma mater.

the future. The Department of Agriculture and Department of the Interior may gain a new diagnostic device for carrying out their missions. These satellites, with remote sensors in the visible and infrared spectra will be able to survey water supplies, determine the quantity and quality of farm crops, search for oceanic fishing areas and geologic areas for mineral products.

The budget in NASA for this project has been low but in our committee, particularly under the overview of Congressman Joseph E. Karth of Minnesota, it is receiving increased attention each year. We are strong supporters of space programs where the returns are readily visible, not just to the scientist, but to the man in the street and the man in the field. If present plans are pursued the first ERTS will be launched in late 1971, with a second to follow about a year later. This use of a satellite reflects one of the ways in which the space program can contribute to not only our future but also to solutions of the world's problems of energy resources; pollution of the atmosphere, decreasing water supplies; and then perhaps, by scanning the urban landscape in detail can contribute to solutions of city problems.

These are a few obvious examples of how the space program can and will be beneficial to our, and possibly, the world's economy and social welfare.

LET ME TURN now to some benefits of our space effort that are not quite so evident. The broad and stringent requirements of the overall effort have necessitated the combined talents of scientists from all disciplines. The interaction among these groups of scientists and engineers would probably not have occurred in a less complex situation. The necessity for integrating all parts of the program—rocket propulsion and guidance, payload design, ground support from launch pad to tracking and data acquisition—resulted in a crossfeed of technology that has produced and will continue to produce advances that were not recognized at the outset of a particular phase of the space program.

That this would be true was recognized in 1958 by the House Select Committee on Astronautics and Space Exploration, and by the corresponding committee in the Senate, which had the task of writing the National Aeronautics and Space Act and preparing a series of reports to guide future Congressional action. Accordingly, NASA was given a direct responsibility to ensure that by-products of the Nation's investment in space be made readily available for the widest possible use.

THIS IS NOT a new concept; when our Nation was founded, men like Thomas Jefferson and Benjamin Franklin recognized the need for Federally supported scientific studies and the universal dissemination of the results. As a result the Constitution gives Congress the power to "promote the progress of science and the useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

NASA, to meet its responsibilities in this area, established internally the Office of Technology Utilization. This office has four main purposes: to increase the return on the national investment in aerospace research and development by encouraging additional uses of the knowledge gained in those programs; to shorten the time gap between the discovery of new knowledge and its effective use in the market place; to aid the movement of new knowledge across industrial, disciplinary, and regional boundaries; and to contribute to the knowledge of better means of transferring technology from its point of origin to its point of potential use.

Knowing that traditional methods of dissemination would not be adequate for the large volume of technological information that was anticipated from the space program, the office has experimented with new mechanisms. These are too many to discuss in detail today, but include such things as NASA Tech Briefs (about 800 a year); Technology Surveys, reviewing the state-of-the-art in a broad technical area; and six Regional Dissemination Centers operated by universities or research institutes and serving fee-paying industrial clients. The centers may be the most important innovation. They provide their clients with rapid access to the NASA scientific and technical information collection by means of computer searches of indexes maintained on magnetic tape. The tapes are updated twice a month, and the computer system can provide not only searches of the entire collection for answers to a specific problem but also regular announcements of selected new documents that are of interest to a client company. There are now several hundred paying clients and each center is expected to become self-supporting.

MORE THAN 2,750 of these technological advances have been shared with industry. During our recent hearings on the NASA budget

several of these specific transfers were brought out. Here are two examples to illustrate the range that these developments can take.

> The need for fireproof materials in Apollo spacecraft has demanded a complete testing and documentation of the flammability characteristics of hundreds of materials. These results have been computerized and are available to industry. Information on flammability of materials developed for Apollo has been passed along to the aircraft industry for its guidance in outfitting future aircraft. Fireproof Beta cloth developed for space suits is being evaluated for firefighter suits in municipal departments.
>
> An ultraminiature television camera developed for NASA measures 20¼ cubic inches in volume, yet is capable of transmitting images with a resolution conforming to conventional industry practice. With such a device, television techniques are available for many new applications in business, education and the management of large enterprises.

THERE IS MUCH more that could be said about the job that NASA has been doing to distribute the results of their work. However, I want to use some of my time to talk about another area where the Nation has benefitted from space exploration, but in a way that can not be easily measured in dollars and cents. This is our international program. Only the U. S. and Russia presently have the resources and technical background to pursue the broad space programs that we have each been conducting. Yet other countries want to be involved to the extent that their resources and economies will allow. We have actively supported this participation by encouraging the initiation and operation of space projects in European and Asian countries. This has taken the form of technical information exchange, open use of launch sites, and in some instances the provision of a launch vehicle for a payload designed and built by another country or organization of other countries.

ESRO, the European Space Research Organization, has had several of their scientific satellites launched by NASA rockets at U. S. missile ranges. Conversely the U. S. has used Canadian, Swedish, and Indian locations for launching upper atmosphere sounding rockets. Italy launched a satellite from platforms in the Indian Ocean less than 2° south of the equator, 3 miles off the coast of Kenya, Africa. This was the first independent launch in the San Marco program, a joint U. S./Italian project to inject a satellite into an equatorial orbit to investigate the very high atmosphere. The Italian team, headed by Prof. Luigi Broglio, designed, developed and built the payload and launch facilities. We provided the launch vehicle and the worldwide communication and data acquisition network. It is pertinent to comment that another communication and data receiving station was installed at the University of Nairobi and contributed its share to the overall success of the project. Another launch in the San Marco program is planned for November 1969. Essentially the same individuals on the Italian and U. S. teams are involved and we are looking forward to another highly successful operation.

I cannot emphasize strongly enough what these international programs mean to our relationships with other countries. Of course the prime competition in launching hardware is from the U.S.S.R. Cooperation with the Soviets in the space program has been proposed but barely exists today. We are exchanging meteorological, geomagnetic and geodetic data routinely and have entered into an agreement for astronaut rescue. This is a start and gives promise of what we might be able to do in the future. Their goals appear to be similar to ours but this can be obtained only by inference and deduction from their program up to this time. Competition exists and our space program was stimulated by the launching of the early Sputniks, and again by Vostok. There is no doubt but that these achievements by Russia aroused a concern in the U. S. for our scientific incentives and what implications this might have for our future. Whatever this may have been, we did become concerned and renewed interest in the sociological need for a scientific base from which technology advancement could proceed emerged as a fundamental requirement for any modern nation.

PERIODICALLY WE have examined the potential of a space program and announced goals toward which we would apply the necessarily limited funds available in the competition for Federal funds. The space program is only one of many Government scientific activities which benefit the Nation as a whole—the National Science Foundation, the Atomic Energy Commission, the National Institutes of Health and, in fact, most of the agencies have research programs. Federal funds are appropriate for these since the entire Nation profits from them and private capital cannot properly be invested in high risk ventures with long term returns. Therefore science and technology has become a purpose of government.

But the appropriation of tax revenues by the Congress must make political sense. There is competition within the scientific fields for

the available money but science and technology are only a part of the many demands and pressures which become integrated in the legislative process.

Thus the scientific community must examine its totality of programs to use the Nation's resources most effectively. Toward this end President Nixon's science adviser, Dr. Lee DuBridge, is conducting a study to determine what the Nation's space goals should be in the next decade. The study involves the White House Office of Science and Technology, the Department of Defense and NASA. He has a deadline of September first to report back to the President. We are doing our own homework in the Congress, let me assure you.

There are critics who think that we should gut the space program because our economy is in trouble. You all are aware of what this would do to the momentum of the program. Dr. William J. Pickering, Director of the Jet Propulsion Laboratory in Pasadena, has said, "We find *increasing* interest in other countries in space—Japan, France, the Soviet Union, at a time when we in the United States are losing interest." I will not deny that there is a certain fickleness in the Congress toward scientific projects—just as public opinion swells and falls. The space program, to my chagrin, is an outstanding example. Thus the advocacy of the space program and other scientific endeavors must be repeated and sustained.

PROFESSIONAL SCIENTISTS and engineers and their professional societies must play a major part in rejustification of funding support and, even beyond that, to the forming and shaping of national policy. I know there has been reluctance on the part of some scientists to become actively engaged in assisting the Government to determine its future in these areas, believing, incorrectly in my opinion, that it would be improper. Also, some organizations who hold tax exempt status have been uncertain of the degree to which it might use its influence. The American Society of Photogrammetry and the American Congress of Surveying and Mapping are tax exempt organizations under Section 501 (c) (3) of the Internal Revenue Code. The advantage of such a position is twofold. Namely, (1) the organization itself does not have to pay taxes, and (2) the members of the organization may deduct their dues paid to the organization from their individual income tax returns. I want to clarify your position in this regard.

If an organization loses its tax exempt status under Section 501 (c) (3), it can still become tax exempt under some other section of the Code, but its members lose their tax deduction. As a result, it becomes more difficult for the organization to attract new members, and the aims and programs of the organization may have to be cut back.

The question then arises, what may an organization do and still not lose its preferred tax status? This came to my attention when Congressman Emilio Q. Daddario, a member of my Committee and Chairman of the Subcommittee on Science, Research, and Development, was conducting a study to determine how Congress could get the best scientific and technical information necessary to deal effectively with many research and development programs. His inquiry sought to determine the type of scientific and technical information required by Congress, and also where this information could be obtained.

One obvious source was the various scientific and technical societies, and he conducted interviews with a number of these organizations. When talking with representatives of one of these societies, they mentioned their reluctance to take an active role because of their tax-exempt status. Subsequently, he went into this issue in some depth, and concluded that tax exempt organizations could take a more active role in formulating science policy.

THE INTERNAL REVENUE CODE provides that "no substantial part" of the activities of organizations such as yours may be devoted to "carrying on propaganda or otherwise attempting to influence legislation." The Code also provides that you may not, as an organization, participate or intervene in "any political campaign on behalf of any candidate for public office."

Now some organizations have taken an extreme position and read *no substantial part* to be, in effect, *no part*. This seems unnecessary.

First of all, there is no limitation on communicating with Congress if the initiative has been taken by the Congress. That is, if the Congress has requested certain information or if the Congress has invited the organization to testify during hearings. Let me issue a standing invitation to you right now to come forward any time you have something to contribute.

Secondly, the limitation applies to legislative as opposed to investigative activities of Congress. For example, if hearings are held on a specific bill, the limitation would apply. On

the other hand, if the hearings are of a general investigatory nature then the limitation would not apply.

Now exactly what *substantial* means is open to some doubt, and I do not propose to suggest a definition here. However, in one of the few court cases on the subject, the Supreme Court found that when an organization devoted less than 5 percent of its time and effort to political activities, this did not constitute a "substantial part" of its activities.

I think the point then is that tax-exempt organizations are permitted to take a more active role than they now do, and they need not unduly fear their tax-exempt status. If an organization has any questions regarding the propriety of its actions, it need only contact the Exempt Organization Branch of the Internal Revenue Service in Washington.

IN SUMMARY, then, you have a communications job to do—to your Congressmen and Senators and to your fellow citizens.

There are more than 4,000 members of the ASP and ACSM attending this meeting. The individuals who comprise this large membership, for the most part, live among people who are engaged in other lines of endeavor. I think it very important that we pass the word in every way possible of the importance to our Nation and society of the space program and our other scientific and technological programs. These programs will never contribute to our welfare as they should without the support of the entire country.

We had that support a few years ago on the basis of emotional reaction and national prestige. I admit that the more solid and long-term willingness to invest tax dollars is harder to sustain.

The maturing of the space program is both the problem and the answer. We accept as a matter of fact, the continued successes of Apollo and other launch programs. The glamour and suspense are gone. But this very dependability is what makes it possible to plan the down-to-earth programs of earth resources surveillance and photogrammetry.

You who see these pay-offs must explain them clearly and forthrightly. No overstatements are wanted or needed. But the competition for attention and for dollars is very keen. A responsible professional approach to this public relations task is worthy of the same hard work you have put into your technical accomplishments. I know you will not fail to respond.