Making American Space Policy

(1) The Establishment of NASA

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"Making American Space Policy (1) The Establishment of NASA" is a working document prepared in the course of research concerning the public policy processes for United States space activities, an area of inquiry within the general School of Industrial Management Organization Research Project (NASA). Organized in the form of an extended case, it differs from the usual case study, in its length, the number of sequential decisions analyzed, and the emphasis placed on policy positions and objectives of institutions and agencies rather than personalities. It is also structured on the basis of an explicit rather than implicit model of political behavior. It is designed as a base document from which short analytical papers, abbreviated cases, and summary documents may be extracted.

Most important of all, it is the first of a cluster of cases exploring certain major policy decisions of NASA, designed to examine the policy process over a period of time and to identify the principal parties at interest involved. The long run objective of these inquiries is to indicate the significance and consequences of the public management of the national space program as distinguished from the properties of private industrial management in analogous undertakings. Thus, the substance of the case is expected to find its way ultimately into a more generalized analysis of NASA.

Miss Bok and I will welcome comments both as to the material and analysis contained in this document and as to the broader research project of which it is a part. We would especially appreciate calling our attention to any errors in fact concerning specific historical events or participant positions and any additional information which might modify the evaluations and conclusions. Further cases will be forthcoming throughout the year.

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"THE BIRTH OF NASA"

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INTRODUCTION

Most Americans engaged in the Research and Development activities concerned with outer space work under public auspices. Professionally they may be members of university staffs or employees of private industry, but their particular projects are almost always publicly authorized and publicly supported. Since October 1, 1958 the overall direction of the American space effort has been lodged in the National Aeronautics and Space Agency, an independent civilian agency within the Executive Branch of the Federal Government. That agency, directed by a single administrator responsible to the President, is provided in the fiscal year 1963 with 3.6 billion dollars for the formal legal purpose of seeking "the solution of problems of flight within and outside the earth's atmosphere and problems for the development, testing and operation for research purposes of aircraft, missiles, satellites and other space vehicles."

The object of this case is to explain why such organizational and financial arrangements exist. Why is the space program a public endeavor? Why is it directed by a civilian rather than a military agency? Why is that agency under a single executive? Why is it financially supported at such a scale and with so few Congressional or budgetary constraints as to place it presently in a unique position compared to other publicly supported enterprises?

There is, of course, a quick and apparently common sense answer to these questions. The launching of the first Soviet satellite on October 4, 1957 represented a Russian achievement in particular scientific and engineering fields which dramatically surpassed that of the United States. The American public and American political leaders viewed this achievement as signalling a dangerous and adverse shift in the balance of military power between the two nations. In the interests of national security, they made a reallocation of national

resources to redress the balance. Since previous space Research and Development activities had been carried out by combined private and military efforts and found wanting, new organizational structures were devised. These changes in resource allocation and management, it was expected, would enable the United States to exhibit in the near future technological superiority in the space field

Yet on closer examination the common sense answer is not very satisfactory. It fails, first, on the grounds of precision and specificity. It does not account for the initial failure of the nation -- as a nation -- to anticipate Sputnik I. It does not differentiate among those segments of the public and those political leaders who responded with great intensity and great concern and those which did not. It does not explain why, among several organizational alternatives and several possible levels of support, particular choices were made. It establishes no basis for estimating the probabilities that present arrangements and the present program will enable America to be first in space.

Second, the common sense answer does not illuminate the process by which the transformation of our space effort from a small privately oriented one to a large publicly oriented one took place. Its gross characterizations of public alarm and official response does not describe how our political system functions in resolving an issue of this magnitude; what considerations motivated influential persons and groups within the system; or what actions they took with what results to account for the successive decisions which in the space of one year led to the establishment of NASA. Thus, the short answer neither identifies the prime components of the system and their interaction nor makes clear what unit of political influence is in fact responsible for the present particular pattern and scale of operations. Yet knowledge of these

factors is essential if we are to distinguish between the consequences of public and private management of the space effort, account for the objectives and character of the present program; and arrive at conclusions as to how it might be directed for more efficient achievement of certain goals in the future.

To achieve greater precision and more explanatory value, then, the case selects and organizes facts according to a contemporary model of how political influence is distributed and applied in national politics. The success of the Soviet launching is treated as generating a conflict (or issue) within the national political system. More accurately, it expanded the scope and intensity of a conflict which had been previously confined to relatively few activists within the system and which had been temporarily resolved by the decisions of the most influential among them. Now, other activists with different motivations, different political resources, different intensities of interest and operating under different informational and structural constraints were engaged. Although all the activists could be said to be motivated by common considerations of national security, their perception of that goal, their place within the system, and the impact of the conflict upon their political resources, established a second order of objectives which differentiated among their preferences of possible solutions to the conflict.

In a new and larger structural context, the activists devised strategies by which they sought to have their preferences for successive policy choices prevail. To assure the success of their strategies, they sought to make coalitions with other activists by discovering identities of interest, by persuasion, by bargaining, or by the exercise of superior formal authority (coercion). The successes and failures of respective activists in carrying out their strategies

through acquiring a preponderance of influence resulted in a new composition of participants who determined the character of the space program.

Obviously, an analysis which screens data by these criteria does not identify all the relevant forces which help account for the structure and magnitude of our space effort. Neither does it exhaustively characterize the properties of the forces which it chooses to emphasize. Highly relevant traits of personality, undocumented or undisclosed actions of major participants, unconscious motivations probably escape detection. Contemporary case studies are not history. Taken together, however, with a cluster of other cases of major space decisions, this case does suggest the structure of political power -- the mix of political influentials -- which directs the nation's greatest technological venture. Recognition of this elite and its probable behavior is a prerequisite for those who would alter the substance, magnitude, or operation of the present program. It is basic to understanding the characteristics, capabilities, and limitations of public management of the space enterprise.

CHAPTER 1. SPACE BEFORE SPUTNIK

The technological success of Sputnik I surprised most American citizens and the political reaction which followed caught many American political leaders unaware. Yet not every segment of the public nor every public official had failed to anticipate the Soviet accomplishment or its political repercussions. There was a United States space program in being prior to October 4, 1957. But it was an effort with which few citizens were familiar, with limited support by figures of national prominence, and carried forward in the lower echelons of the national bureaucracy. Those who anticipated that the launching of an earth satellite would be a political event of first magnitude lacked the resources, motivations or skills to arouse the nation or persuade its leaders to take action.

The origins of the American program were in defense establishment. In 1946, the Department of the Navy recommended to the Research and Development Board of the Department of Defense that a project to place a small satellite in orbit around the earth be initiated. The Committee on Guided Missiles of the Board rejected the proposal as "not having sufficient military requirement."[1] There the matter rested until 1954, when a confluence of interests from within the DOD and a portion of the scientific community then engaged in planning the International Geophysical Year occurred. As to the first, in September of that year, Dr. Wernher von Braun of the Army Ballistic Missile Agency published a classified paper, "The Minimum Satellite Vehicle Based upon Components Available from Missile Developments of the Army Ordnance Corps."[2] After discussions within the Ordnance Corps and with civilian scientists, von Braun made his first efforts to initiate the project. In December, a joint voluntary Group of the Army and Navy undertook design planning and christened their effort Project Orbiter.

So far as the civilian scientists were concerned, their interest in a satellite

project derived from America's forthcoming participation in the International Geophysical Year. This undertaking - which was to last from July 1, 1957 until December 31, 1958 - was the third such investigation of geophysical phenomena by the international scientific community. Under the sponsorship of the International Council of Scientific Unions, sixty-six nations participated in a coordinated world-wide program constructed from various proposals submitted by individual nations and modified through periodic meetings of the Comite Special de l'Annee Geophysique Internationale (CSAGI). Among the proposals considered by the CSAGI in 1953 and 1954 was the launching of orbital satellites. In 1955 the American National Academy of Sciences - National Research Council, and the Soviet Academy of Sciences, respectively, agreed to present the satellite projects to their governments.

In the Spring of 1955 the National Security Council reviewed this proposal, decided favorably, and directed the Department of Defense "to develop the capability of launching a small scientific satellite by 1958 under the auspices of the IGY." The NSC instructed the DOD to review various satellite plans and to recommend an equipment program and operating structure by August 1 Within the DOD, the responsibility for coordinating the development program for the satellite launching was vested in Assistant Secretary of Defense, Research and Development, Donald A. Quarles. To advise him in the selection of a technical program, Quarles selected a Special Capabilities Advisory Group of civilian scientists, chaired by Dr. Homer J. Stewart, professor of Physics at UCLA. The Committee reviewed the Joint Army-Navy Project Orbiter, an Air Force proposal, and a separate Navy plan. It finally selected the Navy's Project Vanguard because "it promised to carry the largest payload with the smallest and lightest rocket vehicle,"[4] thus best fulfilling the scientific commitments of the IGY proposal and incidentally, offering the "biggest ball for a buck."

The decision was recommended [illegible] Quarles as the Secretary for Research and Development, and Dr. William Pickering from the Jet Propulsion Laboratory and proposed Orbiter. Their major concern was that the Navy proposal required the development of a brand new three-stage rocket, whereas (the Army) proposal was based essentially on a combination of existing and available rocketry.[5] Despite this minority view, the decision was upheld by the Research and Development Policy Council, over Army opposition, and was authorized by the Deputy Secretary of Defense on September 9, 1955.

Two premises on which the Vanguard decision was based dominated the [illegible] space effort until the launching of Sputnik. First, the satellite program was divorced from the development of military missile rocketry. The National Security Council, prior to directing the DOD to develop a satellite project, had ruled that the program was in no way to impede the ballistic missile program. Thus the Stewart Committee was required to "consider...the impact of the recommended program on weapons development projects," with the implication that no resources, development work, or available hardware were to be diverted from on-going missile projects.[6] Since the Army proposal included the Redstone missile as a basis for a four-stage launching vehicle, it was not accepted lest the satellite program compete for "diversion of Redstone engines [illegible] weapons."[7] The Air Force proposal, based on ICBM motors was likewise rejected because of both uncertainties about the availability of ICBM hardware in the IGY and fears that in any event, the weapon development program might be delayed as a result of combining it with a scientific satellite program.

Second, the satellite program was viewed by top leaders in the Administration and the DOD as a purely scientific endeavor. Thus the Navy proposal was [illegible]

[illegible] was deemed to be the most appropriate for the scientific objectives of the IGY. The Naval Research Laboratory, a basic and applied research organization, was given operational responsibility for the project. It had done much research in upper atmospheric probing with its Viking rocket, and the Vanguard was to be based upon this purely research vehicle. The Laboratory was ordered to cooperate with the National Science Foundation in designing the scientific payload and these two agencies were to be under the overall direction of the National Academy of Sciences. Organized in this way, the Vanguard project would not interfere with higher priority ballistic missile programs of the DOD.

In effect then, although the Stewart Committee had emphasized the propaganda value of launching the first earth satellite[8], their decision institutionalizing the separation of the scientific mission from development of military hardware relegated the Vanguard program to low priority status within the DOD. Dr. John P. Hagen, director of the Vanguard Project in the Naval Research Laboratory, found that his requests for top priority transmitted through Navy channels to the DOD were "not granted in the form in which (he) asked for them."[9] On April 2, 1956, the Navy requested that the Vanguard be included in the "S" category of the Master Urgency List of the DOD, the Department's highest priority category for urgent military items such as ballistic missiles. On May 29, the DOD directed, instead, its inclusion as Item #1 in Category "1", outranked by the items in Category "S". Hagen made a subsequent request for Category "S" status in October, 1957, but this was approved only on November 7, four days after the launching of Sputnik II.[10] Furthermore, the Office of the Secretary of Defense funded the project from its emergency fund, with frequent delays and penurious oversight until August, 1957.

when Congress appropriated 3[illegible].2 million to complete the project.[11]

While the Laboratory struggled with its new assignment, the Army attempted to reverse the Vanguard decision. After the final verdict, in August, 1955, Gen. Simon, Chief of Research and Development for Ordnance, U.S.A., wrote the OSD, analyzing the Vanguard proposal and pointing out its shortcomings and the serious damage to American prestige that might result from failure to launch the first satellite.[12] The Army scientists questioned the potential success of Project Vanguard, since it required that "something be done...in two years that had never been done before in two years," namely, the development of a new rocket vehicle.[13] Alternatively, they argued that the Army proposal, based on tested components of the Jupiter-C could launch a satellite the following year, in 1956. In April 1956, Secretary Clifford C. Furnas requested that the Army explore the possibility of using the Jupiter-C missile as a backup to the Vanguard. The Army immediately did so, but on May 15, Lt. Gen. James M. Gavin, Deputy Chief, Office of Research and Development, U.S.A. received a directive from Mr. William Holaday, Special Assistant to the Secretary for Guided Missiles "without any indications of serious difficulties in the Vanguard program, no plans or presentations should be initiated for using any part of the Jupiter or Redstone programs for scientific satellites."[14]

Nevertheless, the Army Ballistic Missile Agency was proceeding to develop the Jupiter IRBM with a recoverable nosecone, based upon the same engine design and preliminary hardware work done on Project Orbiter. In September 1956 the Army launched Jupiter-C missile with its solid fuel upper stages in satellite configuration, and sand in its fourth stage in order to test nosecone recovery. The test missile was a brilliant success, flying 3300 miles and 600 miles up into outer space. According to Gen. Medaris, Commander, ABMA, USA, "We had on

hand a backup missile for that one still in the original (Orbiter) satellite configuration, and at varying times during this period we suggested informally and verbally that if they really wanted a satellite we could use that backup missile as a satellite. In various languages, our fingers were slapped and we were told to mind our own business, that the Vanguard was going to take care of the satellite problem."[15]

Again, in November 1956, Medaris sent a proposal through Brucker to the OSD, suggesting that the Jupiter's proven and available hardware could be spared from its military mission, and should be used to launch a satellite. In June 1957, the OSD sent back to the ABMA a reminder of the May 15, 1956 directive which had instructed the Army to stay out of the satellite business. Indeed, by this time the ABMA campaign for the satellite mission was thoroughly irritating to the OSD. It was in this context that Secretary of the Army Brucker had to state publicly that same month that "the Army did not covet any part of the Navy's mission" and that the Army considered the Satellite program to be in capable hands. Furthermore, Brucker sternly added, an Army satellite would be "gross interference in and duplication of" the Navy's mission and the Department of the Army was "embarrassed" at renewal of the request by the ABMA.[16]

Faced with this official opposition, the ABMA and Research and Development personnel fell silent. Gavin, Medaris and von Braun watched the Vanguard delays and the Soviet progress throughout the summer, and after the successful ICBM flight on August 27, it became obvious that the Soviet were close to launching.[17] Gavin testified that he met with a group of civilian scientists in the Department of the Army on September 12, and after "worrying for two weeks,

prepared another proposal to the DOD that would authorize an Army satellite program on a crash basis. "We did not send that out and, of course, on the fourth of October they launched."[18]

In retrospect, Medaris found the experience "somewhat incredible." Gavin termed it "very frustrating - and that is an understatement." Politically, however, the experience was consistent: consistent with the expressed purpose of the Administration and the DOD to segregate satellites from military projects and to ignore the propaganda benefits which would accrue to the winner of a race they consciously refused to enter.

This limited nature of the space conflict prior to Sputnik was not due to a lack of information about Soviet advances in the field. Both the military Research and Development groups involved in space and civilian scientists in the IGY were aware that the Soviets had established a special section for space sciences in the Soviet Academy of Sciences in 1954 and that their program utilized military rocketry. Moreover, the general public and the political elites were forewarned: in June, 1957 The New York Times reported Russian assertions that rockets and instrumentation for a satellite project were prepared and that a satellite would be launched in a few months.[19] September 18 brought a Moscow radio report of an imminent launching. The disinterest expressed by the public at large in this news,[20] however, only mirrored the limited dimensions of official concern.

It was in this atmosphere of public unconcern, low-level Navy and Army competition, the scientific community's interpretation of the satellite program as a research venture essentially unrelated to matters of high policy that A. N. Blagonravov, the chief Soviet delegate to the International Conference on Rockets and Satellites of the IGY left Moscow for the Washington meetings on September 30. At the airport, he remarked to American reporters that "we will not cackle until we have laid our egg."[21] He could have almost held his breath.

CHAPTER II: THE LAUNCHING OF THE SPUTNIKS AND THE SPREAD OF POLITICAL CONFLICT: OCTOBER 4-NOVEMBER 7

On October 4, 1957, the Soviet Embassy in Washington held a reception in honor of the members of the International Rocket and Satellite Conference. At 5:58 P.M. Dr. Lloyd Berkner, President of Associated Universities, Inc., and Chairman of the International Council of Scientific Unions, interrupted the festivities to announce to his Russian colleagues the successful launching of a Soviet earth satellite into terrestrial orbit.[22] The international, scientific setting of this pronouncement and the unabashed pride with which the Russian scientists received the news and accepted congratulations for their feat illuminate rather ironically the purely scientific emphasis of America's early space efforts.

Despite the scientific acclaim which greeted Sputnik I, however, as the news went out over the wires the event was soon drowned in its political implications. From a limited conflict within a small segment of the military and scientific elites, space suddenly grew into a major national conflict: embroiling the Administration, the entire military establishment, the scientific community, the Congress and the public at large in a political issue which was to ramify out through many facets of American life. The reactions of nationally known political figures to Sputnik now created a broad arena of national debate which brought into question America's political leadership, scientific and technological capabilities, educational system, defense policy and, indeed, her very potential for national survival. The year of the Sputnik had begun, and with it the birth of NASA.

1. The Administration

At the outset of the new debate it was plain that the Administration had miscalculated the political significance of Soviet technological virtuosity. This miscalculation can ultimately be attributed to the President, the apex of the American political system. It had been Eisenhower's choice, among contending advisory opinions and organizational biases, which determined the scientific nature of Project Vanguard. Thus, after Sputnik, the President's responses in the new conflict became the focal point for other actors' reactions in the now enlarged political arena.

Of necessity, Eisenhower had to evaluate the launching of Sputnik I in terms of its implications for national security, partisan politics, the power of the Executive Branch, and the program of his own Administration. With immediate evidence that a strong, perhaps even hysterical public reaction was setting in, the President faced prospects of a radical realignment of his previous bases of support.

In this posture of political defensiveness, Eisenhower's first reaction was, not unnaturally, to attempt to contain the scope of the conflict. Thus, the initial White House communiques minimized the significance of the launching and tried to suppress the rising political storm.[23] In his news conference on October 9 Eisenhower emphasized that ballistic missiles had consistently and properly received more priority than satellites; that the only Soviet victory was in political propaganda; and that his scientific and military advisors assured him there was no need to accelerate defense programs. After discounting the military significance of Sputnik, he sought to calm the nation by relating that his apprehension about national security had not been raised "one iota."[24] Moving to the scientific argument,

he asserted that the satellite program had "never been considered as a race: merely as "an engagement on our part" and that "in view of the real scientific character of our development, there didn't seem to be a reason for trying to grow hysterical about it."

> From the beginning, the whole American purpose... has been to produce the maximum in scientific information. The project was sold to me on that basis.... I don't know of any reason why the scientists should have come in and urged that we do this before anybody else could.

When queried about what America could have done to avert what at least some newsmen were interpreting as a crisis, Eisenhower responded that he had done "everything I can think of... and I don't know what we could have done more." Finally, in a personal conclusion he would later regret, he sought to find out what all the fuss was about. After all, "the Russians have only put one small ball in the air."

Others interpreted Sputnik somewhat differently, and as shock, criticism and positive suggestions appeared in all quarters, the President began turning to those of his institutional supporters, whose interests might be served in allaying, if possible, or retrieving, if necessary, a rapidly deteriorating political situation. The President's "official family": his staff, the Vice President, the chiefs of executive departments, and the Republican leaders in Congress moved initially to his defense. In the month following Sputnik, Sherman Adams, Charles Wilson, Clarence R. Randall (a special assistant to the President for international economic affairs), John Foster Dulles, Sen. William Knowland, and Vice President Richard Nixon all sought to sustain the tenor of his position. Alternatively, it was this group which Eisenhower selected to voice the guarded concern of the White House and its intention to "do something" about Sputnik. These men, whose political futures were more or

less dependent upon the President himself, thus attempted to remove the end of the crisis from Eisenhower's shoulders in order both to defend him from personal political attack and to preserve his freedom of action.

Randall and Adams, both personal assistants who had no bases of influence except those derived from the President, and Wilson, the outgoing Secretary of Defense, were the most outspoken belittlers of the Russian achievement. Randall in an off moment, dismissed the satellite as a "silly bauble... a bubble in the sky."[25] Adams, in the same vein, asserted that the U.S. satellite program sought to "serve science, not high score in an outer space basketball game."[26] Wilson merely repeated what he had said all along: that the Sputnik had nothing to do with military preparedness or relative missile capabilities. These men had nothing to lose from such uncritical assertions. Moreover, their statements, while not reflecting the growing political concern within the Administration, served definite purposes. It was important that defense of the Administration be voiced so that its moves to correct the situation would appear to be starting from the highest possible threshhold.

Other spokesmen for the President: notably Dulles, Knowland and Nixon, had to voice support of their Chief within the limits imposed by their other political obligations. Dulles, although enjoying the complete confidence of the President, was still forced to consider the concerns of his Department and the views of his critics. Thus, it was in his interest both to support the President and to minimize damage to his own special province by pursuing foreign policy moves in the space arena at once appealing to the President and to his own critics.

The Soviets had been making extraordinary mileage out of their achievement,

and editorial comment from both neutralist and allied countries showed that Sputnik was one of the most stimulating events of the recent past. In response to this barrage of successful propaganda, Dulles took two tacks. Sharing in part the immunity from political pressures of the President's personal advisors, he belittled the Sputnik and emphasized the contributions of German scientists to the Soviet satellite program.[27] On the other hand, he did embark on two new policy ventures. First, he initiated moves toward cooperation with NATO allies in scientific and technological efforts, and an amendment of the Atomic Energy Act of 1954 to permit such cooperation.[28] Second, Dulles used outer space to untie the "inseparable" package of disarmament proposals which the West had offered in London, thereby proclaiming America's interest in the use of outer space for peaceful purposes.[29] Thus Dulles could claim for Eisenhower that the United States had initiated definite new policies in the international politics of outer space.

On another political front, Senate Minority Leader William Knowland represented the President in a Congressional arena which was becoming increasingly involved in the missile and satellite issue. Knowland, as the leader of the President's party in the upper house, was obligated to defend the Administration posture. At the same time, Knowland was obliged to protect his own role in a legislative branch constitutionally divorced from the Executive. Moreover, Knowland at this time harboured Presidential ambitions. Thus he, more than Eisenhower's personal advisors or even Dulles, had to maintain a degree of distance from the President's own position.

Knowland appeared to compromise his various political obligations. By calling for a "bipartisan review" of the entire defense effort he fulfilled his Senatorial role; by arguing that politics should be ignored in assessing past

responsibility and future plans he defended the Administration as best he could.[30] His position that the national security program needed regular review "from time to time" was designed both to make the Congressional action seem like business as usual and to put any future policy shifts of the Administration in a favorable light.[31]

Finally, Richard Nixon served as the spokesman for the policy shifts which were to occupy the Administration in the subsequent months. His own strategic position could be characterized as complex. As a Presidential aspirant, Nixon logically could not afford to identify himself too closely with the mistake of the President. At the same time, as heir apparent of Modern Republicanism, Nixon was dependent upon the sustained reputation and prestige of Eisenhower. Thus, Nixon both advocated effective responses to the Sputnik within the Administration and announced those which the President chose.

In a speech on October 15, Nixon first indicated that some action would be forthcoming in response to the Sputnik by stating that the nation must place its security before a tax cut. Given the Administration's previous advocation of governmental economy, this linkage of high spending and national security was a necessary move in order to win credibility for any future plans to bolster the national defense. Although making no direct reference to the connection between past goverment economy and the pace of the Vanguard project, Nixon did argue that America "must react ... strongly and intelligently to (Sputnik's) implications.: He did not abrogate the basic tenets of his Chief: "Militarily," he assured his audience, "the Soviet Union is not on bit stronger today than it was before the satellite was launched." Yet he did reflect the forthcoming shift in the Administration's emphasis when he added, "we could, however, make no greater mistake than to brush off this event as a scientific stunt."

The President not only sought to limit the conflict by enlisting his supporters in a public attempt to downgrade Sputnik. He also attempted to enlarge current programs and to initiate, within the Executive Branch, new efforts which might speed America's space effort, thereby pre-empting his critics. His immediate policy choices were in three major domains: increased emphasis upon the missile program; high-level consultation with representatives of the scientific community; and a personal appeal to the people.

In the defense field, the Administration reacted to the apparent Soviet lead in rocket thrust capability by ordering a stepped-up missile program. Although this would entail no major increase of funds, rumors became current that the President would permit the DOD to spend above its 38 billion ceiling if such action were necessary to expedite the missile program. In effect, the Administration removed certain financial bottlenecks on Research and Development work.[33] Even more important, Government officials were shifting from the initial Administration position of minimizing Soviet missile claims to "expressions of guarded concern about the status of the United States' missile program in comparison to the Soviet's."[34] Thus the Administration conceded that Sputnik did indeed carry implications for America's strategic missile capability.

More notable than any early policy shifts were the mode and character of the Administration's new concern. In the two weeks following Sputnik, the New York Times observed, more scientists visited the President than in the previous ten months. Dr. Detlev Bronk, the president of the National Academy of Sciences, Dr. Alan Waterman, the director of the National Science Foundation, and Dr. John Hagen, director of Project Vanguard, were all present at the National Security Council meeting on October 10, which first grappled with the implications of the launching. Later in the month, Eisenhower met with his

Science Advisory Committee in the Office of Defense Mobilization to discuss the pursuit of basic research in the Federal Government and its role in any technological competition with the Russians.[35] Indeed, this new access of scientists to the highest echelons of policy-making was the most obvious change in the Administration's style in the immediate post-Sputnik weeks.

Finally, Eisenhower decided to discuss defense, space, the need for an enlarged scientific effort, and problems of Government spending in a series of nation-wide speeches during the winter. He used these speeches as forums for assuring the country that America did not face an immediately dangerous crisis. At the same time, he announced the policy changes he had chosen to meet the Soviet challenge. Significantly, he exposed himself to some Americans who expected an integrated program to meet a critical situation. If he did not feel a new national security program was necessary, he was at least prepared to answer the various political actors who thought it was.

2. The Department of Defense

In contrast to the President's desire to contain the conflict engendered by Sputnik, the leaders within the Department of Defense wished to capitalize upon it. Within the constraints imposed by being part of the Executive Branch, DOD officials - particularly military officers not politically dependent upon the Commander-in-Chief - sought to enlarge their own roles, missions, and budget in the space field. Like other actors in the political system at once responsible to the President and enjoying bases of influence apart from the President, the DOD simultaneously supported Eisenhower and attempted to direct his choices towards Departmental goals.

By an ironical twist of fate, Secretary of Defense-designate McElroy was visiting the ABMA arsenal at Huntsville when Sputnik went up. Back in Washington

two days later the Secretary gave no evidence that there had been a [illegible] good conversation over luncheon produced any policy shifts in the satellite program. Together with other DOD spokesmen, his public support of the President was unequivocal.

In replying to their civilian and Army critics, DOD officials emphasized the separate nature of Project Vanguard and looked back to the fateful 1955 decision to account for America's comparative position vis-a-vis the Russians. Holaday further observed that the Sputnik "was not evidence of Soviet technological superiority in missiles and rocket development,"[36] and SHAPE Headquarters assured reporters that there were no military potentialities of earth satellites of which they were aware.

The Defense Establishment bore the brunt of such public debate since it was charged with operational control over a satellite program which Administration policy had failed to exploit. In addition, the Soviet ICBM capability directed attention to American missile efforts. While such attention enhanced the Department's effort to fend off critical attack, it simultaneously enabled the military establishment to openly pursue the new mission. The DOD stood to gain from an American space program if this program were primarily military in emphasis, and it capitalized upon the absence of clear-cut space policy to assert its own claim.

McElroy revealed the Department's new concern by a series of immediate policy decisions, all of them contributing to a space effort. In the field of military support for scientific Research and Development, the Secretary revoked former Secretary Wilson's August 17 directive reducing service test and evaluation expenditures.[37] He returned basic research funding, which had been reduced to compensate for over-expenditure earlier in FY 1958 to its

original appropriations level, thus augmenting available funds by 9 million. Further, the Secretary lifted certain overtime restrictions on missile development work.

In the ballistic-missile field, McElroy announced that he would assume personal direction of the program, ordering weekly service progress reports and declaring himself constantly available to discuss any problems. Like the President, he believed the program basically sound, and emphasized that removal of technical and administrative bottlenecks would suffice to speed it on its way. His heightened interest, however, attested to both the Administration's increased evaluation of the Soviet ICBM capability, and its willingness to consider a larger American effort.

Finally, in the space field the DOD gradually shifted to a new emphasis upon prestige and military objectives. The Services reactions varied with the level and success of their respective space roles. The Service directly responsible for the ongoing satellite program, however, echoed the Defense Department's initial reaction to Sputnik. Rear Adm. Rawson Bennett, Chief of Naval Research, depicted Sputnik as "a hunk of iron almost anybody could launch."[39] His commanding officer, Adm. Arleigh Burke, Chief of Naval Operations, supported this contention by arguing that America had rocket power sufficient to launch a satellite of Sputnik's weight. There was some internal opposition to this official sanguinity. Rear Adm. John T. Hayward, Assistant Chief of Naval Operations, Research and Development, later indicated that there had been some reappraisal of Project Vanguard within the Navy at this time. "When Sputnik went up and everything was confused I made the same proposals that you gentlemen have gotten legislation for now. And I was slapped down pretty hard."[40] Like the President, however, the DOD and Navy officials publicly

dismissed the existence of a space race in which the United States had not yet crossed the starting line.

Army spokesmen took a more parochial tack. Civilian scientists within the Department of the Army and the Huntsville team immediately reminded the news media that the Army could have launched a satellite in 1956. Indeed on October 8 at the Eighth International Astronautics Federation Congress in Barcelona, Maj. Gen. Holgar N. Toftoy, Commander of the Redstone Arsenal, and Brig. Gen. John A. Barclay, Dept. Commander, ABMA said an army satellite could have been up in 1955. To this Barclay cryptically added that the wisdom of the Vanguard decision "remains to be evaluated."[41]

A small stir ensued within the Department. The next day the Office of the Secretary of the Army issued an order to Army personnel that any public statements about the Army's satellite or ballistic missile capabilities were inappropriate and therefore banned.[42] Shortly thereafter, both the Navy and the Air Force issued similar directives since, as the Air Force explained, "any comments are almost certain to be misunderstood."[43]

Indeed, comments were guaranteed to be misunderstood, since the DOD's public position at this juncture was an uncomfortably composite one. Nonetheless, the Department was moving into the space field. The Air Force immediately accelerated its high altitude research rocket firings, Project Farside, in an attempt to offset the impact of Sputnik. The first news of these firings was of reported failures and the Air Force refused to comment on the project.[44] The acceleration was significant, however, since only a few months before the DOD and the Air Force had curtailed the mission. In the ill-starred Vanguard program there was no order to accelerate. Such a course was considered, but further evaluation revealed that it would be a sufficient

technological feat to keep the project on schedule. Furthermore, a crash effort would seem like "metooism". Instead, for the first time, the DOD turned to serious consideration of long-term, large military space projects. In the days following Sputnik, the Air Force received a sympathetic hearing on its reconnaissance satellite program, and von Braun was invited to present an Army proposal for a circumlunar space platform.[45] Although these proposals would not become operational for several years, their review by the DOD revealed a new interest in space efforts which might outstrip the Russians. No longer were such futuristic projects considered science fiction; no longer was outdoing the Russians for prestige purposes considered beyond the mission of the DOD.

3. The Scientists

In October, 1957 the American scientific community had no clearly defined role in the highest echelons of public policy making. A number of distinguished scientists and engineers had been alienated from Government work in the McCarthy era, and their outlook reached its nadir of disaffection in the years after the Oppenheimer security hearings. The military services and some other executive departments had established scientific advisory committees, but the highest echelons of formal scientific participation was in the Office of Defense Mobilization.

Sputnik signalled the reappearance of the scientists as important members of the national political system, but with uncertain objectives.

From their earlier participation in Project Vanguard, the scientists bore a certain responsibility for the U.S. position. As scientists, however, they appreciated the Russian accomplishment. Hence, a strong flavor of ambivalence characterized the immediate reactions of the scientists to the

launching. Some expressed admiration for a significant scientific feat; others were critical of the low priority given Project Vanguard and of the rejection of Project Orbiter. Underlying both attitudes was a general concern that American scientific progress and educational standards were rapidly being surpassed by the Soviet Union.[46] Moreover, many scientists cited Sputnik as evidence of Soviet ICBM capacity and suggested that America undertake a vast program of scientific Research and Development to match it. Their suggestions had impact. Torn between traditional respect for the international achievements of science and concern for America's welfare and security, the scientists were suddenly provided substantial opportunities for influence.

In the first days after Sputnik it seemed clear the scientists intended to use their opportunities. The Administration was prepared to give careful attention to their views. And as private and public debate intensified many scientists sought to broaden the agenda of subjects for high-level consultation beyond the obvious fact that the scientific satellite program needed increased support. Instead, they called for - and secured - a general review of all Government scientific policies by Eisenhower's new-found official scientific advisors.

Their voices, in turn, were heard. On November 3 John Finney reported that "for the first time, in the past weeks top government officials have been heeding the advice of scientists and educators."[47] Although the scientists did not at this time offer a clear policy of what they wanted in space, they had gained access to the President and a right to be consulted by him in future space policy.

4. The Congress

After Sputnik, the key institution which determined whether or not and if so, how far the political conflict would be broadened, was the United States Congress. With the Administration following a policy of reassurance, continued high political visibility of the satellite program seemed possible only if powerful Congressional leaders chose to maintain it. Such was the character of the issue that it almost guaranteed an initial reaction - for it served many purposes of many Legislative members.

The immediate and predictable response of virtually all Congressmen to Sputnik was a rash of public statements commenting gravely upon the seriousness of the situation. Quite beyond the chance for general publicity, however, there were other gains to be achieved for the parties and subparties within Congress, key leaders and important committees.

On a party basis, reactions to the launching divided, as might be expected, four ways. The Liberal Republicans had to defend Eisenhower and at the same time push him into policy decisions which would maintain his and hence their prestige. Accordingly, they were most anxious to limit the conflict engendered by Sputnik. Conservative Republicans, less loyal to the President, were cross-pressured by concern at the Russian advance and their long-time advocation of the balanced budget. Their reactions were more critical of the President than those of their liberal brethren, and thus less designed to contain political conflict. Predictably, liberal Democrats were the chief opponents of the Administration, even more anxious to evalute the space program in a partisan context. But the group most interested in expanding the conflict engendered by Sputnik were the moderate Democrats, particularly the two Texans who then, in concert, led the Legislative branch of the Government.

[illegible] their [illegible] led to [illegible] the more [illegible] from the [illegible] and more influence by which to [illegible] than any other segment of Congress. Their ability to shape Congressional policy and their decision to capitalize upon the issue became the [illegible] factors in determining the scope and intensity of the conflict.

Both segments of the Republicans were on the defensive. Moderate Republicans, in order to maintain their own and their Party's standing with an aroused public, sought to save the President, even if in their view he would not save himself. Senators Javits and Case and Representative Keating all called for greater coordination of the missile and satellite program and greater defense expenditures, maintaining that Government economy must be subordinated in times of crisis. Their simultaneous appeal was that partisan criticism should be avoided lest it impede the defense effort; keeping politics under the rug was a condition of their strategy's success.

These spokesmen were joined by Senators Bridges, Saltonstall and Flanders, all senior Republican members of the Armed Services Committee with relatively safe Senate seats. However, they placed more emphasis on program needs and less on party interests. Bridges, who led his party in the defense debate, was the most outspoken. He joined the Democrats in demanding a full-scale Senate inquiry into the defense effort and attacked "ostensibly responsible spokesmen for the Administration for grossly misleading statements belittling Sputnik," an obvious reference to Randall and Adams.[48] He called for less concern "with the depth of the pile on the new broadloom rug or the length of the tailfin on the new car, and (greater readiness) to shed blood, sweat and tears if this country and the free world are to survive."[49] Like the liberal Republicans, Bridges abjured partisanship, not because he feared the

use against himself, but because it might place limits upon his Senatorial autonomy as a rather swashbuckling critic of the Administration.

Few orthodox Republicans were this immune to the political risks of protesting too much about the Administration's defense posture. As conservatives, some were legitimately concerned about the expenditures which a stepped-up space program would require. Others, faced with hard campaigning in the fall, needed Presidential and party prestige for their own career purposes. Thus, some conservative Republicans discounted the Soviet achievement in the same way Eisenhower's close advisors had done. Homer Capehart evaluated the launch as "psychologically bad, but practically it doesn't mean much."[50] Alexander Wiley saw it as nothing to worry about, but rather as "something to keep us on our toes."[51] Logically, it was this group which consistently accused the Democrats of playing politics with national defense.

Senator Knowland stood midway between the two Republican positions. Possessed with strong political ambitions, and a high regard to the autonomous power of the titular leader of the Senate's Republicans, his actions as Minority Leader were relatively limited. He vacillated between support of an inquiry into defense policy and castigation of Democratic partisanship. His behavior reflected a thorough realization that the forthcoming session of Congress could bode no good for the Republicans, and that it was in the majority party that the Congressional response to Sputnik would ultimately be fashioned.

As the majority party, the Democrats initially responded to the challenge of Sputnik with an attack led by their liberal wing. On the evening of October 4 Senators Symington, Jackson, Mansfield, Smathers, Anderson, Humphrey and Kefauver were already placing responsibility for the Soviet space advantage

on Eisenhower's lack of leadership and program of economy-above-all. They demanded that the missile and scientific space programs be accelerated and coordinated, and called for investigations and a special session of Congress. They scored "the soothing platitudes of the Administration spokesmen"; termed Sputnik a "devastating blow to the prestige of the United States as a leader in the scientific and technological world"; and called upon the President "to assume personal responsibility for speeding the missile program."[52]

Similar sentiments were voiced by ranking leaders of the National Party, Truman, Stevenson, Harriman, Butler and Benton. On October 11 the Democratic Advisory Council of the Democratic National Committee issued a statement charging that "the Russian achievement is visible proof that the Administration has failed to understand the amount of effort which is needed by our country in basic research and in applied engineering if we are not to become inferior to the Russians."[53] In rapid fire order the Council charged that the Administration valued economy above security; claimed that, had Truman's missile program been sustained since 1953, the United States would never have been surpassed; and called upon the President to be a leader. Former President Truman chose to attack both Republicans in general and the Republican Administration in particular, announcing that in the 1958 elections "we'll rub Ike's halo out altogether."[54] At the least, there were obviously some Democrats who were gleefully prepared to try.

Despite the sound and fury, Lyndon Johnson was the chief architect of the Democrats' ultimate strategy. He was equipped with formidable political resources as Majority Leader; a moderate capable of pulling the disparate elements of the Democratic party into effective voting coalitions; a powerful member of the Senate Armed Services Committee; a man of political flamboyance

sufficient to gain the party's attention and political activity [illegible] to gain almost anything he set out to get. Although member of only one house of Congress, the ruler of the other half, Speaker Rayburn, was his devoted friend, mentor and supporter. Johnson had a deep loyalty to and faith in the Democratic party and firmly believed in the congruence between what was good for the Party and good for the Nation. Moreover, he had an even deeper faith in the congruence between his own interests and those of his country. He was vitally concerned with the Nation's security. And, not coincidentally, he wanted to become President of the United States.

To Johnson it seemed that he and his party could reap the greatest political rewards from Sputnik by working with, but consistently ahead, of the Administration. In this posture, the Democratic leadership in Congress, with the aid of Liberal Republicans and the more partisan Democrats could appear as the defenders, indeed the architects, of national preparedness. Johnson feared that a partisan attack upon the Administration might backfire into countercharges of Democratic politicking with national survival. Yet he had no intention of declaring that politics stopped at the atmosphere's edge. (Von Braun was later to comment that "space was bigger than Texas." This did not necessarily make it any different"). Thus Johnson's statement shortly after Sputnik that the Soviets were first in space "due to the lack of intelligent, united effort in the United States" appeared as an appeal to united effort on behalf of his own prospectus for military preparedness.[55]

Johnson worked swiftly to establish his position.[56] Senator Symington, a long-time critic of the Administration's defense effort, had greeted Sputnik with pleas for both a special session of Congress and an investigation of the national defense effort by the Senate Armed Services Committee. Upon reaching

Chairman Richard Russell he was informed that Johnson had already set an investigation in motion, although diluting its partisan flavor by calling it an "inquiry." On the day after Sputnik, the staff of the Senate Committee and members of Johnson's personal staff were already collecting data. Chairman Russell waited to call the inquiry until he could contact Senator Styles Bridges, the ranking Republican on the Committee. When he did so, he found that Johnson had already arranged matters in agreeably bipartisan fashion. Thus, Johnson initiated the Senate Armed Services Committee's Preparedness Subcommittee's "Inquiry into Satellite and Missile Programs." The inquiry would serve as an arena in which the whole defense posture of the Eisenhower Administration would be examined and found, under the aegis of Johnson, most seriously wanting. It would also serve as a vehicle by which the Democratic party in Congress, again under Johnson, would offer the nation a program for enhancing its security. Finally, it would put Johnson himself, and his statesmanlike concern for the nation's preparedness, in the headlines of every newspaper in the land.

The Majority Leader was clearly able and anxious to take the initiative in policy-making for national security affairs, including space. His choice to do so, more than perhaps any other factor, guaranteed that the resolution of the space issue would take place in a broad political arena.

5. The Take-off into Self-Sustained Strategy

The immediate response of the major political participants to the launching of Sputnik was in all cases a cursory examination of the profits and losses which might accrue to each from the event. The Administration and the Congress, representing general political interests within the system, had to place the onset of the space age within the broader context of national security and political climate. Each viewed the space program as a channel for the advancement

of military values and moved, either defensively or offensively, into the new arena. They recognized that space was becoming a focal point for the generalized concern voiced by their constituent groups.

On the other hand, the military establishment and the scientific community were specifically qualified to assess the potential role of space in the national effort. Although each had other and at this time more pressing missions, they possessed the technical skills necessary to promote a space program. Moreover, they recognized that the markedly increased interest of the political generalists in the field was the means through which they could transform their specialized influence into broad public policy.

In the first month after Sputnik, then, the immediate reactions of the involved political activists determined that space policy would become a genuine political conflict spreading throughout the political system. Once the existence of the space issue had been established, the activists moved to assess their self-interest and strategic choices in regard to it. Questions of who wanted what and how emerged as soon as the arena of competition was recognized. Out of the ensuing conflict would rise the power structure that would establish the new space agency.

III: EVERYBODY HAS A SPACE CAPABILITY: NOVEMBER, 1957 - APRIL, 1958

While the Administration struggled unsuccessfully to contain the controversy generated by Sputnik I, the half-ton dog-carrying Sputnik II intensified public and political concern.

The new satellite was a sobering reminder that the space race was not a one-shot affair, but an urgent, long-term scientific and technological challenge. Immediately after its launching the Administration, building upon initiatives of the previous month, began to take actions committing the U.S. to a space effort. As its intentions became clear, competition for a role in either the technical-scientific or political exploitation of space became clear as well. With the decision to enter competition settled, the issues of controversy shifted to questions of who should do how much of what, and gain political influence in the process.

The Administration spent the five months after Sputnik II evolving its space policy, for the most part behind closed doors. During this period, its posture was to proclaim its intention to build a new space effort but to avoid specific choices. Given this hiatus, other political participants were free to press their own claims while the Administration debated its choice, and to make clear their respective positions and policy preferences. The Administration's delaying action - necessary in any process of policy formulation - provided the perfect backdrop for the sustained competition of the interested agents.

These other participants set to work first to build strategic positions which might serve them best in providing a greater role in space. It would be from these positions that the Administration's ultimate proposal to establish

NASA, submitted on April 2, would be evaluated. For the moment, however, each political participant sought to convince the Administration of its own special capability in space by calling loudly for recognition of its skills and resources. It was a veritable Anvil Chorus.

1. The Administration

Although the broad outlines of the nation's space program remained undetermined in the period between November, 1957 and April, 1958, the Administration did make certain interim organizational and budgetary decisions to speed up the present effort. But these limited steps did not suffice to stave off the critics - throughout this period the Administration remained on the political defensive. Its behavior was due in part to a continuing desire to contain the conflict as far as possible. It was also dictated by the special requirements of the Executive office in the American political process.

The nature of these requirements demands a brief explanation. The heart of the Administration's problem was that, while critics could call for an all-out space effort, the Administration itself could treat space only as one part of a broad national security effort. Necessarily responsible for the entire policy spectrum of the government, the Administration's ability to focus upon and exploit the space effort was more limited than that of its critics. Thus, no matter what the magnitude of the official effort, critics could always complain.

Yet at the same time any Administration is more able to establish the magnitude of national security policy, including space, than any other field of national policy. The "arena of decision-making"[57] for national security lies primarily in the Executive Branch; without enormous effort, neither the public nor the Congress can significantly alter the strategic choices of the Administration, once they are made. Thus the Administration could, within limits dictated by its desire

for political survival, afford to accept criticism of its space effort, expecting that, once questions of character and magnitude were resolved within the Administration itself, it would regain its traditional initiative. [Even with the highly charged conflict which pervaded the political system, nonetheless the Administration retained this control]

Thus the Administration was neither able nor impelled to outshout its critics. Instead it acted to preserve its own freedom of choice, so that it could later exploit the relative Congressional acquiescence and latent public support which exists in any national security policy-making under Executive initiative. As events were to disclose, this was a politically viable posture. Moreover, as it was a conservative choice, it fitted the Administration's fiscal and partisan philosophy.

So far as public statements were concerned, Eisenhower's attitude toward the space challenge during this period was one of serious calm. He reassured the nation that it was not in severe danger. His State of the Union message stressed that the present American deterrent capability was sufficient to wreak annihilation on the Soviet Union, thus discounting any "real and present danger" to the United States. He also reiterated the theme that economic wisdom was the ultimate defense and that America could not have "both what we must have and what we would like to have."[58] Throughout the interim period the President constantly played these two themes: inviting national consensus in support of his program; disparaging partisans and alarmists; and urging Americans to "throw back their shoulders, thrust out their chins and say 'America is strong and will grow ever stronger.'"[59]

However inherently strong the Administration's power position, it still suffered political damage. Eisenhower's popularity had declined 10% since the

1956 election and the Sputniks accelerated the trend.[60] In January, therefore, he was confronted with the most skeptical Congress he had known: one which openly intended to fill the "vacuum" of executive leadership.

As in the first days of immediate reaction to Sputnik I, Eisenhower's advisors joined in public defense of their Chief. Predictably, Dulles and Adams emphasized only the positive side of the Administration's achievement. Dulles observed after Explorer I, America's first satellite, went up on January 31 that "if we put our mind to it, we can do almost anything that can be done."[61] Adams went further and claimed that not only was the Administration doing fine, but that any missile lag which might have inadvertently occurred during the present Administration was the Truman Administration's responsibility.[62] Alternatively, it was Nixon who presented both aspects of the Administration posture. After the Explorer was launched, for example, he both boasted that the USSR had no monopoly on scientific achievement and warned against excessive optimism.[63] In all cases these spokesmen were speaking for the President; in all cases, too, they implicitly or explicitly asked the nation to trust Eisenhower in defense matters.

Finally, White House tactics sought both to disassociate the President from current difficulties and to associate him with the successes of America's early venture into space. After the Vanguard failure, Hagerty claimed that the White House had in no way been involved in the excessive publicity which surrounded the attempt and which was subsequently widely criticized. He also referred all questions concerning the failure to the DOD.[64] Yet the announcement of the successful launchings came first from Eisenhower's office. In essence the emergent information policy concerning the satellite program was a simple one. Hagerty revealed it when he remarked to reporters that if

[illegible]

[illegible] research [illegible]

The Administration did [illegible] moves to expand the future space effort. These actions were [illegible] higher priority for science as a national resource, an expansion [illegible] missile and satellite effort, and a more liberal attitude toward [illegible] pressure to allocate more resources to space activities.

One major step to raise the prestige of science after the Sputnik was [illegible] formal recruitment of scientists into the ranks of the policy makers. The Presidential conferences of October with scientists and educators began [illegible] bear fruit: In a nation-wide television speech on November 7, Eisenhower announced the appointment of Dr. James R. Killian, the President of Massachusetts Institute of Technology, as his new Special Assistant for Science and Technology. On November 29 the President transferred the President's Science Advisory Committee from the Office of Defense Mobilization to the White House, thus buttressing Killian with a broadly-gauged advisory structure. These moves were intended to "give science an impressive new voice in the inner circle of Government."[66]

At the same time the President sought to put some of the earlier suggestions of scientists and educators into effect: specifically in the fields of scientific education, basic research and scientific cooperation with NATO allies. In a speech televised in Oklahoma City on November [illegible] he echoed the scientists' claim that scientific education was the most critical problem facing the nation, and offered initial suggestions in the field which were to become his first legislative proposal in the new national security effort. The Administration bill as finally approved as the National Defense Education Act

provided one billion dollars over a four-year period [illegible] and technical schools, and graduate fellowships.

To further scientific cooperation with the allies Eisenhower announced in December a preliminary agreement with Prime Minister MacMillan on joint British and American research activities, contingent upon amendment of the Atomic Energy Act. In support of such cooperation, the White House announced in late December the appointment of Wallace R. Brode, associate Director of the National Bureau of Standards as Special Assistant to the Secretary of State for Scientific Affairs.

Finally, in the field of basic research, the new Fiscal Year 1959 Budget included a request for 150 million for the National Science Foundation, three times as much as the actual appropriation of the previous year. The request for the NACA was increased more than 50% to permit advanced research in space flight. Finally, the DOD requested 50% more than in the previous year for basic research applicable to military Research and Development, including space.

Eisenhower also provided increased funds for national security, including space research and exploration, although in relatively marginal amounts. While promising a "very considerable" increase in defense spending, Eisenhower later reversed himself and indicated that the FY 1959 budget would be only moderately higher than the current one.[68] (Predicted defense spending in FY 1959 was to be between 38 and 40 billion, as compared with 38.4 in FY 1958). This ambiguous posture stemmed from conflict between Eisenhower's public rejection of price tags for defense and his commitment to fiscal responsibility. As late as December he still hoped to maintain a balanced budget and to avoid raising the debt limit.[69] By January 15, however, he was asking Congress to raise the ceiling by 5 billion.[70]

So far as interim organizational steps for space were concerned, Eisenhower

concentrated upon the DOD. He announced on November 7 that Mr. William M. Holaday, former Special Assistant to the Secretary of Defense, would become the Director of Guided Missiles vested with the full authority of the Secretary to supervise and coordinate the missile program. Holaday was also granted temporary control over the satellite program. The next day the DOD authorized the Army's satellite program as a back-up for Project Vanguard. And, most significant for our purposes, on November 15 McElroy announced that he would subsequently appoint a new director for advanced weapons development, including guided missiles now in early stages of research, anti-missile missiles, satellites and space platforms. Such weaponry, according to McElroy, would be developed by a single manager and subsequently assigned to the Services for use. The President also began to make clear his long-range conception of the structure of the space program. As early as his Oklahoma City speech Eisenhower suggested that the distinction between civilian and military exploitation of space upon which the Vanguard decision had been based would remain a primary criterion for assigning the space program. He then stated, in discussing the satellite program:

> "If the project is designed for scientific purposes, its size and cost must be tailored to the scientific job it is going to do .... If the project has some ultimate defense value, its urgency for the purpose is to be judged in comparison with the probable value of competing defense projects. [71]

By early February there were indications from the White House that this distinction would be institutionalized in arrangements separating military and non-military space programs. On the fourth Eisenhower ordered Killian to draw up a timetable for scientific objectives in space, with the special charge of matching these with an organizational structure for research and exploration in space. The following day in his news conference, Eisenhower indicated that

he was sympathetic to a division of responsibility. The emplacement of space weaponry in the DOD, and overall responsibility for space sciences in a civilian agency, distinguishing between "what is in the realm of probability in the whole scientific area (and) ... the defense aspects of this business."[72]

It is clear that the principle of divided control of the space mission between military and civilian operating agencies had been established when Killian was instructed to draw up his report.[73] After this time White House spokesmen substantiated this principle in increasingly forceful terms. On February 17 Nixon stated in a speech at the Jet Propulsion Laboratory that the exploration of space was a civilian task for two basic reasons: First, "research as well as operations in this field (should) not be established by military need and military opinion;" since such military limitations would, in Nixon's view, put unnecessary and destructive limits upon scientific investigation. Furthermore, he considered it "vitally important that we continue to emphasize that our efforts (in the space and research fields) are for peaceful purposes."[74]

In late March Eisenhower made his first explicit commitment to civilian control of space: "I expect to send up shortly recommended legislation providing for civilian control and direction of governmental activities incident to a civilian space program."[75] On the same day he released "An Introduction to Outer Space," the space primer prepared by Killian and his committee, under the direction of Dr. Edward Purcell. This primer outlined a projected program for scientific exploration of space under civilian direction. Finally, on April 2, Eisenhower sent up his message to Congress proposing the National Aeronautics and Space Agency with expanded authority and mission to direct all American projects in space, "except for those projects primarily associated

with military requirements."[76] Thus the Administration, exercising its crucial role as initiator of the legislative process, chose to formulate the space mission around the key concept that scientific-civilian dimensions of space would be distinguished and separated out from the military dimension.

2. The Department of Defense

The Department of Defense is both a part of the Administration and a military establishment vested with the monopolistic mission of defending by force the national security of the United States. This mission requires such vast resources and specialized personnel that the Department can exercise a significant degree of independence apart from the political control of its Commander in Chief. Moreover, within the Department the Services have analogous independent power positions. While outlining the separate space policy positions of the Department vis-a-vis the Administration and, in turn, of the Services within the Department overturns the organization charts, it acknowledges political reality.

The civilian officials in the Office of the Secretary of Defense as members of the Administration, publicly supported Eisenhower's level of commitment to the space effort. As military officials, however, it was also their duty to impress upon the President the potential military significance of space exploitation. Moreover, each service sought to protect and extend its mission in space in opposition to each other's claims, while together pressing a broad program of space activity upon the civilian officials in the OSD. Thus the DOD was at once an extension of the Administration, a single military agent making peculiar strategic demands upon the Administration, and a multiple actor expressing divergent service claims of space capabilities. This Janus-faced quality of the DOD makes the task of interpreting its claim upon America's

operational space capability a peculiarly complex but equally important one.

(1.)The Office of the Secretary of Defense

Throughout the period from November until April, the OSD officials argued consistently that the Sputniks did not reflect an operational Soviet military advantage. However, they did admit the military significance of the powerful rocket thrust which had launched the satellites. Thus, given the Department's primary mission to promote the national security of the U.S., its major reaction to the Sputnik crisis was to accelerate the missile program. To this end, McElroy authorized the production of both the Jupiter and the Thor IRBMs on November 26, speeded development of the Atlas ICBM in December, and authorized Research and Development on the Minuteman ICBM early in 1958.

In general, the OSD sustained the official position which had led to the Vanguard decision: that the exploitation of space should not hamper the major task of developing America's ballistic missile capability. On November 11 Undersecretary of defense Donald Quarles indicated that the U.S. had rockets capable of lifting satellites as heavy as the Sputniks, but that the DOD did not consider this a proper military use of the vehicles.[77] In a speech to the American Rocket Society Holaday repeated this argument, saying:

> "We will be able to have large satellites whenever we want them.... When we are assured of an adequate IRBM capability and an ICBM system with the necessary support equipment and stockpile of missiles, then we intend to jump into space. To do so beforehand would be like trying to lock the front door and let (sic) the back door stay open. This does not mean that we will discontinue space work. We will have an effective and continuing program. But missiles will be our Number One job."[78]

The exploitation of space, insofar as it contributed to a stronger defense posture, was included within the DOD's overall mission. Its significance, however, would be evaluated relative to the utility of other defense programs.

[illegible] Sputnik. [illegible] the Soviet [illegible] [illegible] assuming responsibility for the [illegible] [illegible] acknowledged that, had the political effects of the Soviet [illegible] according to [illegible] been foreseen, the decision might have been made [illegible]

The [illegible] assumed increased responsibility for the political [illegible] [illegible] On November 3, four days after Sputnik II went up, the DOD [illegible] [illegible] Explorer as a supplement to Project Vanguard. As [illegible] [illegible] stated

> "In consultation with my associates, (it was my belief) that [illegible] doubt as to the success that would be ascendant upon the launching of a satellite by the selected...Navy Vanguard method. We felt [illegible] had been some evidence that our major competitor in [illegible] was able to do this. We felt that in the general interest of the [illegible] nationally and internationally, we should make certain that we would be able to launch satellites for our IGY commitment [illegible] the year 1958.[80]

[illegible] policy concerning IGY satellite launchings also [illegible] [illegible] concern. The extreme publicity surrounding the Vanguard [illegible] produced extremely adverse domestic and international [illegible] in addition the Vanguard was variously termed the Duffnik [illegible] and Stayputnik. Thereafter, the DOD adopted extremely [illegible] There were no further press releases concerning [illegible] and public announcements were made only after launching [illegible][81]

[illegible] the DOD expressed an immediate substantive interest in [illegible] after the Sputnik launchings and requested the Services [illegible] projects consistent with their missions. McElroy [illegible] [illegible] undertake an active program in various fields [illegible]

space exploitation

> "We have felt the responsibility, and do feel the responsibility for any kind of military weapon development, no matter in what field it may reach.... (It is necessary) to recognize early in the game the importance of some very novel kinds of weapons which some people are likely to brush off as Buck Rogers stuff."[82]

Soon this recognition of the political and substantive implications of space for military activities led to organizational changes and Research and Development programming of considerable significance. Despite its early emphasis upon missiles it became clear that the Pentagon wanted a major role in whatever space program appeared.

The first evidence of this policy choice was the organization of existing military space programs. The OSD seized the initiative over the Services. On November 15 McElroy announced that he would appoint a new Director for the development of advanced research projects: in effect, a single manager for space and other advanced missions. Until this agency could be set up space would be under the jurisdiction of Holaday, the Director of Guided Missiles.[83] McElroy was intent upon this mission being organized within the OSD - precluding the possibility of a Service taking overall control over the incipient space program.[84]

In keeping with OSD philosophy, when the Air Force set up a new Directorate of Astronautics on December 10 to manage advanced space programs within the Service, Acting Secretary Quarles announced that he had asked the Air Force to delay such action until the new Advanced Research Projects Agency was organized. Quarles claimed that the DOD, while not opposed to the Air Force plan, considered it "premature."[85] The issue was closed when Secretary of the Air Force, William H. Douglas, suspended the order on December 13 under OSD instructions. Department officials felt that "apparently the Air Force

wishes to show its ability in this field and see if it can grab the limelight and establish a position.[86] They took quick action to squash this attempt to usurp the military space mission.

The OSD intent was "an immediate one: to pull under a single manager... the first time this has been done in the DOD - actual operating units for the Research and Development work that goes on in the anti-missile-missile field and in the satellite and space applications field."[87] The ARPA was to have authority to develop such weapons and turn them over to Services for deployment and use. McElroy testified that after consultation with all the Services the entire DOD was agreed that the new agency should control all activities of any Service in these areas.

In December, however, the OSD modified McElroy's announced plan for a single-manager, inhouse-capability agency. Holaday testified that

> "If this group took off and developed its own engines and everything... it would be wasteful. The planning and thinking... is that we will be a cooperative group, not fighting, and will use the available material (the Services) have to help out in (the agency's) program."[88]

This change reflected a serious struggle within the DOD. In competing for particular space missions the Services had adopted strong positions for or against the prospect of an all-powerful operating agency for advanced Research and Development.[89] Moreover, some outside contractors were criticizing the potential disruption which such an agency would introduce into contracting procedures with the services.[90] These arguments respecting the establishment of the ARPA continued for months while McElroy sought a director for the agency.

Thus, as ARPA came into existence, the exact extent of the new agency's potential authority remained unclear. Nonetheless, McElroy's general position had Eisenhower's support. On January 7 the President sent a message to Congress

requesting transfer of [illegible] million from various military appropriations to the ARPA in the Supplemental Defense Appropriations Bill for FY 1958. This sum would cover the expenses of establishing the agency, including "acquisition and construction of such research, development and test facilities and equipment as may be authorized by the Secretary of Defense."[91] Shortly thereafter, in the State of the Union message Eisenhower argued that:

> "Some of the important new weapons which technology has produced do not fit into any existing Service pattern. They cut across all Services, involve all Services and transcend all Services at every stage from development to operation, In some instances they defy classification according to branch of Service.... In recognition of the need for single control in some of our most advanced development projects, the Secretary of Defense has already decided to concentrate into one organization all anti-missile and satellite technology undertaken by the DOD."[92]

The Administration clearly believed that the establishment of the ARPA was well within the broad powers of the Secretary granted under the National Security Act of 1947, as amended, permitting him to transfer, reassign abolish or consolidated non-combatant functions.

The Congress, however, claimed that the Administration had usurped a legislative function by altering the roles and missions of the Services without its approval. Consequently, Congress adopted the attitude that the ARPA was largely a stop-gap measure, pending further Congressional consideration of space organization. The conference committee on the Supplemental Appropriations Bill directed the Secretary of Defense to engage in Research and Development on advanced weapons systems, either through the Department or one of the Services, and permitted the Department to undertake for one year such non-military space projects as the President designated. The Committee, however, deleted all specific reference to the ARPA, providing at best a shaky legislative history

for the new Agency

On February 7, ignoring Service and Congressional opposition, the OSD announced the formation of ARPA and the appointment of its director, Mr. Roy W. Johnson. The relevant Directive[93] provided "within the DOD an agency for the direction and performance of certain advanced Research and Development projects," including the nation's space research and the development of space weapons. ARPA was authorized to contract out Research and Development work with other agencies of the Government and outside contractors or to acquire such facilities as it might need. Thus the DOD had established what was on paper a powerful operating agency, the only organization in Government with the explicit mission of developing advanced space projects.

With ARPA established, the OSD moved to add substance to the newly invigorated military space program. It requested proposals from the Services for military space projects in an effort to avoid inter-service rivalry.

Against stiff service opposition, Holaday and later ARPA reviewed a number of projects, although most decisions were postponed pending refinement of the organization. Among those decisions which were made in order to carry out the DOD's temporary responsibility for space programs, were the November 8 authorization of the Army's Project Explorer, and the March 23 directive ordering one or two lunar probes under Army auspices, three under Air Force direction and the development of mechanical ground scanning systems by the Navy. Military space projects were highly classified, but we know that one of these, the Air Force reconnaissance satellite, the Pied Piper, was funded during this period. Major decisions about the man in space program, the one-million-pound thrust engine, and weather and navigational satellite programs were not made, although relatively small investments were

ordered for component development, preliminary engineering, and design work on these programs, pending final decisions.

Conflict concerning responsibility in the space field both between the various Services and ARPA and between the future civilian-military allocation of the space mission contributed to the relative inaction of the ARPA programmers.[94] Yet the level of support ARPA enjoyed was also the result of conscious policy choices in the OSD. John Finney, of the New York Times, one of the best informed observers of ARPA's efforts during this early period, suggests that the "deliberate" pace of the agency's activities reflected the apathy towards space development permeating the highest echelons of the OSD and the Administration. Although this relative inaction was in part due to unsettled organizational questions, it also reflects the priorities which DOD officials assigned to the space mission. While adamant that the military establishment should be empowered to define those areas of space development which might contribute to the military mission, the OSD had to weigh military space efforts against more immediate claims upon the defense budget. The resultant assessment embodied in the military space budget for FY 1959 indicated that the OSD was not pressing an urgent, top priority effort in the military exploitation of space.*

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* The FY 1959 budget request for ARPA was 520 million, of which 72 were for nonmilitary lunar and scientific satellites to be later transferred to the civilian agency; 310 million for an anti-missile missile system and for the Pied Piper; and the remaining 138 million for all other space programs. These included projects that were both clearly military and those whose civilian or military nature was under discussion: the man-in-space program, the million-pound engine, weather and navigational satellites, satellite tracking systems, instrumentation projects, the development of power sources. (See HE, pp. 1164 and also NYT, May 25, Section IV: article by John Finney).

The OSD's effort to assert control over the total space program on a low-priority basis conflicted, of course, with the embryonic Administration policy. Two days before the OSD established the ARPA, Eisenhower announced that the Killian Committee would investigate organizational alternatives for the nation's future space effort.

By implication the Administration contradicted the OSD's reforms. As early as November McElroy suggested that the DOD take responsibility for developing the civilian uses of space if requested by a civilian agency to do so. "Our responsibility," the Secretary maintained, "on the civilian aspects of satellites involves whatever decision another agency of Government wishes to make in respect to using us. In that case we are glad to offer our serivces if we can be helpful but we do not consider that it is a responsibility of ours to initiate in that field."[95] He agreed that the Government should pursue basic research and exploit civilian potentialities in the space field and that the National Science Foundation, AEC, and NACA all had responsibilities in the area. Since, however, the only capability for exploring space lay in the military, he conceived of a civilian space program as one of collaboration between the military developer and the civilian user. The model uppermost in his mind was apparently that of the IGY in which a civilian agency designed a scientific mission in space which the DOD performed. To implement this relationship his sole suggestion was that Killian should study "whether there cannot be some improved coordination of the research activities in these various parts of the Government, (since) I think that it is possible to make improvements."[96]

During the months of policy hiatus, the DOD's opposition to a civilian space agency was almost axiomatic. Holaday testified on December 13 that the establishment of an independent civilian commission to control the satellite

[illegible] would "[illegible] [illegible] in [illegible] or [illegible] to produce space [illegible]. He stated that it would indeed be a "[illegible]" to place space development outside the military, since "[illegible] [illegible] of [illegible] space work in this area without being released to [illegible] with the [illegible] people in all [illegible]."[57] He argued that all scientific [illegible] [illegible] to produce civilian applications would be useful for military [illegible] as well, and thus properly belonged within ARPA. The OSD view [illegible] the Administration close to place non-military space [illegible] in a [illegible] agency. As members of the Administration, OSD officials had to support [illegible] choice. Their support, however, was conditional upon the assumed [illegible] military establishment's freedom to pursue its own interests in [illegible] not be impinged by any formal commitment to overriding civilian [illegible].

[illegible] The Services

For each of the Services, as for the OSD, the introduction of [illegible] the military mission implied a possible change in its [illegible] and [illegible]. Each was involved in part in the embryonic space program; conversely, each would profit from benefits accruing from a military space program. The Services provided not only the resources by which the DOD could develop [illegible], but also one of the strongest stimuli for this development. [illegible] in the period of policy-making from November [illegible] to April, the Services [illegible] peculiarly free to emphasize in Congressional hearings and [illegible] their particular space capabilities. Thus, with the initial [illegible] of [illegible] over, the Services became independent [illegible] in the struggle for space.

The Navy

The Navy was the least involved of the three Services in the contest for space. It did not view space as a natural outgrowth of its mission, although it did express interest in exploiting certain navigational, communication, and meteorological aspects of space. Furthermore, it did have to carry on with Project Vanguard.

That Project seemed rapidly to lose its charm for the Service. After the first two Sputniks the Navy maintained a decorous posture, merely reiterating that the Vanguard was on schedule. This entailed four test vehicle launchings, some of which might carry six-pound test satellites, between December and March, and six fully-equipped twenty-pound scientific satellite launchings to fulfill IGY commitments by the end of December, 1958. When the DOD announced authorization of Project Explorer to supplement the Vanguard on November 8, the Navy publicly welcomed the Army aboard the scientific venture. It continued to stress that neither Soviet nor Army competition would alter its plans. Unofficially, however, the Navy attempted to accelerate the program, indicating that, if initial tests were successful, a fully-equipped satellite might be launched in January.[98] With the failure of the first test on December 6, in the full glare of national and international publicity, the Navy fell silent and concentrated upon keeping the project on schedule. Subsequent postponements and still another failure before the first successful test launch on March 17, plus the successful Army launching in January, downgraded the project still further. Indeed, the OSD seriously considered eliminating Vanguard and utilizing some of its components in Army and Air Force satellite vehicles.[99]

Under the cloud of failure, the Navy continued to emphasize that Project Vanguard was a purely scientific endeavor with no importance for either naval

capabilities for military Research and Development or for the Navy's mission. Secretary Garrison Norton, Assistant Secretary for Air, testified that the Navy was not a competitor with the other Services for the production of space vehicles. Although the Navy had requirements in space, it had no desire to develop its own capabilities for these. On the other hand, it was willing to put its own research facilities at the disposal of whatever agency or service was designated by the OSD to develop a space capability, just as it had for the National Science Foundation and the National Academy of Sciences in Project Vanguard.[100]

In general, the civilian Navy officials and the officers in the Pentagon discounted the military significance of space exploitation. Secretary Norton warned in December against "Buck Rogers" thinking, terming the development of operational ballistic missiles the DOD's primary task and urging that nothing dilute this effort. These officials also resisted any reorganization of the space program within the DOD. Admiral Arleigh Burke, Chief of Naval Operations stated flatly: "it appears to me that this pressure toward reorganization is an illogical reaction to our not having an operational ballistic missile or satellite in the sky."[101] Norton agreed, arguing that each Service should have its own Research and Development organization with the DOD merely providing a monitoring organization to prevent duplication and facilitate communication between the Services. In part, this skein of attitudes reflects the Navy's traditional fear of DOD centralization, which gravely threatens to limit the roles and missions of the Service. Specifically, however, it reveals that the Navy, although relatively disinterested in space, preferred to retain its option to pursue this mission rather than to lose it irrevocably to a centralized agency or to one of the other Services.

Navy Research and Development people, however, dissented from these views. Dr. John Hagen, Director of Project Vanguard, emphasized both the military and political significance of space, and recounted his dissatisfaction with the low priority placed upon the Vanguard. Hagen particularly stressed the need for scientific research in military development and complained that the DOD gave basic research virtually no priority.[102] As far as organizational alternatives were concerned, he argued that:

> "What is needed - and the precise location of the organization is perhaps debatable - is a single organization devoted to this type of work (space investigation and flight). Whether that organization would be better placed in the DOD or whether it is better in a separate agency is the question to which I do not have the answer, but I know it would work within the DOD. There should be, however, this single agency into which policy decisions would be passed and then both the authority and the responsibility for action would be given to the agency."[103]

This reflection of professional scientific rather than Service bias introduces yet another set of particular interests and missions existing within the DOD. The Research and Development scientists, both civilian and military, shared many attitudes with their professional colleagues and yet were among the most outspoken advocates within Government, for a high priority program of great magnitude in space exploitation. They were also to be the most sympathetic individuals within the DOD to the concept of a civilian space program.

The Army

In sharp contrast to the Navy, for the Army space exploitation was a matter of profound significance. Unequivocally, Service spokesmen favored the establishment of a centralized military agency to conduct space Research and Development.

The reasons were not obscure. The Army had already proved that its research teams and facilities at the ABMA and the Jet Propulsion Laboratory were capable of undertaking advanced space research projects. Yet it labored under a currently

restrictive mission assignment in ballistic missiles. In an organizational shakeup the Army, specifically its Research and Development elements, was convinced that its teams could be preeminent in a military space effort. But, if space were to remain divided among the respective Services, it seemed likely that the Air Force would assume an increasing portion of the mission. The immediate tasks as Army leaders defined them in the months after Sputnik were therefore to impress the DOD officials with the Service's capability in space, and to support the establishment and decision-making powers of the ARPA.

Four days after the launching of Sputnik II, the Army received its chance to prove itself. McElroy authorized the launching of Jupiter-C test vehicles carrying an eighteen pound Explorer scientific satellite to supplement Project Vanguard in the IGY. Determined to avoid an Army-Navy satellite race, however, the Secretary declared that the OSD would retain authority over the launching schedules of the two projects. Although the Army had sought the mission vigorously for three years, now it was apparently caught off guard. It was also disappointed by remaining within the framework of the IGY and hence the constraint of having only a limited satellite mission. Medaris and von Braun announced that the DOD directive failed to provide precise information about the number of satellites to be launched and the schedule to be met, and continued: "until we are sure that we fully understand the participation that is expected of us we will have no comment."[104] Thereupon, the OSD directed the Army to proceed immediately with modifications of the guidance system for the Jupiter C, ordered the Navy and National Science Foundation to provide the satellite instrumentation, and specified that the Army was to undertake two launchings, the first around February 1. At this point the Army plunged full speed ahead, convinced that it could beat the Navy in launching a full-scale satellite.[105]

In Medaris' words:

> "I have language from the Army that says in good old-fashioned military terminology 'you will on or about such and such a date do so and so'...the directive I now have is in words of one syllable and leaves nothing to the imagination. It just delights my soul."[106]

He and his team were justifiably confident. The Jupiter-C, previously prepared as a satellite launching vehicle for Project Orbiter in 1956, was almost ready, requiring only a modification on the nose-cone and the addition of some minor components to return it to its original form as a satellite carrier. When the first Vanguard exploded on December 6, Army preparations speeded up. And on January 26, when the second Vanguard shot was postponed, the Army was officially authorized to make the next attempt.[107]

At 10:48 P.M. on January 31, 1958, America's first earth satellite, the Army's Explorer I, was launched into orbit. The Research and Development team under von Braun and ABMA officials immediately issued abrupt, forthright statements that the Explorer had proved the "capability of the Army's scientific and industrial team in the realm of outer space exploration."[108] Lt. Gen. Arthur G. Trudeau, the new Army chief of Research and Development, mentioned the entire Service in his boast: "the Army has never let the people down yet; ... any time they give us the ball we know what to do with it."[109] On a more parochial level, the Explorer's home town of Huntsville celebrated New Year's Eve all over again. Fire engines and police cars unloosed their sirens and ten thousand shrieking citizens roamed through the streets, carrying placards with such messages as "move over Sputnik, space is ours" and "our missiles never miss."[110] Only one breach appeared in the convivial spirit. After the tracking station in the Azores had picked up the satellite's signal, an aide asked Medaris whether he should contact Washington. The General is

reported to have responded: "not yet; let them sweat a little."

The Army's jubilation stemmed not only from the successful launch but also from the prospects it raised for the Army's subsequent role in space. All echelons expressed the opinion that the space mission was as or more important than any mission in the military establishment. Given the restrictions upon the conventional man-power capability of the Army and the two-hundred-mile limitation placed upon missiles under Army operational control by Secretary Wilson in November, 1956, space offered the Army a new lease on life. Hence its spokesmen's emphasis on the significance of space for military purposes was never divorced from outspoken assertion that Army teams were well-qualified to go into space.

Secretary Wilbur Brucker argued that it was imperative to demonstrate capabilities in the satellite field, adding that "the Army has a unique capability to make significant and early contributions to this conquest of space."[111] Gen Gavin flatly stated that unquestionably space exploration was "the most important thing confronting the country today."[112] He viewed the military satellite as a development of "tremendous significance, perhaps the most significant thing of our times,"[113] and gave it higher priority than the development of ballistic missiles. Although emphasizing the political and scientific significance of space exploration, his major concern was with achieving military control of space before the Russians did.

> "You have got to get out there and get out there first and be able to sit down in international councils and determine as to who is going to be out there and who is to do what out there."[114]

In Gavin's view the control of space would dictate control of earth, and while he could not predict the changes space would introduce into the daily lives of human beings, he predicted "tremendous things will happen and we must get out there."[115]

Medaris echoed Quarles' view that military satellites should have comparable priority than ballistic missiles by identifying the coupling between the two:

> "I feel that the priority should always be on the furthest thing out that you can conceive as a possibility. The priority today should be on the attainment of a space capability by the U.S. at the earliest possible date. Now you get all the ballistic missiles if you do that. They will come out just as an outfall of a properly developed forward looking program that has as its aim the development of at the least parity, and hopefully control in the space area."[116]

In the same vein, von Braun outlined the nation's need for large, powerful single engines of at least one-million-pound thrust and for immediate financial support in the order of 1-1.5 billion annually, if the country was to avoid the mortal danger of Russian space domination.[117] Such a program, he predicted would be the determinant factor in the military balance of power within fifteen years.

With their views on the significance of space underlined, Army spokesmen moved on to sketch the program and organizational arrangements best suited to the interests of their Service. After Sputnik II the Army formally proposed to the OSD the immediate launching of several 200-300 pound reconnaissance satellites by the Army during 1958; development of more powerful rockets by the Army and Air Force including initial work upon a single million-pound thrust engine; lunar, solar and planetary probes; manned satellites including lunar voyages; satellite developments in mapping, geodesy, meteorology and communications which would all offer civilian applications; the development of an anti-satellite capability; and work upon advanced propulsion techniques including nuclear, ion and photon power.[118] In forwarding the program through Army and OSD channels Medaris termed it a national rather than an Army plan emphasizing that it sought to build from existing hardware in all Services, avoid interference with ongoing weapons programs, and utilize whatever teams

and facilities had proven capabilities in space research.[119] Not coincidentally perhaps, he depicted the Army as fully qualified to participate with other Service Research and Development teams in such an effort.

With such interests, it is not surprising that the Army gave strong support to the establishment of the ARPA. Brucker indicated that he preferred a centralized space mission within the OSD, adding that he sought no disagreement with the Air Force but that centralized direction could best utilize the capabilities distributed among the various Services. Gavin, who argued strongly for a competent military staff directly responsible to the OSD, concurred. Medaris, the Commander who would be directly under the supervision of such an agency, were it established, also favored a single decision-maker (although he opposed an operational agency within the DOD which would remove the space mission from "experienced teams.")

> "I believe sincerely that the best method for achieving it is that there must be someone responsible only to the Secretary of Defense; that is, right at his right hand, who is assigned by the Secretary and the President the power of decision in the things that were outlined in (the Army program) which do not exist, the authority to say yes, and the courage to do so, who through the medium of a very small staff can carry out the necessary job of assigning these projects, approving the total plan, assigning the resources, and monitoring the total competency to see that they do not fall backward."120

Such an agency, in the minds of these Army officials, would properly protect the interests of their Service. Yet, while the Army sought centralized direction for the space mission, it was intent upon maintaining military control. Medaris reflected this Army position in his adamant opposition to an independent civilian space agency.

> "I believe that that individual (decison-maker) should properly be within the DOD, since otherwise you will have great collision of resources throughout the whole system by his being, by there being unfamiliarity with the current state of other things which affect the availability of resources and manpower in the different areas

required to carry these things out, whereas, if he is working as a direct subordinate of the Secretary of Defense, he will normally and naturally be fully informed all the time with respect to the current status of other demands and will therefore place his requirements on people who are most able to carry them out."[121]

According to Army officials, a civilian agency divorced from the DOD would cause total confusion and seriously hinder the nation's venture into space.

As in the case of the Navy, however, Service scientists differed from their colleagues in uniform. Von Braun's proposal for a new space organization envisaged a broad, expensive national space program under what he terms a "national space agency" either in the OSD or as an independent, civilian agency, and armed with both inhouse facilities and contracting authority. His major thrust was that

"this kind of thing obviously does not belong in the Navy or the Air Force or the Army. It is a development of an entirely new technology...."[122]

He noted that at the moment the Services were jockeying for position in the space contest and urged that no single Service be permitted to gain control of such a crucial mission.

Although the elimination of Service rivalries seemed his major concern, von Braun indicated that the scientists and the military differed in their views of the proper locus for the space mission. Hesitating initially to state his own choice, under Senator Johnson's close questioning he conceded that he ultimately would prefer to organize the space program in a way comparable to atomic energy. For the short run, however, he settled for assigning the space mission to the OSD with Service Research and Development and missile capabilities utilized as that office choce."[123]

Thus the Army presents a coherent posture of favoring a broad military and scientific space effort under centralized, although non-operational direction

by an agency within the OSD. Such a position favored the Army's participation in space; for, were one Service to receive the mission, it seemed likely to be the Air Force. If the OSD were in charge of allocating space projects, however, Army leaders believed that its proved capabilities in scientific and military exploitation of space could secure a very respectable slice of the pie.

To a limited extent the DOD did permit the Army to exercise its space capability. In February it authorized a third Explorer shot and gave informal approval for two fifty-pound satellite launchings with the Jupiter-C rocket vehicle. In March it directed the Army to use these two satellites for lunar probes in the IGY program. And, according to Medaris, the OSD requested a firm schedule and budget proposal for Army space projects through December, 1958. Medaris indicated that he anticipated the Army would "get the go-ahead on at least the first twelve months of this program."[124]

Yet at the same time there were indications that the Army would not win the long-range space mission it so avidly sought. In January, the retirement of Lt. Gen. James M. Gavin, Army Chief of Research and Development, was an ominous sign that the Service could not expect OSD support for the reorientation of Service and military structures necessary to exploit a massive new program. Gavin indicated to the Senate Preparedness Subcommittee on January 6 that his vigorous advocation of an urgent space effort hurt his chances for promotion. Implicitly he suggested that the DOD's evaluation of the Army's special space role and appropriate program was far from his own view. Announcing his resignation he explained:

> "I don't want to defend next year's budget because I don't believe in next year's budget, the Research and Development budget, of the Department of the Army. I don't want to be put in the position of coming before Congress and saying that I approve of certain things that I don't."[125]

Confirming Gavin's fears, John Finney of the New York Times reported on March 6 that authorities within the OSD were predicting that though scientific or "prestige" assignments would still be made to the Army, the Air Force would be charged with developing military applications of outer space.[126] McElroy, according to Finney, considered space exploitation consistent with the Air Force's overall function. Such an assignment was precisely the opposite of the Army's goals.

The Air Force

The Air Force position stemmed from an earlier allocation of missile responsibilities. The Air Force had operational control over much of America's booster capability: the Thor IRBM, and the Atlas, Titan and Minuteman ICBMs. Moreover, it had been working in space research since the end of World War II. This program was almost entirely military, and hence classified, but throughout the months after Sputnik, ongoing projects received enough public attention to indicate that the Air Force was more deeply involved in military exploitation of space than any other Service. Buttressing these advantages was the Service's claim that the space mission was a natural outgrowth of its military responsibility in the earth's atmosphere. Accordingly, the Air Force saw its interest to be that of resisting, or at least downgrading, the centralization of the space mission within the OSD. Its rule of thumb was that the less control granted, the more might fall to the Air Force.

The Air Force's evaluation rested on an interpretation of space exploitation as a natural extension of the ballistic missile program. Although ardently contending for the space mission, the Air Force sought above all to protect the status of its on-going aircraft and ballistic missile programs. Hence, top officials in the Service, like officials in the OSD, concentrated on

the need to maintain control of the air with ballistic missiles. Under pressure, Secretary Douglas stressed that space developments and ballistic missiles should be given equal priority, but added "I would like to leave the priority with the ballistic missile program to the extent that the two might conflict."[127] Similarly, Richard E. Horner, Assistant Secretary for Research and Development, argued it would be "utter folly to reduce the sense of urgency on the ballistic missile program at this time"[128] and agreed with Douglas that, if ballistic missiles and space operations were competing for resources, the missiles should be given top priority. Such competition could, of course, be avoided if the pace of both missions were determined concomitantly by the Air Force.

Only Gen. Bernard Schreiver, Commander of the Air Force Ballistic Missile Agency, specifically stated that in long-run terms, national security would depend upon space superiority.[129] Yet he, too, argued consistently that 90% of the developments in the missile program could be applied to space and that the two must move together.

> "The entire astronautical development program which I have touched upon can be initiated at once, with no dilution in diversion of our ballistic missile programs. As I analyze the future, if we are to meet the challenging requirements of either ballistic missile acceleration or of astronautics, we must recognize where our strongest capabilities lie today and make certain decisions now."[130]

In short, all the Air Force witnesses who testified before the Preparedness Subcommittee argued that space was important, even crucial, but not so important as to divert resources from ongoing missions. Hence, Air Force spokesmen did not argue, as the Army had, that space was the most significant arena of potential military activity. Instead, they evaluated the significance of space for national security and sought to pace space exploitation in terms of the development of Air Force roles and missions.

The Air Force had a strong case, both logically and empirically. Its ballistic missile capability provided a fine basis upon which to build an astronautics program and Air Force officials constantly repeated this refrain. Gen. Schreiver argued that "our present studies have shown that by using our presently existing rocket engines and missiles, we can provide both at the earliest date and at the greatest economy, not only unmanned reconnaissance of the moon, but also a basic vehicle for manned space flight."[131] Indeed, he stated that current Atlas, Titan and Thor programs would provide booster capacity for all the space missions of interest to the DOD for the next ten years. Moreover, the Air Force had ongoing space programs in a broad range of fields. It had engaged in high altitude research to study cosmic rays, thermal characteristics and effects upon human beings launched in balloons. The School of Aviation Medicine at Randolph Air Force Base had been investigating medical aspects of outer space, and Research and Development groups in the AFBMA had been working on guidance and propulsion problems of space flight. Air Force witnesses argued that this comprised a broad, comprehensive program in which the Service was making real progress.

Specifically, two Air Force space projects were in the final stages of development in the early months of 1958. The X-15 research aircraft, developed with NACA cooperation, was scheduled to fly in early 1959. If successful, this model would permit man to fly at speeds above one mile per second and at altitudes above one hundred miles, at the boundaries of outer space,[132] and hence presented many of the reentry problems confronting manned satellite flight. Second, the 117-L reconnaissance satellite, or Pied Piper, was closer to operational deployment than any other military satellite program. The OSD had authorized the Air Force to move into the systems development stage shortly

before Sputnik I and subsequently accelerated the program.[133] The Air Force hoped to launch a test vehicle by October, 1958 and to launch the first actual satellite by Spring, 1959. The test vehicle, incorporating certain components of the final satellite, would use the Thor booster; the satellite itself would eventually utilize the Atlas, thereby promising a significantly heavier payload.[134] Both programs called attention to the Air Force's capability for scientific and military exploitation of outer space, and the Service used them to bolster its claim for operational responsibility in this field.

Organizationally as well, the Air Force undertook to preempt the space mission. On December 10 it established short-lived Directorate of Astronautics with Brig. Gen. Homer Boushey, Deputy Chief of Staff for Research,[135] as its director. According to the Air Force, the new Directorate would be an internal management organization to pursue and coordinate advanced research projects within the Service under the overall guidance of ARPA. As indicated earlier, the OSD interpreted this move as a clear Air Force attempt to establish hegemony in the military space program and to undermine the ARPA. But the announcement of these plans by Donald Putt, Deputy Chief of Staff for Development, was a measure of the enthusiasm with which Air Force officers, particularly those in Research and Development, viewed the space mission as an extension of Service responsibilities.

Like the Army, the Air Force presented a plan for future space exploration to the OSD which would further the Service's long-run interest in space. Unlike the Army's national plan, however, the Air Force offered proposals which were primarily to be executed by Air Force facilities. The most signifcant divergence from the Army's plan was the Air Force's disbelief in the necessity of developing a single, million-pound thrust engine. The Air Force preferred to

rely on combinations of its existing rocketry.[136]

General Thomas D. White, Chairman of the Joint Chiefs and Lt. Gen. Clarence S. Irvine, Deputy Chief of Staff for Material, USAF, had predicted already that the next war would be fought by space weapon systems.[137] The Air Force space plan now reflected this prediction by providing an evolutionary shift from present ballistic missiles to future space weaponry. In the first stage, the present Thor booster with second stage hardware from the Vanguard could reputedly lift 3000 pounds into orbit, in late 1958.[138] With additional third stage hardware, the Thor could permit unmanned reconnaissance of the moon, impacting a small instrumented package upon it, by the end of 1959. A slightly modified Thor with a high-energy fueled upper stage already under development could put a larger payload in orbit, make initial unmanned reconnaissance of Mars and Venus, or send an instrumented recoverable package around the moon. Later the Atlas could make soft lunar landings and the Titan, with high-energy second and third stages, could put ever greater weights into orbit, support extended manned satellite missions, deliver larger payloads to Mars and Venus, or launch manned circumlunar flights. In addition to building the required booster capacity for these programs, the Air Force emphasized that it was currently working on the guidance systems, payloads, and manned experiments to be used in the projects." In other words, Schreiver concluded, "we are not just groping around. We can actually specify things."[139]

It was obvious, however, that what they specified was a program to be undertaken primarily by the Air Force. To men like Gen. White, this was utterly logical since the Air Force was "synonymous with air warfare" and space was merely a natural extension of air.[140] Hence, contrary to its typical support for greater centralization within the DOD, the Air Force was bitterly opposed to the establishment of ARPA. In the words of Gen. Irvine:

"What we don't need down in Washington is more commissions, more czars and more organizations. We have a President, a Congress, an Administration, and a Secretary of Defense. I said and I say again, we don't need any more czars or any more institutions. We need decisions by the Secretary of Defense and we need less people in the OSD. We need the delegation to the three military departments of the jobs that belong to them, and somebody with guts enough to hit them over the head if they don't do it that way."[141]

The chief impediment to progress in space, according to all Air Force witnesses, lay in separating Research and Development of weapons systems from their military user. In Gen. White's words, "I would naturally prefer to have it (space) in the Air Force because I think we have done more in that respect than anybody else, by a very great margin, and naturally I would like to go on with it." Believing that space was within its mission, the Service was therefore determined to keep space Research and Development in its own laboratories.[142]

So, in addition to pressing its own claims in space, the Air Force disparaged the concept of a strong operational space agency within the OSD. Schreiver argued that "any program to establish a separate astronautics management agency would result in duplication of capabilities already existing in the Air Force ballistic missile programs at a cost in funds and time similar to that already expended on these programs."[143] Schriever admitted under close questioning that he did support a central decision-making agency.

"If that is the way it is set up, I am all 100% for it. But if attempts to set up a procurement staff and do the contracting out of the Pentagon and set up a big technical staff there and make all the technical decisions, I say you are not going to set up a very good thing. The draft of ARPA that I have seen to date... does go to the point where they would set up their own labs, perhaps; they would set up their own procurement organization. This kind of an agency is what I am against. Now they may set it up."[144]

But a low-powered ARPA was only acceptable to the Air Force, not its preferred choice. Gen. White indicated a willingness to go along with the establishment of the ARPA with the proviso that "no matter who develops these things, the

Service that is going to use the end product should be cut in from the beginning."[145] And, he immediately added, the Air Force would be the primary user of such end products since it utilizes "everything that fits into our roles and missions, and in my opinion, almost everything in space does."[146] Once assured of major operating responsibility for military space exploitation, the Air Force came to accept the existence of a downgraded ARPA. Unlike the Army, the Air Force's future in space depended on a narrow definition of ARPA's functions. In its view, the agency ought to be limited to high level decision-making, duly respectful of the Air Force's responsibility and capability for pursuing its roles and missions out into space.

Thus the Services each added its own evaluation of the space effort and organization which the DOD should adopt to that of the OSD. By the end of March, however, problems raised by the ambiguous powers of ARPA were further complicated by the President's advocation of a civilian space agency to share responsibility with ARPA for the exploitation of space. The attitudes which the OSD and the individual Services took toward the proposed NASA were derived from those which they had adopted toward the ARPA. Their new strategies, however, were more similar than the earlier ones. While disagreeing among themselves as to the organizational and budgetary support necessary for military exploitation of space, they were at least agreed upon the need for exploitation by the military establishment. Confronted with a civilian challenge to their freedom to determine what programs were to be considered militarily significant, the Services closed ranks with the OSD. As stalwart defender of the popular faith of national security, the military establishment used its substantial resources of power and influence to meet head on other political actors who doubted either the wisdom or the utility of turning space over to the generals.

3. The Scientists

Sputnik both popularized and politicized science in America. The political generalists responsible for national policy-making had recognized in the scientific specialists the technical skills necessary to meet the current crisis and had called upon them to be the "saviors" of the nation. The scientists responded with uncertainty and ambivalence, and unlike other political activists remained essentially unsure of their strategy in space policy-making throughout the subsequent months. This conflict arose, in essence, because the scientists continued to be uncertain of their objectives even while their new political influence was on the rise.

Three important attributes characterize the scientists' political behavior throughout the months of policy-hiatus. First, they were entering the political arena as only newly prestigious and relatively inexperienced participants. Second, they faced many unresolved questions in their relations with the Federal Government which they considered more fundamental than space. And, last, in contrast to their own view of the Sputnik crisis as a vehicle for the overall reconstruction of their relationships with Government, their political hosts expected them to actively engage in policy-making for space. While these characteristics were common to the entire scientific community, as months passed shades of difference and of emphasis emerged among the scientists outside and within the Federal Government. These differences in turn did contribute to the policy product.

(1.) The Non-Government Scientists

The scientists outside of Government felt these pressures most acutely. During the period from November until April they displayed little urgent concern with the evolution of national space policy. This relative disengagement

[illegible] the issue had [illegible] on traditional boundaries of the community, from the political arena, only slowly [illegible] after Sputnik [illegible] greater interest in other public policy issues concerning science. For these reasons the scientific community outside government assigned a relatively low [illegible] to the immediate exploitation of space and displayed a marked reluctance to offer specific recommendations upon the organization of the space effort.

The first cause of the scientists' dissassociation from policy-making for space lay in their reluctance to see science politicized.

The weekly journal Science set the tone for most scientific journals when it editorialized in late November:

> "Current emphasis on science in the thinking of ... public leaders illustrates both a good trend and a bad habit. To have greater attention given to the welfare of science is good, but to have attitudes changes so quickly and radically is a part of the inconsistent, on and off support that interferes seriously with steady scientific progress."[147]

In short, for the scientists, the political outbursts which followed the launching of the first satellites made suspect any massive new effort in space beyond that which they had earlier deemed professionally warranted. Only if scientific frontiers were demonstrably relevant to national defense were the scientists anxious to see specific political action.

Second, the scientists were more interested in other national scientific efforts than they were in space. The public statements of civilian, non-governmental scientists in the months after Sputnik gives a random picture of this interest.[148] All expressed the basic conviction that the status of science and technology was a measure of social progress in the modern world, urged America to recognize Soviet scientific achievements; reiterated the crucial need for scientific breakthroughs and risk-taking if America were to gain in the cold war; and finally, entered a plea for American society to upgrade

the status of the scientist. To these ends they urged basic reforms along a variety of fronts. They called for federal support of the educational system, both to make it more challenging in general and to increase the amount of scientific instruction in particular. They sought increased government support for basic research; greater recognition by the Federal Government of the scientific input in weapons development; better organization of military Research and Development programs; and greater mobilization of the nation's scientific capabilities for the national security effort. They recommended better working conditions for scientists in federally supported projects or Government agencies, including more translation facilities, less restrictive contracting procedures, freer exchange of information with other scientists, and less stringent security measures.[149]

On these broad issues, the voices of the scientific community were loud and strong. There was, however, only passing reference to space and markedly little precise opinion in the public record concerning either the significance or the potential organization of the space effort - with the exception of a few proposals by particularly space-oriented scientific fraternities or organizations. When these did appear, furthermore, they supported the IGY view that the space effort should be directed towards what might be scientifically valuable.

In testimony before the Senate Preparedness Subcommittee, the star scientific attractions: Drs. Teller and Bush, only mentioned in passing that space should be a specific arena of activity in an expanded scientific effort.[150] In two public speeches in January and February, 1958, Dr. Isidor Rabi, the chairman of PSAC, while referring to the satellites as "an accomplishment... of utility,"[151] urged America not to allay its sense of urgency in general

scientific progress because of the successful Explorer flight.[152] In discussing the organization of the scientific effort, varous scientists such as Dr. Arthur Compton and Dr. Lee duBridge praised the Killian appointment, but did not assign him any particular role in organizing the space effort.[153] The major general scientific association to meet in the months following Sputnik II, the American Association for the Advancement of Science, made no mention of a space program in the report of its Parliament of Science, although most of its discussion was devoted to "science and public policy."[154]

There were, in fact, only five scientific organizations, three of them particularly involved in the space sciences, which offered any unsolicited proposals for the organization and exploitation of space. These statements included a proposal for an Astronautics Research and Development Agency to control outer space development, presented to the President by the American Rocket Society on October 14; a petition in the New York Times from the editors of Missiles and Rockets suggesting a National Advisory Committee on Astronautics on November 7; a proposal for the organization of a National Space Establishment submitted to Dr. Killian on November 21 by the Rocket and Satellite Research Panel of the National Academy of Sciences; a joint summary proposal of the American Rocket Society and Rocket and Satellite Research Panel issued on January 4; a statement by the National Society of Professional Engineers on February 13, recommending the establishment of a federal Space Exploration Commission; and finally, a statement by the Council of the Federation of American Scientists suggesting control of outer space by the AEC along the lines of a bill, S 3117, currently sponsored by Sen. Clinton Anderson.[155] Although varied in scope and organizational detail, each of these proposals suggested an independent, federal space agency or commission outside the DOD using either the NACA or the AEC as organizational models.

Both the American Rocket Society and the Rocket and Satellite Research Panel had initiated work on their proposals before October 4, and their combined proposal, supported as well by the National Academy of Science, is perhaps the most authoritative and specific of these markedly similar proposals. It argued "on the assumption that it is imperative that the U.S. establish and maintain scientific and technical leadership in outer space research in the interests of human progress and national survival," that there be created a national space flight program and a unified national space establishment to undertake the scientific exploration of space.[156] Its functions would be "to unify and greatly expand the national effort in outer space research and in the practical utilization of space capabilities specifically excluding space weapon development and military operations in space which are considered to be the responsibility of the DOD."[157] It was considered "strongly desirable that the National Space Establishment be given statutory status as an independent agency in order that its work...be freely directed toward broad cultural, scientific, and commercial objectives...(which)transcend the short-term, though vitally important military rocket missions of the DOD." The drafters emphasized that the NSE would not have defense missions, and that in the immediate future, DOD facilities and missile technology would be required to execute the mission of the NSE. It was specifically mentioned that the NSE be set up "in such a way that it enjoys the unqualified support of all three services... Such a situation is believed to be possible only if the NSE is an independent agency from the outset - or if it is directly responsible only to the Secretary of Defense during its early years - with the clear prospect of independence at the earliest possible date."[158]

Thereafter, the proposal listed a timetable of space projects to be pursued

in the subsequent decade, and outlined relatively explicitly the distinction between the missions of the NSE and the DOD in space. The only reference to future coordination between the two agencies was that there should be "clear channels for mutual cooperation...in order to assure no jeopardy of short-term vital military need on the one hand, and in order to assure maximum rate of advance of space research on the other."[159] Finally, the proposal concluded with emphasis upon the potential educational, cultural and intellectual contribution of space research to the United States and the world. Space was depicted as an "endless frontier," offering meteorological, agricultural, communication commercial, navigational, medical and biological aids to man's life. Many would be of military value, but the sponsors argued that "their greater value (would) be to the civilian community at large."[160] "To use a homely example," it concluded, "the telephone is certainly a valuable military device, but its importance to the civilian population is vastly greater."

This proposal was based upon two major assumptions: that the peaceful, civilian exploitation of space was of greater ultimate significance than military operations in the same area; and that military uses of outer space could be demarcated with relative clarity, thereby permitting streamlined civil-military liaison. The scientists definitely envisaged the NSE as the single agency in charge of overall planning and basic research for the national space effort ~~as well as responsible for~~ the development and operation of civilian missions in space.[161] On the other hand, the military was to develop space vehicles only for specific military requirements which would be proved feasible by the prior research efforts of the NSE. The proposal urged effective liaison between the military and the civilian agencies but offered no specific suggestions as to how this should be accomplished. By implication, a correct division

and military and civilian functions in space would be based upon agreement between military and civilian scientists on what constituted military requirements.

This proposal had widespread support from the non-Government scientists who were interested in space. Of the thirteen scientists who specifically submitted their views on the organization of space to the Preparedness Subcommittee, ten of these either explicitly supported the NSE proposal or recommended that aspects of the missile as well as the space program be placed under such civilian control.[162] Nine of these ten, not surprisingly, were members of the Rocket and Satellite Research Panel*. The other three, Dr. Clark Millikan, George H. Clement, and Simon Ramo - all closely connected with the Air Force - recommended vesting control of space in a central organization within the DOD, or in one of the Services, presumably the Air Force.

A second specific proposal on space came from the IGY. On February 14, 1958, the Technical Panel on the Earth Satellite program of the U.S. National Committee for the IGY submitted to the Administration a plan for future American space efforts entitled "Basic Objectives of a Continuing Program of Scientific Research in Outer Space."[163] It focussed exclusively upon the scientific returns to accrue from outer space and stressed the scientific dimension of space as the basic motivation for exploring this new frontier.

> "The IGY marks the beginning of man's exploration of outer space... The interests of human progress and our national welfare now demand that a long-term program of space exploration be formulated and pursued by the U.S. with the utmost energy. Although there will inevitably be benefits from such a program of a very practical nature, the basic goal must be the quest of knowledge about our solar system and the universe beyond."[164]

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* Among them Drs. William G. Dow, Krafft Ehricke, Leslie M. Jones, W.W. Kellogg, Myron H. Nicols, Marcus D. O'Day, William H. Pickering, N.W. Spender, and J. H. Allen.

The proposal suggested future projects in the fields of sounding rockets, earth satellites, lightweight satellite experiments, advanced satellite developments, lunar investigations, planetary and interplanetary investigations, and finally manned space flight. This effort was to be supported with due awareness that space technology would develop gradually; that initial payloads, distances and scientific observations would be modest; and that manned space flight would be in the relatively distant future since it could "not now be very clearly justified on purely rational grounds."[165]

The operating criteria of the IGY were perhaps even a purer expression of the scientific view than those of the American Rocket Society and the Rocket and Satellite Research Panel. As participants in an unofficial, apolitical, international scientific alliance and common effort, the IGY Committee was perhaps obliged to discount the political repercussions of the space race - indeed, to discount the very existence of such a race.

Yet more general assumptions were operative. First - and most basically - scientific value judgments were to determine whether space projects rather than other scientific endeavors would be undertaken. Second, within the space program itself the maximization of scientific achievement would serve as the basis for selecting among possible projects. No other considerations were explicitly introduced as criteria for initiating either a space program or any specific project. And throughout the proposal there is no reference whatsoever to military uses of space, prestige purposes of space exploitation, or any specific treatment of commercial or civilian advantages to be gained from space exploration.

This IGY model, while representing the extreme position of the private scientific community, served, therefore, to bolster the arguments of those scientists who wished to stress the scientific nature of space exploration

and downgrade its political or military aspects.[166]

(2.) The Government Scientists

Like the scientific community at large, the great majority of Government employed scientists and those working in close advisory capacities, ranked space exploitation below other scientific activities and urged broad civilian control of whatever space effort was undertaken. The most notable dissenters from the assignment of a low priority to space were some, but by no means all, scientists in military employ and the German rocket scientists, whose zeal for space exploration had remained constant under Hitler, Truman and Eisenhower alike. In general, however, these Government officials, both out of professional bias and need to protect the overall scientific mission of the Government, downgraded the space mission and attempted to dissuade other political actors within Government from precipitating a crash program in space.

In the first few months of his tenancy in the White House, Dr. Killian made no specific public references to the space program. His mission was, in the short run, to unscramble the missile program, and in the longer run to "help the President follow through on the program of scientific improvement of our defenses" and to encourage proper Government support for science and technology.[167] As the job evolved, his duties included overseeing various scientific panels of the PSAC, and presiding over a scientific board of review for planning decisions confronting the President.[168] Killian and the PSAC were to advise upon, coordinate and expedite "problems of national policy involving science and technology" which ranged over a spectrum from federal support of scientific education to organization of military Research and Development policies. Thus they were, in microcosm, charged with the

same mission as the entire scientific community: that of presenting to the Government the overall interests of science. It was increasingly apparent that these advisors were unwilling to jeopardize new-found opportunity for federal support of science by advocating a disproportionate expenditure on space. Thus their judgment of a proper magnitude for the American space effort was a relatively conservative one.

Of the government scientists outside the White House, those within the military services were, not unnaturally, the most concerned with the space program. These men presented an interesting combination of service and military loyalties and professional scientific commitments in viewing the significance of the space effort and its potential organizational structure. In the cases of eleven scientists employed by the military services who answered specific questions before the Preparedness Subcommittee about possible organization of space, all favored centralized Research and Development efforts perceptibly more than the military spokesmen of their respective Services.[169] Predictably, however, the Air Force scientists were less enthusiastic about centralized direction of the space effort than were scientists in the other Services. Furthermore, in the majority of these cases, the scientists favored civilian control of space along the lines of the proposal of the Rocket and Satellite Research Panel, of which ten of them were members.

Like other members of the DOD, these scientists stressed the need to integrate scientific and military exploitation of space. They repeatedly cited Project Vanguard as an example of inefficient use of resources, stemming from an arbitrary divorce of military and scientific missions. At the same time, however, six of them argued that scientific exploitation of space was an urgent and necessary mission of Government which would be best organized within the civilian branch

of the Government in an independent agency directly under the President. Some of the group believed that such an organization should be first established within the DOD and later moved out into an independent agency, an alternative considered in the Rocket and Satellite Research Panel proposal and also supported by Drs. Hagen and von Braun.[170] In either case it seems that the civilian scientists within the military establishment - more clearly than almost any other specialist group concerned with space - foresaw the necessity for an organizational solution which would structure space around interdependent but still distinct military and scientific missions.

Among the civilian agencies of Government, only the NACA professed interest in space. The National Science Foundation and the AEC viewed the enhanced status of science within Government as an opportunity to bolster their own missions rather than to acquire a new one in space. They neither argued for a major Government program in space nor publicly expressed views as to how space might be organized within the Executive Branch. The NACA, however, did see new agency programs arising from the space mission. At the point of diminishing returns in purely aeronautical research the NACA needed an expanded mission for organizational survival. Thus, through internal reorganization and by public advertisement, the Committee sought to promote its own capabilities for the Government's space effort.

On November 12 Gen. James H. Doolittle, the chairman of NACA, announced the creation of a new Special Committee on Space Technology within the NACA. With the appointment of this committee's chairman, Dr. H. Guyford Stever, Associate Dean of Engineering at MIT, on January 12, NACA's promotional campaign began in earnest. On January 16 the NACA adopted a resolution "on the subject of space flight," asserting that NACA had within its broad original authority "investigation of problems relating to flight in all its aspects outside of or

within the earth's atmosphere' thereby including missiles, satellites and outer space projectiles and vehicles as well as aircraft.[172] After outlining the work in space research since 1945, including the X-15 research airplane and stressing that "the urgency of an adequate national program of research and development leading to manned satellites, lunar and interplanetary flight is now apparent," the resolution proposed that the national space effort could be "most rapidly, effectively, and efficiently implemented by the cooperative effort of the DOD, the NACA, the National Academy of Sciences, and the NSF."[17] The proposal vested research, development and operational control of military missiles, satellites and space vehicles in the DOD; authorized the NACA to develop technical devices and conduct flights of additional vehicles and other operations for scientific research in space; and granted overall planning functions and assessment of research priorities to the NAS and the NSF.

On January 26 Dr. Hugh Dryden, the Director of NACA, expanded upon this proposal in a policy statement before the Institute for Aeronautical Sciences After citing the alternative proposals for space organization, both civilian and military, he concluded:

> "There is another solution to the problem of how best to administer the national space technology program, one which clearly recognizes the essential duality of our goals - the prompt and full exploitation of the potentials of flight into space for both scientific and military purposes. Actually this solution is old and well-tested. It is explicitly stated in the 1915 legislation that established the NACA with responsibility to 'supervise and direct and scientific study of the problems of flight, with a view to their practical solution' .... The Committee structure of the NACA embraces both the non-military and the military elements of aeronautics. The research of the NACA (is) designed to be useful to both the non-military and the military segments of aeronautics. The entire operation of the NACA is based upon the premise that coordinated teamwork effort by all parties concerned provides the surest guarantee of progress in aeronautics."173

If Dryden viewed NACA as eminently suited for the new space mission, he still believed that a major revamping of the agency was in order. He stressed

the need for new research facilities, a larger staff, and expanded contracting authority. And, based upon years of experience in doing work with military services in aeronautics, he also was impressed with the need for military exploitation of space. The NACA proposal thus approached the position of civilian scientists in the military establishment in its recognition of the ~~dualism involved~~ in any space effort and its conviction that the military program should be well coordinated with the civilian.

There can be little question that NACA was an obvious nucleus for an expanded space agency. It was also a rallying point for the scientific community, both within and outside the Government. It seemed the most feasible alternative to insure both the use of scientific criteria in determining the amount of resources allocated to space and the broad civilian control for any space effort which the scientists chose to emphasize.

4. The Congress

Like the Administration, the Congress had a general responsibility for space policy. Within Congress, as within the Executive, certain key partisan groups, committees and individuals chose to view space policy from particular perspectives, aligning themselves with similar-minded elements within the Executive or the public. These coalitions emerged during the period of space policy-hiatus with special strategies evolved from the shared interests of the coalition members.

Nonetheless, in its general role Congress displayed a greater institutional interest in the establishment of the NASA than the modern Congress conventionally reveals in policy initiation. As time passed, a Congressional as distinct from an Administration policy for space emerged, different in philosophy and tone which overrode the more limited aims of the internal cliques and confronted the

Executive directly on many points. All major Congressional leaders [illegible] share in a process of heightened deliberation and creative program-building not typically found in contemporary legislating.

(1) Pre-Session Space Politics

The initial efforts at semi-independent Congressional policy-making occurred shortly after Sputnik II. The moderate Democrats led by Johnson and Rayburn, although lacking a comprehensive legislative program of their own, saw themselves as the protectors of national security. Believing the Administration slow and cautious, they were prepared upon almost any aspect of the space issue to go one step beyond the Administration proposal.

While the Administration worked on its legislative proposal, Johnson gradually built a Congressional coalition both willing and able to engage in at least quasi-independent policy-making. To do so, Johnson fought a determined battle against the partisan Democrats' strategy of unrestrained criticism and sought instead to propel the Administration into greater action.[174]. The two Texans' major thrust was that the country lacked leadership and that the Democrats would provide it, whether or not the Administration went along.[175] It was this theme which dominated the conduct of the Preparedness Subcommittee hearings and motivated Johnson's frequent proposals for improving the nation's national security posture. By concentrating upon such a forward looking strategy, Johnson alternatively ignored and disparaged the arrant partisanship of both liberal Democrats and conservative Republicans. Although unable to divest the space issue from all partisan overtones, it was he more than anyone else in Government who raised the space issue to a level of truly national debate, a level at which the Eisenhower Administration remained implicitly, if not explicitly, on the defensive.

By contrast, the more moderate Republicans and those interested in military affairs took the tack that the entire country must support Eisenhower in a national program to meet the Soviet challenge in space. This strategy, however, was complementary to that of the moderate Democrats: it required both prodding the Administration into more decisive action and cooperation with the Johnson Rayburn branch of the Democratic party in Congress. Like Nixon, this group called for a bipartisan review of defense policy, expressing concern with the rate of scientific and technological progress and emphasizing the need for coordination in the satellite and missile programs. Sen. Styles Bridges, emerging as the major spokesman for this group, voiced the opinion that Congress would appropriate whatever was necessary for the defense effort and that missiles and satellites deserved the highest priority effort the Government could provide.[176]

Thus both their Congressional and the partisan roles impelled these Republicans to take their critical stance. As the strategy of the moderate Democrats emerged as the dominant strategy of the session, it was in the interest of moderate Republicans to go along in order to limit as much as possible the freedom with which Johnson could appear as the defender of national security.

This coalition chose the Preparedness Subcommittee Hearings as the specific instrument by which Congress initially joined the space policy-making process. The Subcommittee's "Inquiry into Missiles and Satellites" was itself a broad examination of the defense posture of the U.S., not directly focussed upon the space program. Yet in reviewing past and ongoing space projects, the Senate Committee came to certain conclusions which would later enjoy broad Congressional support and which had important impact on the

organization and magnitude of the future program. The issues on which the Committee concentrated its criticisms of the then current Administration became guidelines for the emerging Congressional philosophy.

From the outset, the Committee fulfilled its constitutional role as overseer of the Administration, with stress upon institutional rather than partisan criticism. "It is," Johnson explained, "not important what kind of a record we make for an election if circumstances are such that we do not have any more elections. That could easily happen if we spend our time eating each other up."[177] Throughout the proceedings The Chairman sought and eventually attained unanimous findings to comprise a truly bipartisan report in the face of what the Committee considered a genuine national peril.

United in this evaluation, the members determined to "find the facts and see what the Senate can do to help out."[178] Johnson's opening statement on November 25 set the tone of the deliberations:

> "Our country is disturbed over the tremendous military and scientific achievements of Russia. Our people have believed that in the field of scientific weapons and in technology and science that we were well ahead of Russia....It would appear we have slipped dangerously behind...in some very important fields. But the Committee is not rendering any final judgments in advance of the evidence on why we slipped or what should be done about it. Our goal is to find out what is to be done."[179]

Given its oversight function, pessimism characterized the Committee's basic assumptions. Questions and comments in open testimony indicate the Senators believed that the Soviet Union was close to an operational ICBM capability. They believed, too, that America was behind the Russians in the development of space weapon systems and that America would need to undertake a vigorous program to regain a balance of power in space.

In the course of a thorough inquiry, these beliefs seemed to find expression

substantiation. From November 25 until January 24 approximately seventy witnesses appeared before the Committee in both public and executive sessions; questionnaires were circulated to almost two hundred individual organizations; scientists, engineers, educators and industrialists; and the total printed testimony ran to more than seven thousand pages.[180] Inevitably, in this broad effort, the space program came under scrutiny.

One set of problems which the Subcommittee considered was the overall coordination of the missile and satellite program. Johnson, Stennis and Bridges were especially concerned with this issue; Stennis inquired repeatedly whether there should not be some single individual who could make binding decisions upon the DOD and the Budget Bureau in the satellite and missile field. The Committee found the chain of command in the missile program confusing and Killian's role ambiguous. When informed that Killian was primarily an advisor, they expressed disappointment that he did not have control over the entire satellite and missile effort.[181] Although it did not favor either military or civilian organization in its January Report, the Subcommittee did urge a centralized locus of responsibility for space. Sen. Kefauver was perhaps most articulate on the organizational issue, arguing that the DOD's dominance in space development would, in effect, exclude substantial scientific research -- an activity he considered exceedingly valuable. In the hearings, Kefauver favored a Secretary of Science to coordinate such non-military applications of space. Although this alternative never won wide support, it did identify the need for a coordinating mechanism to mesh military and non-military space projects -- a problem which neither the scientists nor important members of the Administration had yet directly faced.

These deliberations about space were always set, however, in the broader

context of national defense policy. In the hearings, the Senators concentrated chiefly on the DOD's effort. As the inquiry wore on, their judgment of the Department's competence in scientific Research and Development, in particular, was not laudatory. Accordingly, the Subcommittee concluded somewhat indirectly that a great deal of the space program belonged elsewhere.

In this context, the Subcommittee criticized the Department's organizational arrangements for the missile and satellite programs; its estimates of the existing military situation; and its failure to anticipate the space challenge. It dealt with particular harshness with Quarles and Holaday, responsible officials before the Sputnik crisis. Chief Counsel Edward Weisl and Sen. Johnson were brusque in their questioning of both men and emphatic in their belief that the officials lacked a real sense of urgency. After a particularly acid review of Quarles' speech to the U.S. Conference of Mayors, in which Quarles argued that the Soviet Union did not have an operational ICBM capability and that their satellites had not been of military significance, Johnson remarked:

> "If that is your idea of a speech that is calculated to arouse people,...to spur them to expedite the existing program, to chart new courses, to outline new goals, to regain a superiority that has been lost...then your evaluation of the effect of the speech is different from mine. ... There is a great feeling, I think, in the committee and in the country that there has been nobody in a real hurry about this whole situation and there has been a lot of public officials who have been making statements which are calculated to laugh the whole thing off."[182]

Never losing this suspicion of the DOD, the Subcommittee came to feel that the OSD was less concerned about space than the Congress, some scientists,

some service representatives, and the public.* Nor did the Subcommittee conclude that the Department had sufficient appreciation of the value of scientific research. It reviewed exhaustively the present satellite program; then expressed shock, consternation, and incredulity about the whole affair. In particular, it disapproved of the Department's refusal to recognize the propaganda value of satellites by failing to authorize Project Explorer after September, 1956.[183] To the Senators, the current satellite effort seemed "relatively small,...relatively unsuccessful, and certainly late."[184] To the Committee the Vanguard decision and its dismal aftermath underscored the danger of assigning low priority to scientific in contrast to military Research and Development, and in making decisions on the basis of service rivalries. To the members, the need for new arrangements for advanced Research and Development was clear.

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* Indeed, this conviction led to a game of "can you top this" between Weisl and Quarles:

Weisl: "I know that the members of the Committee, after hearing the evidence that we have heard, are tremendously aroused over the potential threat.

Quarles: "I doubt that any member of the Committee is any more aroused about the threat than I am, Mr. Counsel."

Weisl: "And we feel that the public must be aroused...so that they will make the sacrifice...necessary to meet that danger."

Quarles: "I have just stated that I was at least as aroused as any member of the Committee, Mr. Counsel..."

Weisl: "I can assure you that the Committee is-"

Quarles: "Pretty aroused."

Weisl: "Very aroused."

As a consequence of Committee skepticism of the civilian OSD leadership, its members gave special weight to the opinions of representatives of the scientific and military communities who favored a more urgent effort. These witnesses possessed the expertise necessary to meet the crisis and they seemed natural partners for the Congressmen. The Subcommittee displayed marked deference to the scientific witnesses. It praised the loyalty and contributions of Teller, Bush, von Braun, and Van Allen and reiterated the legislative intent to expand research facilities and resources.[185] The Committee also paid its respects to military men who might oppose the official OSD posture.

Half-way into the hearings the retirement of Gen. Gavin seemed to provide a dramatic substantiation of the Subcommittee's fears. Gavin was popular with the Committee, which openly admired his tenacity in pushing Project Explorer in the face of OSD opposition and his general espousal of scientific Research and Development as a crucial factor in military preparedness. After his initial testimony on December 13 Johnson commented "you talk like the kind of fellow that I have been looking for ever since we started these hearings, and that is a fellow who thinks that things can be done perhaps a little bit faster and perhaps a little bit better....(I am not convinced that) the higher echelons are what I call can-do fellows."[186] At the end of the day, after Gavin had recounted rather vividly the fate of Project Explorer, the need for drastic reorganization of the DOD, and his own fear of the consequences if America continued to ignore space, Johnson and the other members were clearly impressed.

Accordingly, Gavin's announced retirement in late December gravely disturbed Committee members, who suspected "Administration rubber-hose tactics" might have forced Gavin to resign. When Gavin reappeared before the Committee on January 6, he reiterated that he could not support the Army Research and Development

budget; and intimated that his chances for assuming the CONARC command, which he desired, had been denied because of his earlier outspoken testimony.

When he stated that he preferred to retire rather than mislead Congress, Johnson exploded.

> "General, I just think this is a horrible situation. I am surprised that it exists....I do not think there has been a time in the 26 years that I have been in Congress when we needed men of your capacity, your experience, and your foresight as much as we need them now. We are trying to get to the bottom of this thing....We are concerned; the people are concerned. We want leaders whom we can trust and who will speak frankly, and whose only language is the language of candor. We think you are one of them...I hope, General, that you will reconsider because I do not want an Army or a Navy that is made up of just a group of yes men. I think that that is just what we will get if you come up here and put it on the line as you see it and then resign."[187]

The facts of the Gavin case -- which to the outside observer, appeared more ambiguous than Gavin had outlined them for the Committee - are not at issue here. The significance of the episode was its impact on the Senators. Now they were even more persuaded that the Administration underestimated the crisis and more than ever determined to correct the situation.

When the unanimous report was issued, three important themes appeared to form the basis for future Congressional action. First, the Senators were clearly convinced space exploration was an important national objective. Second, they were prepared to consider radical organizational changes urging that the Administration "accelerate and expand Research and Development programs, providing funding on a long-term basis, and improve control and administration within the DOD or through the establishment of an independent agency."[188] Finally, by emphasizing the criticality of the situation and the Administration's apparent inability to meet it, the Preparedness Subcommittee declared Congress' willingness to embark on an independent course to assure a greater space effort.

(2.) The Emergence of Senator Johnson

As the Preparedness Subcommittee's hearings ended it was apparent that Lyndon Johnson's early strategies were bearing fruit. Partisan controversy had been minimized and semi-autonomous Congressional participation in the policy-making process secured. Now, the strategy required that Johnson maintain his bipartisan coalition and convince the Administration to work closely and informally with a Democratic-led Congress.

The partisan controversy over space did not die but it became an increasingly false issue as Johnson initiated his master plan of bipartisan prodding, and the Administration moved with him. That Johnson believed this course of action would lead to the best attainable defense posture is unquestionable. In addition, however, he had tremendous personal investment in such statesmanlike behavior. His recognition of the significance of space for him had, if anything, increased since October 4 and he was determined to pursue the course of action he had embarked upon the Preparedness Subcommittee hearings. Indeed, his private consultations and negotiations in Washington, his speeches and their timing comprised a virtuosic performance. In tours across the country he outlined a massive civil and military space program under a new independent space agency; called for increased missile production of such magnitude as to delight the Army and the Air Force and appall the Comptroller General of the DOD; and advocated a space effort under the UN to conquer the new frontier for purely peaceful purposes.[189]

The Majority Leader's master stroke, however, was his own "private State of the Union Message" which he delivered to the Democratic Party Caucus two days before the President's. It was no ordinary review of a Committee's findings by its Chairman nor an ordinary catalogue of problems delivered off the cuff

by the Majority Leader to his party. Rather, it was a careful, [illegible] document - widely distributed to the press before the presentation - [illegible] a long list of popular objectives befitting - as reporters were quick to [illegible] a presidential candidate. It was, in short, Johnson's move to the center of the political arena; a warning, in Reston's view, that the Governments of the Soviet Union and the United States would now have to prepare themselves to [illegible] with Texas.[190]

This document - an extraordinary one in American political annals - reveals much of the future character of the legislative process affecting space. That Johnson made such a speech at all indicates the degree of Congressional initiative he intended to extract from his colleagues. The contents further suggest the great significance which Johnson, and to a lesser extent Congress as a whole, attached to space. Finally, the speech was dramatic confirmation of the individual leadership of the Senator in this area.

Johnson's substantive argument was a simple one. In his mind the exploitation of space by selfish men; e.g., the Soviet Union, was the gravest threat facing the world. By contrast, its exploitation by those devoted to freedom: the U.S. or its allies, could both alter the face of the earth and liberate it from all potential enemies. Thus, the major task of the session was to devise an organizational structure and a substantive program which would assure American superiority in space: an incomparable opportunity to save the nation and the world.

Charged with such a task, Johnson recommended several lines of attack. First, he urged that the U.S. revise its previously low estimation of the significance of space. Second, he made the expansion of America's scientific capability a first aim of national policy -- by aid to education, support of

basic research, and increased military investment in advanced Research and Development. Third, he sought scientists to manage the space program since "from the evidence accumulated, we do know the evaluation of the importance of control of outer space made by the U.S. has not been based upon the judgment of men most qualified to make such an appraisal."[191] Fourth, he wanted the United States in a position of unquestioned domination of space. "There is something more important," he argued, "than any ultimate weapon; that is, the ultimate position...of total control over earth (which) lies somewhere out in space."[192] This effort would entail development of a missile capability, but would extend far beyond it. More significant, however, was that such military domination would provide for the first time in history, an escape from war, and make total security possible. Finally, Johnson called for a new advanced weapons and space agency outside the DOD, on the model of the AEC. Only such a structure, under a President who recognized the significance of outer space for America, could coordinate and maintain a top-priority space program.

The political repercussions of this "message" were immediate and far-reaching. It was clear that Johnson, for his own and his country's welfare, would press for a major space effort. How far he would pursue this goal within his self-imposed confines of positive cooperation with the Administration remained an open question. Two facts were certain: he would await the initial suggestions of the Administration in order to build upon them according to his evaluation of their merit. And he would be a potent ally for any other official or group who wished a greatly expanded program in scientific and military exploitation of outer space.

There was nothing parochial in Johnson's position. Unlike military spokesmen

or scientists, he was vitally concerned with both aspects of space exploration. He delved deeply into the substance of the program as he sought to shape its future form. The result of his effort was to establish his own interests and those of the Congress at a level of importance rarely seen in the process of policy making in a modern state.

Johnson was not the only Congressional figure with a role to play in space. Somewhat as a counterweight to Johnson and representative of a more traditional behavior pattern which sought to dispose expeditiously of Presidential business, House Majority Leader John McCormack emerged as a secondary power in the legislative process. His concern with space stemmed from a long-time personal interest in scientific progress, experience with Government efforts in scientific development since World War II, and interest in science-based industry such as that surrounding his home district in Boston. These interests gave McCormack's posture a more conventionally bipartisan flavor than Johnson's. He acted more to expedite policy than to initiate policy, and was in general willing to accept Administration leads. These different political stands would greatly affect the final product of the National Aeronautics and Space Act.

Finally, although no other members of Congress were so crucially concerned with space as Johnson and McCormack, a variety of proposals for space policy from a variety of sources were introduced during the initial months of the session. The most significant of these supported Federal aid for education, new governmental organization of the scientific effort, and reorganization of the DOD. Others specifically dealt with space. Prior to the submission of the Administration's space bill, the bills reflected particular authors' interests, whims and loyalties. Sen. Anderson, Rep. Holifield and Rep. Durham, for example, all members of the Joint Committee on Atomic Energy, introduced similar bills

amending the Atomic Energy Act of 1954 to develop outer space through the peaceful application of atomic energy.[193] Other Democratic Congressmen out of partisan or career concerns as well as generalized interest in national security, suggested that independent commissions be established to organize the space effort.[194] Three bills were introduced by Republicans building an outer space agency upon the NACA by amending the Act of 1915 and expanding the NACA's mission.[195] Finally, Rep. Keating introduced a Concurrent Resolution expressing the sense of Congress that the U.S. take the lead in efforts to gain an international agreement that outer space be devoted to peaceful purposes.[196]

As opposed to this scattering of bills, Johnson waited until the Administration proposal was in before he chose to act. Giving no backing to any, he preferred to place the Administration's legislation under severe Congressional scrutiny. At the same time, Johnson had extracted such influence from the Administration and from the rest of Congress that his views of the important issues in any impending space effort would set the agenda for this Congressional policy-making.

(3.)Organizing Congress for Space

One further sign of the exceptional pattern of Congressional activity was that body's special internal attempts to handle the new issue. Ordinarily, space legislation would be referred to existing committees according to the content of the particular bill. Now proposals appeared to grant jurisdiction in space to the Joint Committee on Atomic Energy; to create a joint Committee on Outer Space; and to establish separate House and Senate Standing Committees on space. An initial move was made by the Joint Committee on Atomic Energy when Carl Durham, its Chairman, announced the establishment of a Special Subcommittee on Outer Space Propulsion, with Sen. Anderson as Chairman.[197]

After a certain amount of negotiating over conflicting jurisdictions, Sen Johnson, with Sen. Knowland's support, introduced a resolution prepared by the Preparedness Subcommittee creating a Special Committee on Space and Astronautics ~~to frame~~ legislation for a national space program.[198]

The resolution passed the Senate on February 6 and the Committee was "authorized and directed to conduct a thorough and complete study and investigation with respect to all aspects and problems relating to the exploration of outer space and the control, development and use of astronautical resources, personnel, equipment and facilities."[199] It consisted of seven Democrats and six Republicans, a blue-ribbon group which included eleven ranking members of the six standing Committees whose fields of jurisdiction space might affect. The Committee was considered so prestigious that the Senate leadership invoked the Seniority rule to select its members: Bridges the ranking member of the Appropriations Committee; Russell and Saltonstall, the Chairman and ranking member of the Armed Services Committee; Anderson and Hickenlooper, the vice chairman and ranking Senator of the Joint Committee on Atomic Energy; Green and Wiley, Chairman and ranking member of the Foreign Relations Committee; McClellen and Mundt, Chairman and ranking member of the Committee on Government Organizations; Magnuson and Briker, Chairman and ranking member of the Interstate and Foreign Commerce Committee, Symington, a member of the Armed Services and Government Operations Committees who, although outranked on both, was selected on the basis of his wide experience in Government; and Johnson, who had introduced the resolution and thereby traditionally qualified for section. On February 20 Johnson was elected chairman.

This committee was especially qualified to execute Johnson's space policy. As a function of their status its members were relatively autonomous political powers. Many had gained experience in the Preparedness Subcommittee Hearings.

[illegible] Committee [illegible] of [illegible]

Congressional quandary which had characterized its attitude throughout the [illegible] of the Sputnik.

Not to be outdone by the upper chamber, the House leadership [illegible] a parallel group. At the suggestion of Rep. Vinson, Chairman of the [illegible] Services Committee, Overton Brooks introduced a resolution to create a [illegible] committee on space on February 11. The leadership of both parties supported this resolution at first, but later on the measure was withdrawn in favor of one introduced on March 5 by McCormack.[200] This new solution permitted McCormack rather than Brooks to assume the chairmanship, an unusual provision for a House Majority Leader does not normally chair a committee. The House, however, sought an eminent spokesman on a par with Johnson to give added dignity to the new Committee. Like the Senate, the resolution established a 13-member Select Committee to be chosen by the party leaders. In contrast to the Senate measure, however, which had established membership "on the principle of representation from specified committees with related interests," no such [illegible] provision was made in the House Resolution."[201] Joseph Martin, the Minority Leader, was appointed. Some members were chosen because of prior committee assignments: Brooks and Arends from the Armed Services Committee: Natcher and Ford from Appropriations; Hays and Fulton from Foreign Affairs, and O'Brien from Interstate and Foreign Commerce. Keating, Metcalf, Sisk, and McDonough made up the other members.[202]

Besides these organizational moves, the Congress passed on February 1[illegible] PL 85-325, enabling the DOD to pursue basic and applied Research and Development for military requirements and authorizing the DOD to undertake, for one year, any advanced space projects designated by the President.[203] In effect, this law established the ARPA to pursue the ongoing non-military space program unt[illegible]

Congress made more permanent organizational arrangements. On the previous day the Supplemental Defense Appropriations Act of 1958 had appropriated funds for such activities.[204]

Thus, the Congress indicated a broad concern with the organization of the space program. First, in setting up special committees to study the space effort, the Houses of Congress were delineating a new area of Congressional activity -- a step not taken lightly in the National Legislature where new missions are more typically handled in old structures. Second, the specific authorizations of acceleration in the present space effort were tentative ones: signalling the Congressional expectation that a new approach to space would soon be forthcoming. Third, the Congress had, in effect, indicated that at least a portion of the space effort would be in civilian hands. There were no serious proposals to organize the entire space program under the DOD or to place Congressional review of space in the Armed Services Committees. Indeed, by permitting ARPA responsibility for civilian space programs for only one year, the Congress indicated its unwillingness to give the military an unlimited mandate in space.

Most important of all, these first steps made clear that Congress gave high priority to the future space program and its organization. Neither defensive nor moderate in its attitude toward space, disposed to push both civilian and military programs, Congress wanted a major space effort. It exerted its own authority in expressing these view, making it clear that the final space program would be a joint Executive-Legislative effort.

Like other participants in the formulation of space policy, Congress remained dependent upon the President to show his hand. With the scientists and the military spokesmen, the legislative branch required a focal point for

its positions. Now having established its preferences and objectives, the leadership in Congress awaited the Administration bill before making its final round of strategic choices.

IV: PRESIDENTIAL CHOICE: THE DRAFTING OF THE BILL

The military establishment's intense and growing concern with space; the new political visibility of the scientists; and the Congressional pressures for a broad-gauged space effort, taken together, guaranteed space a high priority on the agenda of national affairs. It was clear that "doing something" on a major scale about space was necessary. What remained to be established was the character and magnitude of the effort. This was the province of the Administration's choice.

The Administration chose a visible, substantial response: the establishment of a high level agency with a clear mandate to pursue broad programs of exploration and development in space. The bill, submitted by the President, created an independent civilian space agency under a single administrator, charged with the direction of basic research and non-military projects in outer space. It was faithful in its provisions to Eisenhower's earliest reactions to the challenge in space, primarily his insistence upon civilian control for non-military space programs.[205] It reflected, too, the aims and preferences of three special groups of influentials who came to dominate the drafting process.

That process, which began in the Executive Office just after the launching of Sputnik II, was a relatively secretive one. It initially involved officials from the White House, particularly from PSAC and Killian's office. Later it included the Bureau of the budget and the NACA, upon which the new agency was built.

The Killian appointment and the reconstitution of PSAC in the White House Offices during November precipitated discussion about the form of the future space program. This initial evaluation lasted throughout November and into December. "As soon as the outlines of an expanded and accelerated space program emerged from the deliberations" the White House agreed that civilian and military aspects of space exploitation should be given organizational recognition in two separate agencies.[206]

The original suggestion to place the civilian and scientific space missions within an enlarged NACA and to permit continued DOD participation in military space programs appeared to come from the Space Sciences Panel of the PSAC, the advisory group given primary responsibility for considering the new mission.* By January this proposal was the accepted position of the PSAC.[206] Given this decision, in late December Killian approached the Director of the Bureau of the Budget asking that the Bureau undertake organizational and administrative planning for the space program.**

Concurrent with the discussions within the PSAC, the NACA initiated its public campaign for the space mission.[208] NACA itself did not participate in the PSAC's original consultations, but its Chairman, Dr. James H. Doolittle, was a member of the PSAC during this period. NACA also made recommendations to the White House[209] at this time and while NACA officials were not themselves involved in the final decision, certainly the Administration was made aware of their preferences.

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* A source within PSAC cites Dr. James Fisk, a member of the Panel, as the originator of the proposal.

** The Bureau of the Budget is statutorily charged by the Budget and Accounting Act of 1921 with responsibility for evolving and overseeing the organization of Governmental activities. Thus, it was standard procedure for Killian to request assistance from the Bureau's Office of Management and Organization in establishing this new administrative structure.

Thus, by the end of January, the group of scientific advisors whom Eisenhower had charged with designing a space program and the agency's leadership were agreed that NACA would be the base on which NASA would be built. The Bureau of the Budget, perhaps guided by Killian's input of the PSAC's deliberations, reached the same conclusion. Rapidly a consensus emerged from separate appraisals of a rather complicated administrative problem, suggesting a high community of interests.

The interests were overlapping - but not identical. The PSAC, vocally representing the interests of the scientific community, sought a primarily civilian structure in which basic research and important peaceful space missions could be pursued free from military control. The NACA provided such a structure. Furthermore, its ongoing nucleus of research facilities and staff could be expanded at a rate which the scientific advisors considered consistent with the overall scientific interests of the Government.

PSAC's organizational preferences stemmed from that body's conception of the substantive space program. These guidelines - as later outlined in the Purcell Committee's report "An Introduction to Outer Space" - identified four major factors which made the advancement of space technology imperative: "the compelling urge of man to explore and to discover"; defense objectives; national prestige; and new opportunities for scientific observation and experiment.[210] Of these four, the Committee was primarily concerned with scientific inquiry, outlining a variety of research purposes for scientific satellites. It argued that in the past pure research had a "remarkable way of paying off" and that, while it could not predict the future utility of space ventures, the "scientific questions come first."[211]

Furthermore, the Committee was skeptical about the potential military uses of outer space.

> "Much has been written about space as a future theater of war, raising such suggestions as satellite bombers, military bases on the moon and so on...for the most part, even the more sober proposals do not hold up well on close examination, or appear to be achievable at an early date..... In short, the earth would appear to be, after all, the best weapons carrier."[212]

With such emphasis on civilian space activities as a part of a total scientific program, building NASA around NACA seemed to PSAC the "natural" organizational solution.

On NACA's part, interests of organizational survival coincided with a substantive outlook similar to that of the PSAC.[213] NACA acknowledged the importance of military objectives in space more readily than the PSAC, but NACA spokesmen concurred that civilian and scientific objectives might well be subordinated in a military agency. Thus NACA favored separating civilian from military exploitation of space, viewing this two-space-agencies solution as parallel to the dual NACA-DOD structure which had supported aeronautical technology for forty years.

Finally, the Bureau of the Budget viewed NACA as an administratively neat solution by its own special criteria. The Bureau as a rule does not enjoy creating new Executive agencies, on the theory that current administrative resources should be utilized for new missions if at all possible. In Director Maurice Stans' words:

> "Retrospectively, a major objective of the legislation was to build upon existing institutions and to avoid increasing the total number of Federal Agencies involved in aeronautical and space matters .... The bill accomplishes this aim by utilizing the NACA as the nucleus of the new agency."[214]

Thus, the upgrading of NACA offered an efficient and economic administrative arrangement.

Initially, the Bureau expressed some difficulty in designing the structure for a new space program by conventional organization and management principles. Associate Director William Finan believed that the management planners had "read too much, or perhaps too little, science fiction in the past... and that it required the applications of a special mental discipline to be sure that they were planning for the organization and administration of the program being officially conceived and not for the even more fantastic projects being speculated about in public."[215] When Killian specifically requested aid in writing the bill, however, the Bureau took the opportunity to incorporate its favorite tenets of streamlined administrative management into this seemingly occult agency.

By February 4, thus, when Eisenhower publicly announced the establishment of the Purcell Committee and charged it with delineating America's future space program, the Executive Office had already agreed that a new civilian space agency would be built upon ~~the NACA~~ structure.[216] Thereafter, the drafting process proceeded with an increasing sense of urgency. Public and governmental uncertainties about the management of the space mission were rising and the President was eager to send a bill up before the Easter recess, eliminating any further opportunity for independent Congressional space policy-making. Work on the legislation was thus done under "crash" conditions by a selected and limited group of policy-makers in Killian's office, the NACA, and the Bureau of the Budget.

The actual drafting committee met first in late January or early February. The men worked under the overall aegis of the Bureau's Division of Organization and Management and consisted of William Finan, the Assistant Director in charge of that Division; Alan Dean, one of its senior staff members; Paul Dembling, the Legal Counsel to NACA; S. Paul Johnston, Director of the Institute for

Aeronautical Studies and temporarily a member of Killian's staff (who also served as the Executive Director of the Purcell Committee) and finally, Kenneth McClure, Assistant Counsel to the Department of Commerce on loan to the Bureau.

The Bureau of the Budget took overall charge of evolving the draft legislation. Killian had frequent contact with Budget Director Brundage and Finan as well as direct access to the drafting process through Johnson. He took an active interest in the proceedings and one can best define this 'Administration Bill" as Killian's bill in his capacity as Eisenhower's personal advisor. Killian also was the first agent of the Administration to mobilize Congressional support for the legislation through several private discussions with House Majority Leader McCormack with whom Killian remembered establishing a "heartening relationship."[217] The PSAC also participated in that the Space Sciences Panel of the PSAC saw various drafts of the bill as it evolved.

The NACA's views were also well represented to the drafting committee. Director Dryden had three or four discussions with Finan, and additional ones with Killian and Brundage. Dembling also provided a channel of communication between the NACA and the drafting committee.[218]

Out of this convergence of interests, the Administration's draft of the National Aeronautics and Space Act of 1958 reflected consensus in general policy objectives and a special blending of particular philosophies and preferences in the detailed organizational provisions. The bill provided for "the solution of problems of flight within and outside the earth's atmosphere and ...for the development, testing and operation for research purposes, of aircraft, missiles, satellites and other space vehicles."[219] Such activities were to be directed by a civilian agency "exercising control over aeronautical and

space research statement for the U.S. cannot identify as some activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the agency may act in cooperation with, or on behalf of the DOD."[220]

Below this level of generality, the acceptance of NACA as the basic building block reveals the impact of Budget Bureau management philosophy. The long-standing preference of the scientific community for a multi-member Executive unit composed of private citizens with professional scientific backgrounds was abandoned. Breaking sharply from the pattern established in NACA, the AEC and the NSF, the single executive structure placed reliance on generalized administrative competence and restricted the use of a plural member specialized body to an advisory role in the National Aeronautics and Space Board. The Board was to consist of not more than 17 members, of whom not more than 8 would be from appropriate departments or agencies of the Government, including at least 1 from the DOD. The others would be eminent private citizens. The Board's role was to advise the President and the Director - later the Administrator - of the agency on Government policies and programs in space and would be consulted by the Director prior to initiation or substantial modification of policies or programs.

Major operating authority was vested in the Director. It was in his hands that the shaping of the research program, the construction and management of facilities, and the establishment of the contract provisions for private enterprise were placed. Such an agency was deemed most amenable to clear executive coordination and control, thereby avoiding the pitfalls of vested interests, potential military domination, or powerful Congressional alliances which a more autonomous administrative structure, such as a Commission, might induce.

Two other principles long favored by public management experts in the Bureau were also incorporated. The drafters relied on administrative flexibility and inter-agency cooperation in place of detailed prescriptions to set the boundaries of agency operations. In the first instance, the enabling language was general since the character of the space mission was so relatively unknown. Relatively unfettered executive discretion would permit the President and the Director to continue to shape the substance of the space effort. Second, inter-agency coordination was to be secured through regular channels of the Executive Branch: the legislation avoided statutory liaison committees or specific designations of membership on the advisory board.

In short, the liaison process was to continue the informal relations with the DOD, NSF, AEC, Weather Bureau and Department of State which NACA had previously established with considerable success. Where working-level liaison and joint participation in space projects broke down, the President would resolve disputes and ultimately determine overall national space policy. Thus the NASA emerged not as an overall national policy-making agency for outer space activities, but rather as a regular arm of the Executive Branch specifically devoted to pursuing basic research in space sciences, operating space experiments in conjunction with other government agencies, and cooperating with the military establishment in Research and Development of military interest.[221]

These concepts were supported both by NACA and PSAC for they confirmed the old agency's working experience and appealed to the scientists as logical extensions of their basic aims. But the Budget Bureau provided the rationale of the arrangements. To Finan the working group had a priceless opportunity to write a "kitchen stove kind of bill" based on optimal administrative theory, complete with such heretofore exotic touches as exemption from Civil Service

classification requirements for scientific personnel and an extremely liberal patent policy.[222] This sort of design for the NASA could both assure a vigorous American space program and provide a model agency which conformed to the purest tenets of administrative theory.

As for the specific relations between military and civilian space activities, the draft was almost cryptic - understandably so, given its basic tenets. There was enabling language included for DOD activities but, on the assumption that these projects could be clearly delineated, no specific liaison structure was proposed. In case of controversy the President would be the final authority.[223] Similarly, no specific references to other agencies appeared. The drafters considered it unnecessary, for example, to state that the NASA should cooperate with the State Department to assure peaceful utilization of space or with the AEC to foster development of nuclear propulsion for outer space vehicles. A "straight line" operation required, especially in the Budget Bureau's view, no special statutory language to confirm the natural workings of the Executive Establishment and the plenary powers of the President.

Reasoned and reasonable as the Administration's bill may have seemed, however, it remained the product of a limited group of congenial interests. Neither the State Department nor the Weather Bureau was consulted,[224] though each had a role to play in the proposed civilian space program. More important, the military establishment was, for the most part, bypassed. A few military individuals did participate:

Gen. Schreiver had a discussion with PSAC scientists during January or February in which scientific exploitation of space was the sole topic. Dr. Herbert York in his capacity as a member of the PSAC Space Sciences Panel "sat in on many arguments" about the organization of the new agency before his appointment in February to the DOD as chief scientist of ARPA.[225] But no ARPA

Army, or Navy personnel were included. Instead, they heard "rumors" that a civilian agency was to be built upon the NACA.[226]

To Executive Office personnel, these omissions appeared natural ones for they assumed a relatively limited and clearly defined military space mission. Moreover, the military establishment may have inadvertently encouraged the de-emphasis on liaison arrangements. As Roy Johnson noted later in May:

> "Within the DOD, up until just recently, there was a feeling that (the new agency) was basically an extension of the relationship with NACA as it existed in the past and there was not much concern about the language (of the bill) or the change in relationship as I interpreted it."[227]

Nonetheless, what the narrowly-based drafting group gained in initial unanimity, it paid for in later criticism and conflict. In mid-March the completed bill cleared the President's Advisory Committee on Government Organization. Dryden reviewed it for a week and suggested some changes, and then the Bureau of the Budget began the normal process of inter-agency clearance. Compared to the usual procedure, the period of circulation was short, lasting from the afternoon of Thursday, March 27, until noon on Monday, March 31, although the Bureau accepted additional comments through April 1. The Bureau took the position that the Departments with substantial interest were already familiar with the major provisions of the bill and could and thus were expected to keep their comments to a minimum.[228]

The Bureau's expectations were not fulfilled. DOD, the State Department, the Weather Bureau and a few other agencies protested the short time period in which they had to comment. The General Counsel's Office, which was responsible for coordinating the DOD position towards the bill, allowed the various subdivisions of the Department only twenty-four hours in which to comment. This restriction applied to the services and the ARPA and led to Sen. Johnson's later

observation that the draft had "whizzed through the Pentagon on a motor cycle."[229] York and Roy Johnson of ARPA and Assistant Secretary MacIntyre of the Air Force all testified later that they had discussed certain reservations about the bill's demarcation of military-civilian space jurisdiction with the General Counsel and Quarles during the day allotted to them but that their ideas did not get into the draft. Each was unhappy with the deadline and argued that a longer period could have produced a better bill. Brucker and Medaris, while not submitting formal comments to the OSD also expressed reservations to Quarles which did not see print.

Nevertheless, open inter-agency conflict did not result at this sage. The OSD concluded that essentially the bill was an extension of the DOD-NACA relationship and interpreted its enabling provisions to mean that the DOD was still free to pursue the military space mission as it chose.[230] Thus, dissent of the services and the ARPA was foreclosed for the moment, to reappear in visible form when the bill reached Congress. Yet, significantly, the inter-agency clearance process did not produce full Executive support behind the Administration bill. The civilians continued to minimize the military program. The OSD remained content in its belief that NASA like NACA before it would function as a help-mate in projects which OSD was willing to relegate to it. And the legislation remained "a draft in which Dr. Killian's office, the Bureau of the Budget, and the NACA participated...the compromise (on which) was the bill" which the Administration sent up to Congress.[231]

Apparently, the President expected to surmount the latent conflicts arising from different expectations of the space program through executive action. He directed the DOD to coordinate space projects with the NACA, the NSF and the National Academy of Science.[232] He also asked the Defense Establishment to prepare an operating plan to assure support for the new agency either through

cooperative arrangement or by transfer of facilities to the NASA. Finally, he instructed the NACA to prepare detailed plans for the assumption of its contemplated responsibilities both for the internal management structure of the new agency and its projected space programs, including arrangements with the NSF and the NAS for the participation of the scientific community in setting program goals. Finally, Eisenhower asked the NACA to present to Congress a full explanation of the proposed legislation and its objectives.[233]

By April 2, 1958 then, the President had made public his choice among the alternative organizational structures for the space mission. His solution aligned him with the views of the scientific community, specifically those of his personal scientific advisors and the non-military Government scientists. Coincidental with this alignment was support for other objectives: the Administration's desire to downgrade the military exploitation of outer space for both strategic and budgetary reasons; its wish to capitalize on the political appeal of space without an open-ended assignment of energy and resources; and finally, its need to ally itself with the newly prestigious scientists against any Congressional or military opposition.

This confluence of objectives made it difficult, of course, to estimate the force of the scientists' influence. Clearly, the scientists did make a substantive contribution to the initial design of America's space effort. Yet, like most men in politics, they were both manipulators and manipulated, members of the strategic alliance forged by the President to serve a number of potentially gainful political ends.

[illegible]: SECOND ROUND OF POLICY-MAKING: THE LEGISLATIVE PROCESS

On April 14, Senators Johnson and Bridges introduced the Administration's bill as S. 3609 and Representative McCormack filed the same measure as H.R. [illegible]. The filing had two predictable effects. First, it provided Congress with its own opportunity to take formal and final positions on the organizational issue. Second, it offered other political activists their last chance to reassert their own policy interests.

Hence, at this stage, the interested elements of Congress could fashion somewhat oblique alliances with unsatisfied elements within the Executive without a frontal assault by Congress on the Administration policy or public displays of Executive insubordination. In this instance, Johnson's drive for an independent policy-making role, and the military services' concern that their own role in space was minimized combined to revise substantially the National Aeronautics and Space Act of 1958.

1. Entering the Legislative Arena

Hearings on the bill opened in the House on April 15 and in the Senate on May 6. During the subsequent weeks representatives of the Administration, the scientific community, the DOD, and the services testified before two Congressional bodies. Each of these groups developed distinct attitudes towards three key issues: the respective roles of the DOD and the NASA in space; the sources of decisions allocating activities to each; and finally, the role and proper composition of the National Aeronautics and Space Board. In one way or another, all three issues revolved around the plausibility of distinguishing between military and civilian space efforts and the need to establish an organization which could at once insure a substantial "basic research" space effort without obvious program payoffs and Research and Development immediately relevant

to the demands of national security. The military establishment appeared in the main not to recognize the need for sufficiency; the scientists often failed to acknowledge the need for relevancy. To many of the participants in Congressional deliberations, the Administration bill satisfied the first criterion but failed to give due weight to the second. The prospects for major organizational modifications in the legislative arena were thus evident at the outset.

Dryden and Doolittle, supported by Stans and Finan, presented the Administration case, with rationales consistent with their established positions. They reiterated their conviction that in regard to the respective roles for the DOD and the NASA the military was empowered to engage in Research and Development peculiar to weapons systems or military operations. The civilian agency was to be responsible for all others.[234] Decisions about which projects were of military interest would be arrived at by joint consultation between the NASA and the DOD, with unresolved disputes left to the President.[235]

Representatives of the civilian scientific community and non-military Government scientists -- [still persuaded of the non-controversial character of many project assignments] -- also defended the Administration's position on this issue. As Dr. Van Allen argued, the NASA should have "primary and dominant cognizance of space matters among all Government agencies and...only in case it is clearly demonstrated that an endeavor has a direct importance to our military preparedness...a direct and significant importance, should the primary cognizance reside in the DOD."[236]

As for the basic decision-making for programming space activities, Administration spokesmen saw the process working this way. They assumed that the basic research program which must precede any exploitation of space would naturally be located in the NASA.[237] Then, they envisioned the DOD presenting

the requirements to the NASA which, in turn, would provide the research capabilities for future military developments.[238] Thus NASA would naturally coordinate, if not control, all basic research in the space sciences.[239]

So far as the Board was concerned, Budget Bureau officials and non-Governmental scientists alike were persuaded that the scientific community ought to be amply represented on the Board and that its role was best conceived as advisory rather than liaison. Though government scientists such as Dr. Waterman and Dr. Wexler, director of the Office of Meteorological Research in the Weather Bureau, emphasized the need for agency representation, they accepted the basic proposition that participation by scientists was the crucial requirement.* In the minds of both Administration spokesmen and the scientists the controlling authority for space-policy making below the President ought to be in the hands of the Special Assistant for Science and Technology.

These assumptions were unacceptable both to the scientists in military employ and, most particularly, to their service superiors. Most of these scientists continued to support civilian control of space but placed great emphasis upon the military utility of the new mission.[240] Although they reasoned concomitantly that scientific investigation would have to precede military applications, national security considerations were to them the underlying impetus for space explorations.[241] Thus, they favored wide discretionary authority for the military to pursue whatever research programs they chose and to establish conclusively the military requirements for the program.

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* An editorial in the June 13, 1958 issue of Science rather bluntly made this point by declaring that "the degree of favoritism incorporated into the final version of the Space bill will be one measure of the importance that Congress attaches to the scientific investigation of outer space." p. 371.

Acknowledging the need for cooperation in civilian and military aspects, most military scientists urged increased representation of the DOD on the National Aeronautics and Space Board.[242] They foresaw a broad national space program formulated jointly by the two agencies.[243]

DOD spokesmen were even more outspoken in their dissent and broader in the scope of their criticism, for they took exception to substantive as well as organizational matters. As they reflected on the legislation, they became increasingly uncertain that the NASA would be just another NACA. In particular, they took violent exception to section 2 of the bill which declared that America's activities in aeronautics and space "should be directed by a civilian agency exercising control of aeronautical and space research sponsored by the U.S. except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the agency may act in cooperation with or on behalf of the DOD."[244] This provision, they believed, deprived them of control over their own space activities.

On April 2, another Presidential action seemed to confirm these fears. In a letter to NACA and the DOD, Eisenhower ordered a division of the space mission in which "the DOD will continue to be responsible for space activities peculiar to or primarily associated with military weapons systems or military operations... Responsibility for other programs is to be assumed by the new agency...In this connection I commend to the attention of the Congress, the comments of my Science Advisory Committee in its statement of March 26, 1958, on the military applications of space technology."[245] The "peculiar to" clause, the ambiguous permission granted the NASA to "cooperate" with the DOD, and finally the reference to the Purcell Committee Report with its highly restrictive view of the DOD's space mission, aroused the DOD to legislative counter-attack.

However, there is no doubt that Dr. Johnson, as Director of ARPA and an early critic of the bill, convinced Deputy Secretary Quarles that the language of Section 2 threatened military operations. Subsequently, from mid-April until mid-May the OSD was outspoken in its defense of the Department's space mission and, led by Johnson, Department officials persuaded the Administration to amend Section 2. This campaign was to become a turning point in the Congressional phase of policy-making.

At the outset of the Hearings, the OSD made clear its determination to achieve ample authority in shaping its own space mission. Quarles argued that:

> "The Defense Department...must have the latitude to pursue those things that are clearly associated with defense objectives as stated here. It must also have the latitude to pursue things that are potentially important to defense and to pursue those within the Defense Department or in cooperation with the...civilian agency.[246] I would construe this language as not limiting the clear responsibility of the DOD for programs that are important to the defense mission, including the support of research that is closely related to the defense mission."[247]

Herbert York, chief scientist for the ARPA followed Quarles in reiterating the need for the military to pursue any research with a "reasonable chance of fulfilling military ends" without oversight by the civilian agency.[248] In effect, the Department supported the concept of a civilian agency responsible for aeronautical and space research only "beyond the proper military interests."[250]

So far as the locus of decision-making power was concerned in sharp contrast to the drafters' view of NASA as the creative agent, the OSD wished the choice as to whether a given project was military or not to rest with the DOD under the overall direction of the President. The NASA and the DOD, as two independent agencies responsible for separate missions, might coordinate or undertake joint projects in space, but only if both agreed to do so. The DOD

[illegible] the Board [illegible] an military space projects to [illegible] for the [illegible] to do [illegible] if [illegible] qualified to [illegible] [illegible] requested by the DOD. If disputes should arise over the military [illegible] of a project, the military could carry its claim up to the President. In their view, no other agency could interfere in this direct line of command responsible for national security affairs.[251] Quarles, at any rate, believed that the two space organizations "will have such similar views and objectives on this matter that it will not be a frequent problem for the Chief Executive."[252]

Finally, DOD spokesmen saw the Board as an informal coordinator of space programs, rather than an agent of mandatory liaison. In particular, they argued that the Board should have no power to allocate projects between the military and civilian agencies: this was a task of direct inter-agency negotiation.[253] In order to ensure that the Board sympathetically exercise even this limited role, the DOD recommended increased military membership beyond the single representative provided for in the Administration bill. In no event, however, was the Board to have binding jurisdiction over defense projects.

Within the context of the overall DOD position each service adopted a specific position traceable to its initial attitude toward the ARPA. The Navy, having opposed a centralized space agency within the military, now faced an even less palatable alternative. A civilian agency would remove scientific space projects even further from Navy labs--and further reduce the service's roles and missions.

Thus, Navy spokesmen were highly critical in testimony. Garrison Norton, Assistant Secretary of the Navy for Air, stated his personal preference for an Executive Board representing both military and civilian interests which would control the new agency.[254] In stating the Navy's position he qualified and [illegible] other assertions, but argued that the Navy had grave misgiving "about certain portions

[illegible] directed [illegible] [illegible] [illegible] be changed so that the NASA would be required to cooperate with the DOD if requested to do so, thus assuring adequate military control over its own [illegible] research, development, and vehicles.

Other Navy representatives, such as Reborn and Hayward, also argued that the military's role in space should be anything which the DOD decreed necessary for the national defense. Each also urged increased DOD representation on the Board, both to protect military needs and to ensure that DOD and service - hopefully the Navy's - capabilities would be considered and utilized. As their testimony continued, it was evident that Navy spokesmen wanted a reconstituted NACA, faithful to the tradition of passive support of and cooperation with the military services.

The Air Force also viewed the new agency as properly an extension of NACA. Unlike the Navy, however, it supported its establishment with real enthusiasm. Anxious to pursue the space mission as part of its own ballistic missile mission, the Air Force had rigorously opposed the establishment of the ARPA, viewing it as a dilution of its own natural monopoly of the space effort within the DOD. Now NASA appeared as a convenient receptacle for space research of the kind in which the Navy and Army had been engaged, but not competitive to present Air Force projects. Hence Air Force personnel strongly backed the creation of a civil agency secure that its own military space role would be unchanged, or indeed increased.

Testifying on the Administration bill, witnesses for the Air Force thus adopted the theme that the military space mission should be recognized as primary. Civilian and scientific exploration would be useful, but the Air Force "did not attach the same degree of urgency to space exploration per se

[illegible] the development of "some space weapon which could be vital to our national security during the next ten years."[256] NASA should properly have increased authority to pursue space research, but it should not impinge upon the freedom of the military to carry out its own requirements.[257] With such an interpretation, the Air Force did not view an upgraded NACA as a threat and was quite content to leave to NASA rather than to another service, residual non-military space activities.

Consistent with the OSD position then, the Air Force urged that the military establishment, preferably itself or a highly dependent ARPA, determine which fields were of military concern. Specifically, Schreiver and MacIntyre argued that the Air Force be left free to refuse transfer of any space mission or vehicle to the NASA if it deemed such a transfer detrimental to national defense. To ensure its own primacy within the DOD, the Air Force advocated service -- as distinct from Departmental -- representation on the Board.[259] If any conflict arose between the DOD and the NASA over the military or civilian character of a given project, the Air Force assumed that the Secretary of Defense would carry the disagreement to the President rather than depending upon the Board to effect coordination.

The Army's view of NASA was almost the precise opposite of that of the Air Force. Testifying before the House Committee, Medaris feared "the more the scientific and military are divided, the more difficult it will be for us to really go forward in the research that must be done now if the next generation of military weapons will be as good as those which we may meet."[260] He recalled that he had opposed the establishment of a civilian agency before the Preparedness Subcommittee and stated that he had seen no facts which had yet persuaded him otherwise.

Such arguments, of course, were designed to save the space mission for the Army. Since purely military exploitation of space now seemed likely to be lodged primarily in the Air Force, the only way for the Army to retain a space capability would be through a centralized organization within the DOD.[261] Moreover, the Army advocated a broad spectrum of research as the only source of futuristic weapons systems, and feared that removal of such research from the DOD might seriously jeopardize future preparedness.

As a last line of defense, in the event that the NASA were established, the Army supported as broadly integrated a national space effort as possible. It urged that the new NASA should exercise overall surveillance over military as well as civilian and scientific interests in order to insure close cooperation and to utilize available teams. Thus, the Army sought to have the DOD represented on the Advisory Board through the ARPA, rather than the services, a position obviously consistent with the Army's aim of enhancing the role of ARPA within the DOD and ensuring close coordination between the ARPA and the NASA.[262] Should disputes arise as to the placement of vehicles, teams or projects between the two agencies, the Army looked either to joint resolution by the two agencies or ultimately by the President.[263] Through such provisions the Army sought to avoid a situation in which the Air Force and the NASA would gain respective control over the military and civilian space missions. To prevent this outcome the Army worked to expand the space mission as far as possible; to retain an absolutely, if not relatively, large slice of the space pie; and to integrate the space research and exploration missions so that capability rather than roles and missions or civilian or military status would determine who would undertake a given project.

The services' differences never disappeared in the course of the Hearings.

but they were overshadowed by congressional action. The Senate and the House Committees reopened far more trenchantly than the critics themselves the question of civil versus military control of space. Thus the OSD and the services found willing legislative allies to extract from a previously reluctant Administration an enhanced space mission for the military establishment.

2. The Houses Go Separate Ways

What troubled both committees of Congress which were to deal with organizing the space mission went beyond service and agency roles. Congressional leaders concentrated their fire on the absence of criteria by which to determine civilian or military jurisdiction in space; absence of inter-agency coordinating mechanisms; absence of machinery for overall national space policy-making; and, finally, absence of substantive provisions to support the sweeping generalizations of the bill's declaration of policy. Congressmen rejected as unworkable the Administration's argument that through normal inter-agency coordination channels the NASA and the DOD would either "get along" or take their disagreements to the President. In their view such permissiveness left major policy questions unanswered. These issues boiled down to a central question: should the NASA make policy for either part or all of the space effort or, alternatively, should it merely administer policy made elsewhere, and if so, where? Within this broad issue lay a host of complex questions of a scientific, strategic and administrative nature on which the two Houses of Congress differed in both emphasis and response.

For a number of reasons, the House Select Committee on Astronautics and Space Exploration chaired by McCormack, was more civilian in its orientation than was its Senate counterpart. The Committee lacked the background which the Upper House had gathered through the Senate Preparedness Subcommittee;

only two of its members served on the House Armed Services Committee,[264] and it was chaired and staffed by men particularly concerned with the scientific, civilian and peaceful potentialities of outer space. McCormack and Keating, for example, viewed the NASA as a basis for further Government organization of science at the Cabinet level. They also repeatedly stressed the need to consider peaceful uses of outer space before military developments progressed so far that arms control would be overly difficult.[265] McCormack, George Feldman, the chief counsel and other committeemen initially preferred a Commission form of organization like the AEC which would place both civilian and military exploitation of space under a single civilian controlling body. In the face of total White House opposition they did not press this view, but it colored their response to the NASA.[266] McCormack's close relations with Killian also added to this civilian-scientific bias.

Thus the House Committee viewed the establishment of a civilian agency with primary responsibility for the exploitation of space as an urgent, necessary mission of the Congress and distrusted Administration attempts either to downgrade the Agency or to upgrade DOD responsibility in space. Specifically, Feldman suspected that the Administration's proposal for a high level agency in space was principally shaped by a desire to meet public concern, not to fashion a major new program. Both he and the individual committee members vented this suspicion upon Administration spokesmen, particularly those from the NACA. They distrusted the NACA's capabilities for a large space effort and displayed marked disrespect for Dryden,[267], the presumed director of the new agency. Feldman more than once referred to the "deadwood in NACA" and McCormack indicated that the new agency would demand men of vision and dynamic leadership, "not men with a status-quo mind."[268] Dryden's reference to von Braun's proposal for a 150-mile shot of a man

into space as akin to shooting a lady out of a cannon,[269] proved especially unpopular to the Committee.* Increasingly the House came to view the Administration's proposal as merely a way of updating and upgrading the NASA -- likely only to result in "doing business at the same old stand."[270]

The Committee was especially disturbed by the traditional dominance which the military had exercised over the operations of the NACA. Though not denying the DOD a substantial role in the space mission -- indeed McCormack denied that anyone on the Committee had interpreted the language of section 2 to exclude ARPA from conducting basic research or as inhibiting the DOD in the performance of its "proper functions" -- the Committee strove to assure NASA independent civilian status.[271] In contrast to the views of the military, the House interpreted the language of section 2 which specified that the Agency might act on behalf of or in cooperation with the DOD in activities related to weapons systems or military operations as a possible authorization for the DOD to remove all original powers from the NASA unless the DOD granted it express permission to pursue space activities. McCormack feared the language gave the DOD "a complete voice in determining to what extent the new civilian agency might operate" since almost all space missions might be associated with either weapons systems or military operations.[272] Only after two weeks of hearings was McCormack persuaded that the Administration's safeguards for civilian initiative were sufficient. Then he acknowledged that Gen.Doolittle's testimony in firm support of a civilian agency had revived his enthusiasm for an administrative solution which had previously seemed vulnerable to military domination.

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* This anti-Dryden campaign on the part of the House ultimately denied him his expected promotion as the Administrator of NASA.

A second major concern of the House Committee was the specific form of NASA-DOD relationship. House leaders sought a civil-military liaison mechanism at the project level. This form of inter-agency coordination seemed to them the most effective means of handling the necessarily large "gray area" which existed between the military and civilian space missions: those projects which could be utilized for both. Feldman and McCormack were particularly adamant about this form of coordination: Feldman invited witnesses such as Herbert Loper, Assistant to the Secretary of Defense for Atomic Energy, to specifically testify on this subject, and asked everyone else in sight what they thought of such a liaison system. The Committee evidently backed him: in Metcalf's words, " I think it has been developed by Mr. Feldman that no matter what happens to the composition of the board, there has to be daily, constant and continuous liaison between the civil and the military agencies."[273]

The Board did not fully satisfy the Congress as an effective means of policy liaison. They objected to the requirements of prior consultation before the Director could take certain executive actions as limiting vigorous executive action. For the same reasons, they objected to the non-Government majority on the Board. Instead, they advocated a purely advisory committee, vesting overall policy coordination and high-level space policy-making in the Director himself.[274] They saw the NASA as responsible for overall national space policy under the direct control of the President, with the DOD undertaking certain operations and planning according to this policy in the special fields affecting national security. Thus, overall problems of coordination between civil and military operations in space would be solved through "a civilian agency...with direct primary responsibility for an overall civilian, military, research, development, and exploratory policy, as well as the overall primary

responsibility for implementing those various programs. Thus combining all the functions under one policy-making civilian agency, with military given an adequate place.[275] This high level policy execution was to be based upon lower-level coordination through an operating civil-military liaison committee placed in the DOD. Such a lower-level cooperative mechanism, in their view, would permit the NASA to take military needs into account while still retaining civilian planning and control.

The Senate Committee, while sharing many of the reservations of the House, drew some sharply different conclusions from its deliberations. For a variety of reasons, the Committee itself was more preoccupied with military concerns than was the House Committee. First, it was operating in a context formed by the Preparedness Subcommittee Hearings. Second, five of its members: Chairman Johnson, and Senators Russell Symington Bridges and Saltonstall were all members of the Armed Forces Committee. Third, Johnson, having maintained close relations with the OSD over the past months, was thoroughly familiar with military requests for an undisputed sphere of decision-making authority. Finally, Johnson's whole emphasis upon the challenge in space was premised upon the principle "if you would have peace, prepare for war." America, in his view, could only achieve true temporal peace if she retained military control of outer space.[276]

From the outset, then, the Senate Committee was openly hostile to major portsions of the Administration bill: its failure to ensure military exploitation of outer space; to provide overall direction for the space effort; and to recognize various other necessary aspects of space developments including international cooperation, the development of nuclear propulsion systems and a reliable patent policy to protect the public interest. It questioned the

NACA's ability to become a large-scale contracting agency and expressed its initial judgment that the Administration bill was only marginally preferable to the present situation of interagency competition in the space effort.[277]

The Senators were aware of the difficulties inherent in pursuing both military and peaceful exploitation of space without incurring ruinous competition in which the fittest - necessarily the DOD - would survive.[278] But they feared most of all that the military program might "deteriorate under perhaps certain imagined or possible civilian attitudes."[279] The problem of dividing space activities between civilian and military missions and responsibilities - in short, of insuring both sufficient and relevant space Research and Development - plagued the Senate as it had the House. As Symington put it: they were all concerned about "how to get as much as possible out of the military departments and at the same time not affect the military requirement."[280]

As the hearings progressed, the Senators approached an informal consensus around the need to give the DOD primary operating responsibility in those aspects of the space mission which affected national security. Mundt, and Hickenlooper explicitly remarked that the civilian agency had been given excessive responsibility for military space developments. They viewed the phrase that the NASA "may act on behalf of or in cooperation with the DOD" as a clear statement of DOD dependence upon the NASA for the definition of the defense mission.[281]

In order to correct this unnecessary restriction, the Senators reached two conclusions. First, they decided that the DOD should have independent authority in the field of its special responsibilities.[282] Johnson, in extracting from rather less than reluctant DOD officials declarations that they

would appreciate such authority, in effect forced this powerful group to repudiate a basic tenet of its own Administration's bill: that the military would pursue military exploitation of space with the agreement of the civilian agency. Johnson declared that some definite language providing the DOD such autonomous authority to act in space should be written and wrily observed that he thought the "ingenious DOD" could produce some such wording.[283]

Second, the Senate evolved its own form of military-civilian liaison mechanism. The Committee had noted throughout the hearings that in the Administration bill there was no power vested in anyone except the President to decide what phase of space mission belonged to which agency. As Symington noted:

> "Now at the beginning of planning our outer space program, we have an opportunity to provide for some unification. S 3609, however, does not provide for an overall organization which can plan with foresight for our national and international programs in outer space. Separate agencies are to be separate agencies and are to be separately administered, and voluntary cooperation among coequals is supposed to result in a kind of happy coordination....There is even no provision for settling questions of jurisdiction among the various executive agencies which will be concerned with the exploration of space."[284]

Not only did such a system seem inefficient to the Senators; such dependence on Presidential policy-making was distasteful to Congress in its current mood of autonomous policy-making. Moreover, the Senate Committee believed that the President and his scientific advisors depreciated the military potentialities of space to an extent they could not accept. No simple solution such as the House's coordinating channel through a civil-military liaison committee seemed sufficient. They wished a broad comprehensive new program.

What was missing, in the Senator's view, was a high-level policy-making board which could exercise both responsibility and authority over the national space program.[285] Since many conflicts, in the Committee's view, would never

be resolved if "no one in any particular agency has the authority to make the decision," the Committee decided to provide a high-level policy board, empowered to establish national space policy and to determine particular project assignments among various operating agencies according to their military or civil nature.[286] Each operating agency would be free to pursue its own specific mission, but this executive decision-making body, under ultimate civilian control, would serve to coordinate, weigh and direct the various missions which America was to undertake in space.

So, the two houses of Congress, occupied with similar concerns, arrived at quite different concepts of how the space program should be organized. Their major division was on the nature of the military space effort. Given the significance of this issue, however, each of the committees formed alliances with different interest groups within the Administration. Confronted with these contending coalitions, it fell to the Administration to restyle its own proposal to gain an acceptable compromise. It was this process of Administration retreat and Congressional bargaining which ultimately produced the National Aeronautics and Space Act of 1958.

3. The Actors Meet

In May the military establishment, exploiting the concern of both Houses about the division of function between the civilian and military space missions, expressed publicly its own reservations about the Administration bill. Its advance spokesman was Roy Johnson, whose flamboyant disregard of his role as a member of the Administration made him the natural instrument for such a policy offensive. Indeed, Mr. Johnson took such an extreme position that the Administration philosophy of civilian supremacy was virtually forgotten. Only solitary voices like Dryden, Doolittle and van Allen continued to call for a purely "civilian" bill.

Director Johnson launched his attack upon the Administration bill on May 5. Appearing before the House Committee, he stated that "the legislation setting up a civilian group should not be so worded that it may be construed to mean that the military uses of space are to be limited by a civilian agency. This could be disastrous...For example, if the DOD decides it is militarily desirable to program for putting men into space, it should not have to justify this activity to this civilian agency."[287] Johnson proceeded to explain that the language as it stood required exactly this: that it did not permit the military to proceed on its own without the participation of the civilian agency.[288] He then offered, on his own account rather than on behalf of the DOD, his own preferred version of section 2: the civilian agency should undertake all space activities except those which may be "in support of or presumed to lead to the use of space for national defense in which case the agency is authorized to act in cooperation with or on behalf of the DOD if so requested by the DOD."[289]

Johnson argued that the DOD should be free to operate in any field of space interesting to it without any prior civilian approval. The two agencies might work in parallel directions or share voluntarily in a single project, but would be authorized to act independently if they wished. Since only the military was qualified to judge what was of military significance it would be a tragedy, in Johnson's view, if the statute were in any way to reduce its independence by limiting it to clear-cut military objectives. Finally, in response to a pointed question from Rep. Keating about his draft suggestion, Johnson acknowledged that he could barely think of a space mission which could not be presumed to lead to utility of national defense.[290]

Leaving the House to mull over his recommendations, Johnson headed for the

[illegible] side of the aisle. Two days later he found the Senate Committee receptive to his claims, having heard Wheeler acknowledge that morning that he would not object to an amendment permitting the OSD initial responsibility in military space exploitation. Although Johnson's suggestion that the NASA-DOD relationship be something like the IGY-DOD relationship was too extreme for the Committee, he held to his basic position.

> "Let me put it this way, Mr. Senator. If the AEC had been set up on atoms for peace at that time...then I don't believe that Congress would have appropriated the money...nor the country supported it to the degree that it was supported. If (this) civilian agency is set up on the basis of space for peace or space for fun - I think that a parallel is there....I think that it has to be set up with a military connotation, with a full understanding on the part of the public that this is a threat. This isn't something we can sweep under the rug by just saying that it is civilian and it is something that by saying it is civilian we can then decide is not a threat."[291]

Receiving at least partial encouragement from Senators Bridges, Mundt and Hickenlooper, Johnson reiterated the theme he had emphasized in the House: that the civilian and military agencies should be permitted free and independent opportunities to perform space research. In conclusion, Johnson remarked that he really didn't know why there should be a NASA at all, since the NACA was now capable of pursuing non-military space research. As an afterthought he told the Senators: "I understand that even though we are employed within the Government that when we testify before this Committee, we are supposed to tell what we really think and of course I do not know whether I will have a job when I leave here today but I am saying what I think."[292]

In the next few days, Norton, MacIntyre, and Brucker endorsed the spirit, if not the letter, of Director Johnson's testimony. The Senators responded by expressing substantial concern about the language in section 2. When

[illegible] meeting to a meet conference on May 2 that Johnson had no [illegible] clear that the "departmental position is [Johnson's] position" the DOD's final position came clear.[293] Between May 7 and 12 the DOD prevailed upon the Executive Office to accept certain of Johnson's arguments in return for which Johnson accepted Administration policy in support of the new [illegible] agency.[294]

More amendments were afoot. On May 6 Doolittle publicly conceded that increased representation of the DOD on the Board would be necessary, and indicated that the power of final decisions over space missions might not fall to NASA.[295] On the 11th the Bureau of the Budget conceded to the DOD a minimum of three members on the advisory board.

On the 12th the Administration amended section 2. Called to the House to explain discrepancies in his previous testimony, Johnson was a chastened man. Moreover, he was duly escorted by Dr. York and Mr. Robert Decherd, General Counsel of the DOD and versed in the ways of Administration solidarity. When Johnson appeared to be reverting to his former arguments, Decherd interrupted. "To shorten the procedure" he suggested,

> "Mr. Johnson has language on the two items that have been mostly under discussion, which language is satisfactory to the Executive Department as a whole, although it has not finally gone through the ordinary reporting processes. I cannot commit the whole Executive Department to this exact language but I believe confidently it will be approved, having talked to the person in charge of policy decisions... It was written in longhand on the way over, after various telephone calls."[296]

With this introduction, Johnson read the amendments. Section 2 was rewritten to read that the NASA was responsible for space activities "except insofar as such activities may be peculiar to, or primarily associated with weapons systems or military operations, in the case of which activity the DOD will be responsible." The second amendment provided for nine members of the Government in

the advisory board, thus giving the Government a majority, of which three would represent the DOD.

The House Committee reacted to this announcement with understandable alarm. Given their earlier fears of military domination over the new agency, this new language disturbed at least the Chairman and the staff. Subsequent testimony did little to allay their concern. Dechert, in emphasizing the Administration's agreement on the amendments, stated that it was his understanding "the President does not want to go beyond what he said in his message through fear that, if we go beyond it, it will look as if we are trying to take this away from civilian control. Therefore...the Administration wants to keep the expression of the DOD participation in the exact words that the President used...which are weapons systems and military operations....Mr. Johnson has indicated that the research leading up to weapons systems and military operations is necessarily a part of these systems and operations themselves."[297]

Thereafter, the following exchange occurred:

Feldman: "Would you interpret this language... as giving you the exclusive authority to decide without any cooperation or without cooperation with the new agency, what is military?

Johnson: "Yes, Sir.

McCormack: "We might as well put a bill out and put in military control.

Dechert: "Isn't that subject to the fact that both these agencies will be part of the executive department and if those in the civilian agency believed that the military agency had made the wrong decision they always have the right of appeal to the President on it. I think the President is the ultimate arbiter, if there is a disagreement.

Feldman: "Should not some person or agency plan and coordinate all aspects of space research in order to prevent gaps and to insure effective cooperation?

Johnson: "Definitely not, Sir. I think that would be the most tragic thing that could happen to this country.

York: "You do not do that with Maritime. The Maritime and Navy go on and both use the ocean.

Feldman: "Another Pearl Harbor with no coordination.

York: "Of course the purpose of ARPA is to make sure that the Army, Navy and Air Force are together on the space program.

Feldman: "Why not the civilian agency; why not have the same cooperation with them?

York: "If their purpose is primarily to explore space and planets...all we need is the information they get. If they are not getting the information that is necessary for defense, we get it ourselves. That is why I think these things can be almost independent.

Feldman: "In other words, when the President now is talking of a national space program, national space agency, what you are saying instead is that we should have one for the DOD and one for peace time.

York: "I say space is a place and not a program at all. It is a place where you have different programs.

Feldman: "Then the President's message does not mean what it says."[298]

Despite the sentiments of the House Staff, in the following days endorsements for the amended version poured in. On the 13th the Bureau of the Budget submitted identical changes for the Administration to the Senate, which generally received them as positive improvements although by no means an adequate solution to the problem of overall coordination in space. Stans indicated at this time that the amendments had the unqualified support of the NACA and Dr. Killian. On the 14th Dryden and Eisenhower formally endorsed the new version, and five days later Norton, MacIntyre and Quarles did as well. Only the Army, now virtually fighting for its life in space, dissented, by proposing yet more drastic changes. In the week from May 20 until the 27th the Army reported no less than three separate versions of Section 2 to Congress. On the 20th Brucker suggested as a last clause "in which case the DOD shall exercise control."[299] Medaris, predictably, was even more adamant. He repeated Brucker's wording for Section 2 but added the language that "The Congress, recognizing that the predetermination of the primary application of such activities in the vast new field of space may be impossible, hereby declares that where such clear-cut

determination appears impossible, the Secretary of Defense shall be responsible for the determination of whether such projects should be carried out by the civilian agency or by the DOD, unless he is otherwise directed by the President." Finally, on the 27th, Michaelis, chief of legislative liaison for the Army, suggested the following wording for section 2: "except and insofar as such activities are closely related to missions of the DOD, in which case the agency is authorized to act in cooperation with or as an agent of the DOD." Michaelis, however, felt it necessary to specify that this wording did not represent a policy position of the DOD or of the Army.

Thus the Administration had, in effect, completed its final drafting process by acquiescing to elements within itself which had been excluded from the initial writing of the bill. Now, with the exception of the Army, every major element within the Administration deemed the compromise satisfactory. There remained the reconciliation between the two Congressional committees, still widely separated in their views.

4. Congress Makes a Law

The alliance-building which occurred during the Hearings eventually pitted the Senate and the military establishment against the civilian scientists, the Bureau of the Budget and the House of Representatives. Each House of Congress consulted the White House to see which of its proposals might be acceptable, and trade-offs between various items in the respective bills were made within limits stipulated by the Administration . The precise mix of the compromise, however, was determined by the relationships and relative influence of the two Committees and their Chairmen.

Since February, when the Senate had established its Special Committee, a substantial rivalry had existed between the two Houses. McCormack, apparently disturbed by the Senate action, had retaliated by holding the first Hearings, an action which in turn aggravated Johnson. Subsequently, there was relatively little communication or consultation between the two committees, and those contacts which did occur were principally made by staff members. Thus each Committee drew up its bill with a certain deliberate disregard for the known position of the other.

On May 24 the House Committee unanimously reported out H.R. 12575, reflecting the main intent of the original Administration by draft providing final civilian control through the Administrator (formerly the Director) for the entire space effort.* Indeed, the House proposal was more civilian than the Administration bill after its May 12 amendment, since the Committee had resisted Administration attempts to persuade it to accept the rewording of Section 2. In the House bill, this section directed the new agency to undertake all space activities except such as may be "peculiar to or primarily associated with the development of weapons systems of military operations or the defense of the U.S. (including the Research and Development necessary for the defense of the U.S.) in the case of which activities the Agency shall act on behalf of or in cooperation with the Department of Defense."[300] The House feared that the vesting of original authority in the DOD for military exploitation of space might hamper the research activities of the civilian agency. Thus, division between military and civilian operations granted the military freedom to pursue broad Research and Development

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* A staff member has described McCormack's desire to achieve bipartisan support for the Committee bill. He said that all votes on provisions were unanimous although there were some partisan "discussions."

efforts but continued to vest final determination of the space program in civilian hands in the Administrator of the Agency and ultimately in the President.

The House bill also included its creature, a Military Liaison Committee in the DOD. The Administrator was to vest operating relations with the DOD in this committee as well as matters involving interagency jurisdiction and joint activities.[301]

In case of disputes not resolved at this level the Administrator or the Secretary of Defense might refer the matter to the President for final deicision. In addition, the House bill established an Atomic Energy Liaison Committee to effectuate similar coordination with the AEC.

The National Aeronautics and Space Board was renamed the Aeronautics and Space Advisory Committee, composed of nine Government representatives, including three from the DOD, and eight private citizens. This Committee was a purely advisory body which might consult with the Administrator on national space policy and attempt to coordinate programs of various agencies. With responsibility for operational coordination already in the Liaison Committee, overall policy-making fell, in effect, to the Administrator and the President, thereby constructing the "straight-line operation" under civilian control which the Bureau of the Budget and the PSAC had originally favored.

Finally, the House bill authorized the establishment of a Joint Congressional Committee on Aeronautics and Space; specified that the Agency could engage in programs of international cooperation under the foreign policy guidance of the Department of State, and inserted patent provisions modeled on the stringent patent policy of the AEC.

The bill went to the floor on June 2 and passed unanimously after a rather poorly attended two-hour debate.[302] The only significant floor amendment was to strike out the provision for a Joint Committee. This shift was due to a number of factors. Speaker Rayburn preferred a standing Committee in order to provide an important Chairmanship for Rep. Overton Brooks. The House traditionally fears Senate domination in such bicameral settings. Finally, McCormack himself came to believe that the establishment of a standing Committee for Science and Astronautics, empowered to oversee all scientific activities including space, might contribute to the eventual establishment of a Department of Science.[303]

Nine days after the House passed its bill the Senate Committee reported out S. 3609 as amended, - a vastly different legislative product. The Senate bill provided for original DOD responsibility in those areas of space Research and Development which pertained to national defense, and for joint civil-military control of the national space program.[304] It expanded upon the Administration's amended wording of Section 2: so that "activities peculiar to or primarily associated with the development of weapons systems or military operations shall be the responsibility and under the direction of the DOD."[305] The Senate argued strongly for the separation of the military and civilian space missions on the operational level. On the one hand, it stated that "great mischief could be wrought by delegating to the civilian space agency authority over military weaspons systems and military operations."[306] On the other hand, the report argued that removing operational responsibility for military space projects from the NASA would prevent the civilian agency's activities from being inundated by attention to the military applications of space.

Addressing itself to other issues which the House bill covered, the Senate

bill established a Joint Committee for Space and Aeronautics, authorized the agency to pursue international cooperative efforts under the foreign policy direction of the President, and included patent provisions similar to those of the House.

The major innovation of the Senate bill, however, was the establishment of a National Aeronautics and Space Policy Board. In contrast to the limited functions which the House and Administration bills had assigned to what the Administration called the Board, the Senate established a high-level, policy-making organ. Despite Administration opposition to such an administrative structure, the Senate Committee viewed this Board as the answer to the vexing problem of general space policy-making. Established in the Executive Office of the President and composed of seven Government officials (the Secretary of State, Secretary of Defense, Administrator of NASA, Chairman of the AEC and representatives of three other agencies, only one of which might be from the DOD), the Board was obviously a blue-ribbon body. It would direct the NASA and the DOD -- the two operating space agencies -- and coordinate the work of ten other principal Government agencies interested in space exploitation.

The Senate report argued that "any differences arising among the agencies concerned in the course of the execution of their functions must be established at a governmental level higher than that occupied by any of those operational agencies."[307] Interposed between the operating agencies and the President, the Board was to conduct a continuing survey of space activities, recommend a comprehensive program in aeronautics and space exploitation, designate responsibility for major projects, and resolve inter-agency conflicts: in sum, evolve national policy in space. Its role in relation to aeronautics and space would be "comparable to that of the National Security Council with

respect to the integration of the foreign and military policies of the U.S." 308
Like the NSC as well, it would function as a statutory, policy-making body vested with administrative responsibility and held accountable to Congress, through the President. To support its functions, the Senate authorized the Board to employ an Executive Director and other specialized staff.

The structure and functions of the Policy Board reflect the Senate's conviction that no single agency could be assigned total responsibility for the space field. They also reveal the Senate's assumption that the military interest in space would thereby not be abridged. While the Board had a civilian majority in membership, the military departments would be included at this highest echelon of space policy-making. In addition, the Secretary of Defense - but not the Administrator of NASA - was authorized to appeal separately to the President in any case where action or inaction by the Board seemed to threaten his space mission.

On June 16 the Senate unanimously passed H. R. 12575 as amended by the entire text of S. 3609. The sole important amendment on the floor was offered by Johnson, striking out the patent provisions pending review by the Conference Committee. With its passage, the alignments in the final struggle to pass a space act were drawn. The Senate had taken a stand on the division of functions between the DOD and the NASA which aligned itself with the Administration (in its latest position) and against the House. But so far as the mechanisms providing for national space policy-making were concerned it placed itself in opposition to both the Administration and the House.

Shortly after the Senate passed its bill communications between the two committees broke off almost completely, with neither body apparently disposed to compromise. The House considered its bill close to the original Administration

proposal. The Senate held the position that its bill alone recognized the characteristics of urgency and breadth necessary for a successful space program.

Preliminary attempts to resolve differences at the staff level failed. For several weeks the only contacts between the committees were those between Mrs. Eilene Galloway, special consultant to the Senate Committee, and Dr. Charles Sheldon, associate staff director of the House Committee, who could meet in the neutral territory of the Legislative Reference Service.[309] The House staff tried subsequently to extend contacts without success. They believed that Johnson was striving to increase his bargaining position by holding out for the Senate bill or not at all.

At this impasse, the White House reentered the arena. The stimulus seemed to come from Senator Johnson. One Sunday late in June or early July, when Dr. Killian was in Boston, the Majority Leader called on the President.[310] During this interview the President - reputedly for ressons not directly related to the space program - agreed to a modified version of the Policy Board.

When Killian returned, the President informed him of his wishes. With Administration concurrence, and with a record of support for Administration space policies, McCormack was now persuaded to reconsider the House position. In this atmosphere and with two major outstanding issues settled -- the wording of Section 2 and the interagency coordination mechanisms -- negotiations for a conference committee meeting reopened. The issues at hand were the formulation of Congressional Committees; provisions for international cooperation, and patent procedures. Both Houses agreed that the agency could engage in international cooperative ventures under the foreign policy guidance of the President.[311] The Senate abandoned its demand for a Joint Committee and accepted two Standing

Committees. The House accepted the Senate patent provisions.* These staff soundings completed, the Conference Committee met for one session on July 15 with Johnson in the chair. The agreements were ratified and the conference accepted the bill.**

In addition to these compromise proposals reached in conference, the final bill contained those agreements made by the two Houses with the Administration. Section 2 finally read: "(aeronautics and space activities) shall be the responsibility of and shall be directed by a civilian agency exercising control over aeronautics and space activities sponsored by the U.S. except that activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the U.S. (including the Research and Development necessary to make effective provision for the defense of the U.S.) shall be the responsibility of and shall be directed by the DOD."[312] This wording represents a victory for the Senate although incorporating the clarifying language about Research and Development written by the House.

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* These granted title to the NASA except under certain specified conditions in which the Administrator could waive title to the contractor. The provisions were written in the O'Mahoney subcommittee on Monopoly of the Senate Judiciary Committee. During June the patent attorneys of the APLA and their clients had argued in favor of the original Administration assumption that NASA patent procedures would follow the DOD, vesting patent rights in the contractor in exchange for free use of the patented invention by the Government. Resisting such pressures, the Senate wrote in restrictive provisions. See ibid, section 305.

** The conference bill was principally drafted by the House Staff, see Griffith, Chapter IX. The House Committee on Science and Astronautics was established on July 21 in House Resolve 580 on the basis of H. R. Report #1837, "Amending the Rules of the House to provide for a Committee on Science and Astronautics. The Senate amended its rules to create a Committee on Aeronautical and Space Seicnes in Senate Resolve #327 on the basis of Senate Report #1925.

Section 204 provided for a Civilian-Military Liaison Committee composed of representatives from the DOD, the services, and the NASA. This organ would permit the two agencies to consult and inform each other on matters within their respective jurisdictions. Its structure departed slightly from the original House proposal, since it was no longer placed in the DOD, but it was designed to provide the project-level coordination which the House had deemed necessary for effective collaboration in space.

What had been the National Aeronautics and Space Board in the Administration proposal, the Aeronautics and Space Advisory Committee in the House bill, and the National Aeronautics and Space Policy Board in the Senate bill, finally became the National Aeronautics and Space Council. This nine-member advisory organ was to be composed of the President as chairman, the Secretaries of State and Defense, the Administrator of NASA, the Chairman of the AEC, one other representative of the Federal Government, and not more than three private citizens appointed by the President. It was authorized to employ a staff and was to advise the President on all activities authorized by the Act. Specifically, the Council would survey all aeronautical and space activities of all U.S. Government agencies engaged in such programs; develop "a comprehensive program of aeronautics and space activities to be conducted by the agencies of the U.S. Government."[313] While now an advisory agency rather than the public administrative organ which the Senate had demanded, its functions and high level composition clearly resemble the Senate's proposal.

The Bill passed both Houses on the day of the Conference, and Eisenhower signed it into law as the National Aeronautics and Space Act of 1958 on July 29.[314] "In the long view of history," Johnson proclaimed a month later, possibly the most important step we took during this session was to establish an agency to

guide America's effort in the exploration of outer space."[315]

Conclusion

The passage of the National Aeronautics and Space Act of 1958 was generally viewed by informed observers as a "victory" for the scientific community. From one perspective this interpretation seems plausible. NACA, the oldest scientific enterprise within the federal government, had been preserved and reinvigorated. The military had not assumed primary responsibility over the total space mission. Spokesmen for science had participated directly in the drafting of the Administration's legislation and had indeed shaped its key concepts. Scientists outside and within the government had generally united in their preferences for an independent civilian-based space agency, emphasizing the exploration of outer space as a pursuit of knowledge as well as a strengthening of the nation's security. Except for the establishment of the Space Council, the revision of Section 2 of the Act and the reconstruction of the Advisory Board, no major amendments to the initial bill had occurred.

Yet a moment's reflection on the events and actions incident to the Act sharply modifies this plausible interpretation. For one thing, the interests of the scientists were shared by other powerful actors in the process. A separate civilian agency, a clear orientation on the peace time uses of a space program, served the political and budgetary purposes of the Administration very well. They also reflected the convictions of "generalist administrators" ably represented by the Bureau of the Budget. The single executive, the limited role of the Advisory Board, the retention by the Presidency of responsibility for coordinating the military and civilian aspects of the program were basis tenets of established administrative doctrine as practiced by the Bureau of the Budget.

They were also sharp departures from the traditional organizational preferences of scientists who heretofore had preferred multi-headed agencies and heavy management representation by scientists drawn from the private world. Thus, the scientists' initial position was both basically supported by these forces and refined and modified by their particular desires.

Two other points should be noted. First, where the organizational and management philosophy of the scientists appeared to threaten the interests of the military, they did not prevail. The military mission remained protected in large measure to the degree satisfactory to the office of the Secretary of Defense and the Air Force. Indeed, the Air Force support of NASA as an alternative to a strong ARPA may well have been a decisive factor in limiting the intensity and scope of the opposition of the defense establishment. Most important of all, the Congress of the United States, led by Lyndon Johnson, succeeded in broadening the conception of the space program and identifying it as a major national program far beyond the expectations and even the desires of the scientists and their allies within the office of the President. Johnson's concept of a Space Council which institutionalized the high priority he placed on the program, his equal emphasis on military and civilian aspects, and the sense of urgency which he attached to the total undertaking triumphed both over the Administration and the House Committee representation of the Administration. In a fundamental way it was a broadly conceived and dramatic program which emerged responsive to the political impact of Sputnik, rather than a carefully designed reasoned policy for the support of science per se.

The influence of these other components of the political porcess can lead a thoughtful observer to doubt not only that science "did it alone" but also to question whether science as a political force could ever do it alone. Prior to

Sputnik I the scientific backing and participation in the original Vanguard program had not been sufficient. After Sputnik II the values the scientific community espoused were clearly joined with other values before the conflict was resolved and the space mission defined.

Two conclusions would seem to follow. First, that the public management of the space enterprise after 1958 involved the pursuit of policy objectives which go far beyond the scientific benefits to be derived from space exploration and even beyond those discernible for national security. A successful administration of the program requires, so the history of the legislation suggests, the simultaneous pursuit of a number of objectives, some clearly non-scientific in character. Second, if the scientists and their spokesmen were to continue to achieve a substantial number of their aims they would have to proceed in concert with their allies and in conflict with their adversaries. This enactment of the law did not mean the end of politics in the space program. It simply signalled a tentative and discernible employment of forces. For men concerned with the overall scientific strength of the nation, the quality of Research and Development, and the training and recruitment of new scientific talent, NASA in 1958 was the beginning of political activity, not the end.

Footnotes

Chapter I

1. U.S. House of Representatives, Select Committee on Astronautics and Space Exploration. Hearings on H.R. 11881, p. 275, testimony of Admiral John T. Hayward, Assistant Chief of Naval Operations for Research & Development (Hereinafter, these House Hearings will be referred to as HH.)
2. U.S. Senate, Preparedness Investigating Subcommittee of the Committee on Armed Services. Hearings, Inquiry into Satellites and Missile Programs, p. 1699. testimony of General John B. Medaris, Commander, Army Ballistics Missile Agency. (Hereinafter, these Senate Preparedness Subcommittee Hearings will be referred to as SPSCH.)
3. HH, p. 155.
4. Ibid., p. 63, testimony of Dr. Wernher von Braun, ABMA.
5. Ibid.
6. Ibid., p. 155.
7. Ibid., p. 156.
8. See SPSCH, p. 282 ff, testimony of Under-Secretary of Defense Donald A. Quarles.
9. Ibid., p. 148, ff.
10. See ibid., p. 209, testimony of Secretary of Defense Neil McElroy.
11. See ibid., p. 165, testimony of Dr. John Hagen, Director, Project Vanguard, Naval Research Laboratories.
12. See ibid., p. 508, testimony of Gen. James M. Gavin, Chief, Office of Research & Development, USA.
13. HH, p. 63, testimony of Dr. von Braun.
14. SPSCH, p. 1701, testimony of Gen. Medaris.
15. Ibid., pp. 1700-1701, testimony of Gen. Medaris.
16. The New York Times, October 15, 1957. (Hereinafter, The New York Times will be referred to as NYT.)
17. See SPSCH, p. 510, testimony of Gen. Gavin.
18. Ibid.
19. See NYT, June 2, 1957, and NYT, June 27, 1957.
20. Survey Research Center. Satellites, Science, and the Public: A Report of a National Survey on the Public Impact of Early Satellite Launchings. (Institute for Social Research, University of Michigan, 1959).
21. NYT, October 5, 1957.

Chapter II

22. See NYT, October 5, 1957, and Science, October 18, 1957.
23. See NYT, October 5, 1957.
24. NYT, October 10, 1957.
25. NYT, October 24, 1957.
26. NYT, October 16, 1957.
27. See NYT, October 17, 1957.
28. See NYT, October 18, 1957, and NYT, October 29, 1957.

29. See Bernhard G. Bechhoefer. Postwar Negotiations for Arms Control (The Brookings Institution, 1961), and NYT, October 7-8, 1957.
30. See NYT, October 14, 1957.
31. See NYT, October 10, 1957.
32. NYT, October 16, 1957.
33. See NYT, October 11, 1957, and infra, Chapter III, Sections 1 and 2.
34. NYT, October 11, 1957.
35. See NYT, October 28, 1957.
At this meeting, Dr. Alan Waterman submitted the National Science Foundation's Report on "Basic Research - A National Resource" to Eisenhower, who received it favorably.
36. NYT, October 5, 1957.
37. See NYT, October 23, 1957 and NYT, October 29, 1957.
38. See NYT, November 3, 1957, Section IV.
39. NYT, October 5, 1957.
40. HH, p. 279, testimony of Rear Admiral Hayward.
41. NYT, October 9, 1957.
42. See NYT, October 10, 1957.
43. NYT, October 17, 1957.
44. See NYT, October 15-16, 1957.
45. See NYT, October 17, 1957.
46. See NYT, October 5-6, 1957, particularly the statements of Dr. Lloyd V. Berkner, Dr. Vannevar Bush, Dr. Joseph Kaplan, and others.
47. NYT, November 3, 1957.
48. NYT, October 24, 1957.
49. NYT, October 6, 1957.
50. NYT, October 16, 1957.
51. NYT, October 6, 1957.
52. NYT, October 5-6, 1957.
53. NYT, October 12, 1957.
54. NYT, October 19, 1957.
55. NYT, October 6, 1957. See also NYT, October 8, 1957.
56. Ibid.

Chapter III

57. Samuel P. Huntington. The Common Defense (New York and London, 1961), p. 220.
58. NYT, November 10, 1957.
59. NYT, January 21, 1958.
60. See NYT, January 21, 1958.
61. NYT, February 2, 1958.
62. See NYT, January 21, 1958.
63. See NYT, February 1, 1958, and NYT, February 3, 1958.
64. See NYT, December 7, 1957.
65. See NYT, March 10, 1958.
66. Business Week, November 16, 1957.
67. See Science, January 2, 1958.

68. NYT, November 13, 1957. See also NYT, November 15, 1957.
69. See NYT, December 5, 1957.
70. See NYT, January 14, 1958.
71. NYT, November 14, 1957.
72. NYT, February 6, 1958.
73. For further discussion of the evolution of the Administration's position on space, see infra, Chapter IV.
74. NYT, February 18, 1958.
75. NYT, March 27, 1958.
76. U.S. House of Representatives. Message from the President of the United States Relative to Space Science and Exploration. Document #365 85th Congress, 2nd Session, April, 1958.
77. See NYT, November 12, 1957.
78. SPSCH, pp. 361-362, testimony of Director of Guided Missiles William Holaday.
79. See ibid., p. 250, testimony of Secretary McElroy.
80. Ibid., p. 207, testimony of Secretary McElroy, emphasis added.
81. See NYT, December 8, 1957, NYT, December 30, 1957, and NYT, February 1, 1958.
82. SPSCH, pp. 236-237, testimony of Secretary McElroy.
83. See NYT, November 16, 1957.
84. See SPSCH, p. 211, testimony of Secretary McElroy.
85. NYT, December 12, 1957.
86. SPSCH, p. 413, testimony of Mr. Holaday.
87. Ibid., p. 218, testimony of Secretary McElroy.
88. Ibid., p. 424, testimony of Mr. Holaday.
89. See infra, pp. 49-66.
90. See Aviation Week, December 23, 1957, statement of Mr. Dan Kimball, president of Aerojet, Gen. Corp.
See also Robert Coward. Unpublished seminar paper on ARPA, pp. 2-
91. See U.S. House of Representatives, Committee on Government Operations. Hearings, Organization and Management of Missile Programs, 1959. p. 133.
92. NYT, January 10, 1958.
93. Department of Defense. Directive #5105.15.
94. See HH, pp. 716-719, testimony of Dr. Herbert York.
95. SPSCH, p. 235, testimony of Secretary McElroy.
96. Ibid., p. 237, testimony of Secretary McElroy.
97. Ibid., p. 415, testimony of Mr. Holaday.
98. See NYT, November 9-10, 1957, and NYT, December 4, 1957.
99. See NYT, March 3, 1958.
100. See SPSCH, p. 1757.
101. Ibid., p. 1952, testimony of Admiral Arleigh Burke, Chief of Naval Operations.
102. See ibid., p. 159, testimony of Dr. Hagen.
103. Ibid., p. 172, testimony of Dr. Hagen.
104. NYT, November 9, 1957.
105. See NYT, November 10, 1957. See also SPSCH, p. 1701 ff, testimony of Gen. Medaris.
106. SPSCH, pp. 560-561, testimony of Gen. Medaris.

107. See NYT, December 14-1, 1957, NYT, December 13, 1957, [illegible] January 28, 1958
108. NYT, February 1, 1958
109. Ibid.
110. SPSCH, p. 464, testimony of Wilbur Brucker, Secretary of the Army.
111. Ibid., p. 1509, testimony of Gen. Gavin
112. Ibid., p. 505, testimony of Gen. Gavin.
113. Ibid., p. 507, testimony of Gen. Gavin.
114. Ibid., p. 1511, testimony of Gen. Gavin
115. Ibid., p. 558, testimony of Gen. Medaris
116. See ibid., p. 613, testimony of Dr. von Braun.
117. See NYT, November 4, 1957. See also, SPSCH, p. 517, testimony of Gen. Gavin.
118. See SPSCH, p. 1709, ff.
119. Ibid., p. 575, testimony of Gen. Medaris.
120. Ibid.
121. Ibid., p. 613, testimony of Dr. von Braun.
122. Ibid., p. 618, testimony of Dr. von Braun.
123. Ibid., pp. 1708-1709, testimony of Gen. Medaris.
124. Ibid., p. 1453, testimony of Gen Gavin. See also NYT, January 5, 1958 and NYT, January 9, 1958. See also infra Chapter III, Section 4, pp. 86-87.
125. See NYT, March 6, 1958.
126. SPSCH, p. 858, testimony of Secretary of the Air Force Douglas
127. Ibid., p. 977, testimony of Richard E. Horner, Assistant Secretary of the Air Force for Research and Development
128. See NYT, November 19, 1957
129. SPSCH, pp. 1678-1679, testimony of Gen. Bernard Schreiver, Commander, Air Force Ballistic Missile Agency.
130. Ibid., p. 1678, testimony of Gen. Schreiver.
131. See ibid., p. 841, testimony of Secretary Douglas.
132. See NYT, January 15, 1958, and NYT, May 25, 1958
133. See NYT, February 9, 1958, and NYT, February 19, 1958. See also, SPSCH, p. 1675, ff, testimony of Gen Schreiver
134. See supra, pp. 43-44.
135. See SPSCH, p. 1675 ff., testimony of Gen. Schreiver. See also, NYT, November 22, 1957.
136. See NYT, November 22, 1957, and NYT, November 30, 1957
137. See SPSCH, p. 1674 ff, testimony of Gen. Schreiver See also, NYT, January 9, 1958.
138. SPSCH, p. 1674, testimony of Gen. Schreiver.
139. NYT, November 30, 1957
140. SPSCH, p. 976, testimony of Lt. Gen. Clarence S. Irvine, Deputy Chief of Staff for Material, USAF.
141. Ibid., p. 1588, testimony of Gen. Thomas D. White, Chairman of the Joint Chiefs of Staff.
142. Ibid., p. 1678, testimony of Gen. Schreiver.
143. Ibid., p. 1679-1680, testimony of Gen. Schreiver

145. Ibid., p. 1593, testimony of Gen. White.
146. Ibid.
147. Science, November 29, 1957.
148. The journals reviewed include: The New York Times; Science; Scientific American; The Bulletin of the Atomic Scientists; Foreign Affairs; Harper's; and The Atlantic Monthly.
149. See SPSCH, testimony of Dr. Edward Teller and Dr. Vannevar Bush, p. 6 ff. See also C.C. Furnas. "Why Did the US Lose the Race: Critics Speak Up," Life, October 21, 1957. See also, Arthur R. von Hippel, Bulletin of the Atomic Scientists, (Vol. 14, No. 3), March, 1958, p. 115; see also E. Rabinovitz. BAS (Vol. 13, No. 12), December, 1957, p. 346; see also NYT, January 1, 1958, speech by Dr. Isidor I. Rabi.
150. See SPSCH, p. 6 ff., testimony of Dr. Teller and Dr. Bush.
151. NYT, January 1, 1958.
152. NYT, February 4, 1958.
153. See NYT, November 9, 1957, especially the comments of Dr. Arthur Compton, Dr. Lee DuBridge, and Dr. Detlev Bronk.
154. See NYT, February 7, 1958. See also Science, April 18, 1958.
155. See Science, February 21, 1958.
156. U.S. Senate, Special Committee on Space and Astronautics. Compilation of Materials on Space and Astronautics. No. 1, "A National Space Establishment," p. 17.
157. Ibid.
158. Ibid., p. 18.
159. Ibid., pp. 18-19.
160. Ibid., p. 19.
161. See NYT, December 5, 1957, and NYT, December 13, 1957. See also, Missiles and Rockets, November 7, 1957.
162. See SPSCH, Appendices.
163. See U.S. Senate, Special Committee on Space and Astronautics, Compilation of Materials... op. cit., "Basic Objectives of a Continuing Program of Scientific Research in Outer Space," p. 23, ff.
164. Ibid.
165. Ibid., p. 44.
166. See The Bulletin of the Atomic Scientists (Vol. XIV, No. 2) February, 1958, editorial.
167. NYT, November 16, 1957.
168. See NYT, January 13, 1958.
169. See SPSCH, Appendices.
170. See supra , p. 52 for Dr. Hagen's view, and p. 58 for Dr von Braun's opinion.
171. U.S. House of Representatives, Select Committee on Astronautics and Space Exploration. The National Space Program. Report No. 1758. 85th Congress., 2nd Sess., May 21, 1958. "NACA - Resolution on the Subject of Space Flight, adopted January 16, 1958," p. 118, emphasis added.
172. Ibid.
173. Ibid., "Space Technology and the NACA," pp. 112-113.
174. See supra, Chapter II.

175. See NYT, November 14, 1957, and NYT, November 24, 1957.
176. See NYT, November 9, 1957.
177. SPSCH, p. 2057.
178. NYT, November 11, 1957.
179. SPSCH, pp. 1-3, statement of Sen. Johnson.
180. See ibid., p. 2428.
181. See NYT, December 16, 1957.
182. SPSCH, pp. 280-281, remarks of Sen. Johnson.
183. See ibid., p. 249 ff, testimony of Secretary McElroy, and ibid., p. 282 ff, testimony of Under-Secretary Quarles.
184. Ibid., p. 249, remarks of Sen. Symington.
185. See ibid., p. 344, statement of Sen. Johnson.
186. Ibid., p. 508, remarks of Sen. Johnson.
187. Ibid., p. 1459, remarks of Sen. Johnson.
188. Ibid., p. 2429.
189. See NYT, December 5, 1958, Johnson's speech before the Texas Testimonial; see also NYT, January 10, 1958, Johnson's statement preceding the President's State of the Union Message; see also NYT, January 15, 1958, Johnson's speech to CBS Affiliate Stations.
190. See NYT, January 8, 1958, column of James Reston.
191. NYT, January 8, 1958, text of Sen. Johnson's speech to the Democratic caucus.
192. Ibid.
193. S.3117, H.R. 10352, and H.R. 10271 respectively, all of which were referred to the Joint Committee on Atomic Energy.
194. S.3233, introduced by Sens. Yarborough, Mansfield, Hill, Sparkman, Carroll, Morse, and Humphrey, and referred to the Interstate and Foreign Commerce Committee. H.R. 9847 and H.R. 9966, introduced by Reps. Thomas Lane and Melwin Coad, respectively, and referred to the House Armed Services Committee.
195. S.3604, introduced by Sen. Francis Case and referred to the Special Committee on Space and Astronautics.
H.R. 11188 and H.R. 11860, introduced by Reps. Frelinghuysen and Fulton, respectively, and referred to the House Armed Services Committee.
196. H.R. Con. Res. 265, referred to the House Foreign Affairs Committee.
197. See NYT, January 17, 1958.
See also, Alison Griffith. The National Aeronautics and Space Act: A Study of the Development of Public Policy (Washington, 1962), p. 12.
198. Sen. Res. 256.
199. Sen. Res. 256, Section 1.
200. H.R. Res. 496.
201. Griffith, op. cit., p. 21.
202. See ibid., p. 22.
203. See supra, pp. 45-46.
204. See supra, pp. 45-46.

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205. See Frank Gibney. "The Missile Mess," Harper's, January, 1960, p. 43, where he describes Eisenhower's insistence upon civilian control as "fanatic: his one piece of enthusiasm in the whole space picture."
206. See William F. Finan. "Organizational and Administrative Problems of the Government's Space Program," unpublished paper, p. 1.
207. Private interview sources.
208. See supra, p. 77-79.
209. U.S. Senate, Special Committee on Space and Astronautics. Hearings on S. 3609. 85th Cong., 2nd Sess., 1958, p. 249, testimony of Dr. Hugh Dryden, Director, National Advisory Committee on Aeronautics.
(Hereinafter, these Senate Hearings will be referred to as SH.)
210. See U.S. Senate, Special Committee on Space and Astronautics, Compilation of Materials... op. cit., "An Introduction to Outer Space," p. 45.
211. Ibid., pp. 48-49.
212. Ibid., p. 52.
213. See supra, p. 77-79.
See also lecture by James R. Killian on the establishment of NASA, at M.I.T., March, 1962.
214. SH, p. 282, testimony of Bureau of the Budget Director Maurice Stans.
215. Finan, unpublished manuscript... op. cit., p. 2.
216. See NYT, February 5, 1958.
217. See Killian lecture... op. cit.
218. Private interview sources.
See also HH, p. 421, testimony of Dr. Dryden.
219. SH, S. 3609 "A Bill to provide for research into problems of flight...", p. 1.
220. Ibid., p. 2.
221. See HH, p. 133, testimony of Dr. Dryden.
222. See SH, p. 279, testimony of Director Stans.
223. See SH, p. 195, "Statement of the Bureau of the Budget on Certain Statements made by Assistant Secretary of the Air Force MacIntyre before the Senate Committee, on May 8, 1958."
224. See SH, p. 342.
225. HH, p. 1542, testimony of Dr. York.
226. See SH, testimony of ARPA's Director Roy W. Johnson, Secretary Brucker, and Dr. Hagen.
227. SH, p. 168, testimony of Director Johnson.
228. See SH, testimony of Director Stans.
229. NYT, May 10, 1958.
230. See supra, p. 105, statement of Roy Johnson.
231. SH, p. 25, testimony of Dr. James Doolittle, Chairman of the National Advisory Committee on Aeronautics.
232. See HH, p. 5, "Message from the President..."
233. Ibid.

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234. See SH, p. 195.
235. See SH, p. 15, ff, testimony of Dr. Dryden.
236. HH, p. 866, testimony of Dr. James A. Van Allen.
237. See SH, p. 15, ff, testimony of Dr. Dryden.
238. Ibid.
239. Ibid.
240. See SPSCH, appendices.
241. See HH, testimony of Dr. Herbert York, Chief Scientist, ARPA.
242. See ibid. See also, ibid., testimony of Dr. Hagen and Dr. von Braun.
243. See HH, pp. 312-313.
244. SH, p. 2, text of S.3609... emphasis added.
245. HH, p. 5, "Message from the President..."
246. HH, p. 1110, testimony of Under-Secretary Quarles.
247. SH, p. 67, testimony of Under-Secretary Quarles.
248. HH, p. 178, testimony of Dr. York.
249. See SH, p. 47, testimony of Dr. York.
250. SH, p. 66, testimony of Under-Secretary Quarles.
251. See SH, p. 111, ff, testimony of Under-Secretary Quarles.
252. SH, p. 74, testimony of Under-Secretary Quarles.
253. See SH, p. 67, testimony of Under-Secretary Quarles.
254. See SH, p. 245, testimony of Garrison Norton, Assistant Secretary of the Navy for Air.
255. SH, p. 238, testimony of Assistant Secretary Norton.
256. HH, p. 656, testimony of Gen. Schreiver.
257. See HH, p. 648, testimony of Gen. Schreiver.
258. See SH, p. 198, testimony of Assistant Secretary of the Air Force Malcolm MacIntyre.
259. See SH, p. 197, testimony of Assistant Secretary MacIntyre. See also, HH, p. 672, testimony of Gen. Schreiver. See also, HH, p. 527, testimony of Gen. Boushey.
260. HH, p. 145, testimony of Gen. Medaris.
261. See HH, p. 146, testimony of Gen. Medaris.
262. See HH, p. 690.
263. See SH, p. 221.
264. Reps. Leslie Arends and Overton Brooks - neither of whom participated actively in the Hearings on the space bill.
265. See HH, pp. 75-76.
266. See Griffith, op. cit., Chapter 6.
267. See HH, p. 1121 and HH, p. 1158, comments of Mr. George Feldman, Staff Director and Chief Counsel to the House Committee.
268. HH, p. 893, statement of Rep. John McCormack, Chairman, House Select Committee on Astronautics and Space Exploration.
269. See HH, p. 415.
270. HH, p. 470.
271. See HH, p. 427. See also HH, p. 435.
272. HH, p. 862, remarks of Rep. McCormack.

274. HH, p. 576, remarks of Sen. Lee Metcalf
275. See HH, p. 462 ff
276. HH, p. 136
276. See SH, pp. 6-7, statement of Sen. Johnson
277. See SH, p. 297, ff
278. See SH, p. 30, remarks of Sen. Leverett Saltonstall
279. SH, p. 24, remarks of Sen. Bourke Hickenlooper
280. NYT, May 10, 1958.
281. See SH, p. 229, ff. See also, SH, p. 73.
282. See SH, p. 85.
283. See SH, p. 219.
284. SH, p. 55, remarks of Sen. Stuart Symington.
285. See SH, p. 58, statement of Mr. Edwin Weisl, Consulting Counsel to the Senate Committee.
286. See SH, p. 37. See also SH, p. 276, comments of Mr. Weisl
287. HH, p. 1165, testimony of Director Roy Johnson.
288. See HH, p. 1168, testimony of Director Johnson.
289. Ibid.
290. See HH, p. 1191, testimony of Director Johnson.
291. SH, p. 150, testimony of Director Johnson.
292. SH, p. 169, testimony of Director Johnson.
293. NYT, May 9, 1958.
294. See Coward. op. cit., pp. 7-12
295. See SH, p. 17, testimony of Dr. Doolittle, where he suggests that the President appoint a committee consisting of Killian, Quarles, the director of NASA, Strauss, and Waterman to "resolve questions as to which specific items should be in NASA and which should be in the DOD and which should be joint projects."
296. HH, p. 1528, testimony of Mr. Robert Dechert, General Counsel of the DOD. (Statement cleared with Gerald Morgan, Assistant Counsel to the President.)
297. Ibid.
298. HH, pp. 1534-1540, passim
299. SH, p. 236.
300. U.S. House of Representatives, Select Committee on Astronautics and Space Exploration. Establishment of the National Space Program. Report on H.R. 12575. Report No. 1770. 85th Cong. 2nd Sess., May 24, 1958.
301. See Griffith, op. cit., p. 79
302. See ibid., Chapter VIII. See also, NYT, June 3, 1958.
303. See NYT, June 3, 1958.
304. See Griffith, op. cit., Chapter VIII. The bill itself was largely written by Gerald Siegal, Chief of Staff for the Senate Committee, in Johnson's office. It was accepted in one meeting of the Senate Committee, practically as drafted
305. U.S. Senate, Special Committee on Space and Astronautics National Aeronautics and Space Act of 1958. Report No. 1701 85th Cong., 2nd Sess., June 11, 1958.
306. Ibid., p. 4.
307. Ibid.
308. Ibid., p. 7.

309. Private interview sources.
310. Private interview sources.
See also Killian. Lecture...op. cit.
311. U.S. House of Representatives, Committee of Conference. National Aeronautics and Space Act of 1958. Report No. 2166, 85th Cong., 2nd Sess., July 15, 1958, Section 205.
312. Ibid., Title I, Section 102(b).
313. Ibid., Title II, Section 201.
314. PL 85-568.
315. Congressional Record (daily edition), August 23, 1958. p. 17884.