SPACE-AGE MANAGEMENT AND CITY ADMINISTRATION

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Introduction

"If we can go to the moon, surely we can vastly improve our cities here on earth." This simplistic but oft-repeated complaint is a non sequitur. Mobilizing modern science, technology and management to accomplish bold ventures in space is clearly far simpler than better organizing the extraordinarily complex human interactions that comprise a modern metropolis. NASA's spectacular advances in space are undoubtedly exacerbating public frustration with urban failures, but at the same time they are encouraging the nation to tackle its more complex human problems with greater confidence on a bolder scale. If America can go to the moon, it can indeed do much better here on spaceship earth.

In the preceding paper, General Phillips described NASA's advanced management system for the Apollo Program, one of the boldest and most complex projects man has ever undertaken. Within the diverse enterprises of our nation's space program there are also many other management systems. NASA's range of management approaches is nearly as broad as the range within an urban complex. In this paper some of the significant similarities and differences between NASA and cities will be pointed out, and comparable management problems

identified. The optimum approaches to these problems will be classified on a "spectrum of management" scale, with a considerable overlap suggested for NASA and cities. The essential point is that components of NASA and urban institutions each require appropriate institutional architecture for successful problem-solving within complex environments. The viability of these ever-changing institutional patterns must be a primary concern of those responsible for our space program and our complex urban society. Although managing the Apollo Program is obviously very different from running a city, NASA's broad managerial experience does have relevance for urban administrators.

Similarities between NASA and Cities

Let's begin by examining some of the similarities between NASA and cities. In an obvious way, both are large and complex human systems involving hundreds of thousands of people and billions of dollars. Both involve the dynamic interaction of innumerable individuals, groups and institutions, both are mechanisms for sensing, integrating and solving a great diversity of interrelated problems. Each in its own way is a "public" enterprise that exercises public responsibility, requires public support, and must operate in the "goldfish bowl" of public review and criticism.

In a somewhat deeper vein, for both human enterprises, technology has become the engine of change--the "pacing item" around which many other considerations are scaled. For NASA the surge of new technology is something deliberately created and immediately utilized. For cities, the recognition of technological change is often reluctant, and its social impact seldom foreseen.

Cities often act like victims reacting to technology, rather than beneficiaries welcoming and fostering needed advances to solve new problems. In any event, the winds of social and technical change are having a remarkable impact on both NASA and urban society. They are creating new leadership opportunities --opportunities which should attract competent men who understand how to direct new technology and new management capabilities in the public interest.

Differences between NASA and Cities

Having pointed out a few ways in which NASA and cities are similar, I must now concede that there are also many important ways in which they differ. Basically NASA is concerned with physical systems and "hardware"; cities are concerned with human systems and "software." NASA's interests might be thought of as narrow and future-oriented, in contrast to those of cities which tend to be broad and oriented to the past. NASA can define specific, stated, measurable goals, articulate them, and demonstrate obvious success to its public. Cities have at best very general objectives, many of which are undefined and unmeasurable, some of which cannot be stated in any operable way, and are subjects of passionate public dispute. More importantly, NASA's end products respond to, and are tested against, natural laws which are rational, systematic, codified and well understood by its professionals. Where they are not understood, the power of modern science is called in to rectify the situation. Cities, on the other hand, have their report card marked against wobbly success standards involving prejudice, special interest, wishful thinking, conflicting values, loose rhetoric, prophecy and revelation, or, in the current vernacular --SOUL. A social theory to guide urban society is non-existent--or worse!

In a fundamental sense, NASA is oriented toward problem solving and rapid technological change. We are expected to undertake bold new enterprises, to be innovative, and to experiment with unproven approaches to solve new problems. Although this is challenging, we can see what works and what doesn't, and arrange for a direct feedback of this knowledge to the action controllers running the enterprise.

In contrast, the city is fixed in place physically and legally, with a static structure, old traditions, and hardened institutional relationships. Its people tolerate weak, divided and ineffective governmental organization because they are usually wary of changes that might alter the existing power balance, and suspicious of innovation and experiment. Most importantly--the social science which should provide the social theory to guide urban experimentation and "score" its successes and failures has not yet matured. This makes the information feedback to the fractionated City Halls and urban agencies impossible to rationalize and substantially less useful for corrective action. Improved urban decision-making in the public sector is a major unsolved problem in today's society.

One final important difference between NASA and cities should be mentioned. To a considerable extent NASA picks and chooses the participants in its programs and competitively selects those best fitted for each needed contribution. The criteria for admission are high motivation, competence, and institutional effectiveness. NASA has been able to meet these criteria, and has attracted some of the best talents in the country to contribute to its

achievements. NASA pays its people, and in return demands continuing excellence of performance and commitment to the objectives of the Agency. NASA is an organization which encourages individual independence and initiative, but it must also insist on the highest order of technical discipline, for its work is tested in an unforgiving and harsh environment.

Cities, on the other hand, can erect no standards of motivation, competence or effectiveness for admission, impose no terms and conditions for continued participation--and charge taxes for the ride! Since the golden age of Pericles in Athens, the punishment of exile has gone out of style, although high modern standards of mobility allow individuals to "vote with their feet" and move away from unattractive urban environments.

The Spectrum of Management

The preceding brief discussion of some similarities and differences between NASA and cities was obviously not intended to tout NASA or denigrate cities. Rather, I sought to compare these two kinds of large and complex human enterprises from the manageability standpoint by considering a few of their essential characteristics. If we had a well-understood "spectrum of management," I believe that NASA would tend toward one end of the scale, and an urban complex toward the other, but there would be a large overlapping area. One end of this spectrum of management might be called the "Digital Discipline" or "Punched-Card Management" end, characterized by organized, disciplined and highly structured human activities, strongly oriented toward specific numerically-statable goals. We seem to know best how to manage

activities at this end of the spectrum. Examples from cities are the communication and power services furnished by AT&T and Consolidated Edison; the Apollo Program is a NASA example.

At the other end of the spectrum we find what might be called "Darwinian Discipline" management. This is appropriate for institutions which society can best "manage" by arranging an environment within which the competing components fight it out in a Darwinian manner to see which will best adapt and survive. Individual enterprises which survive in NASA or cities will continue to mutate and evolve in ways which frequently defy description, much less top-level hierarchal management. The "products" of enterprises at this end of the management spectrum may be measurable only in terms of the human spirit. Urban examples of this kind of institution include New York's galaxy of fine restaurants, and the entrepreneurs of Hong Kong. Nothing could be more Darwinian than the survival of individual gourmet restaurants --heaven forbid that they be taken over by a chain. Likewise the net effect of Hong Kong's entrepreneurs has been an extraordinary economic "take-off" for that city, which has provided a remarkably effective solution to the Mayor's problem of absorbing a continuing influx of refugees. Hong Kong has survived as a city in very difficult social and political circumstances because of its rigorous economic system within which a yeasty ferment of entrepreneurial enterprises can compete for capital. No charismatic czar of business development is elected to switch capital and manpower from plastic toys to transistor radios. An example of a NASA activity appropriately managed by "Darwinian Discipline" is the science of astrophysics. Here also is a

rigorous intellectual discipline within which individual professors select new research areas and publish their results for critical analysis. The most exciting and productive men attract the brightest new graduate students, and astrophysics moves on into new theories and new fields. Hierarchal control by a czar of astrophysics, or anything resembling this in NASA's support of university programs, would be disastrous.

There are many obvious ramifications of these rather abstract observations which cannot be developed further in this brief paper. The principal point is that the urban manager, like the NASA manager, must consider carefully the wide diversity of activities that must be orchestrated within the total urban complex or space system. The institutional architecture of each component of the total system must be selected from the spectrum of management--from "Digital Discipline" to "Darwinian Discipline," from Consolidated Edison to Le Pavillon, from Project Apollo to Astrophysics. Structural changes must be introduced with changing technology and social trends. For example, the thousands of "old law" tenements in Harlem built to house sweat-shop immigrant workers more than half a century ago are utterly obsolete in this age--rehabilitated or not, rent-controlled or not--as are the disgraceful neighborhoods in which they stand. The job of replacing them is before us. What are the important human values, urban goals and public expectations here? What new institutional patterns can best achieve the various objectives? What resources will be required over what period? How can the contributions of universities, industry and government be organized? What approach from the "spectrum of management" is best for each component? How will the required

new scientific understanding be acquired through theory and experiment? What technological advances should be fostered and utilized? As the work progresses, how are the experimental results to be fed back to the action controllers? Here is an urgent urban management problem worthy of the nation that conquered the moon. Obviously the job cannot be managed like Apollo, but I believe that NASA's broad experiences in space-age management do have applicability.

Thus, in NASA and in cities the nature of the work to be accomplished varies widely; both the NASA manager and the urban manager must seek the best institutional architecture for components within the total complex. The appropriate choice from the spectrum of management often changes with time. For example, an urban transit system, garbage removal service or cable TV system might best be operated by competing private companies or a single company under franchise during one period, be run by the city using municipal employees at another stage, set up as a non-profit corporation or authority at a third time, and at a fourth time let out to support-service contractors under periodic competitive bid. Technological change will alter the relatively desirability of these approaches as, for example, bus transport replaces electric street cars, electric disposals replace garbage cans and trucks, or radiating TV links replace cables. Few cities today have the managerial structure and resources to take early advantage of technical

opportunities, much less to foresee new possibilities and deliberately bring about needed technical advances applicable to urban systems. This is anachronistic in these times, and can only lead to deteriorating services and soaring budgets. The new federal Department of Housing and Urban Development is seeking to rectify this.

Messages for the Urban Manager

What does this condensed and somewhat abstract discussion mean to the urban manager grappling with the immediate problems of his city? Several significant points might be made from our NASA/urban management comparisons:

First--Many of the most important activities in the city cannot and should not be managed in the "Digital Discipline" sense of that word. The urban manager, like the NASA manager, can and should directly manage only a limited part of the complex interacting human enterprise for which he has responsibility. For the important remainder he must structure a "Darwinian Discipline" system to encourage essential contributions from industry, from universities, and from the entrepreneur, the free wheeler, the scientist, the brilliant innovator, the gifted teacher, and other committed individuals. In no other way can excellence be achieved in the French chef and astrophysicist, the Broadway producer and spacecraft designer, who, with thousands of other individuals, set the quality of urban and space enterprises. Perhaps the most difficult task we have is to conceive and establish the appropriate institutional architecture to achieve this. The greatest single

achievement of the space age may have been the formation of NASA; the rest followed as the energies and talents of America were released and given direction.

Second--It is in the nature of the job for the high-level public administrator to help define and articulate goals in the public interest. If there is to be any consensus of social values and goals in a city, they must be based on the urban manager's understanding and leadership of the city's amorphous and frequently conflicting forces. From his understanding of the environment, the urban manager can decide realistically what he can manage and where he can lead, identifying those areas of activity which need to be moved toward a different management approach, and effecting the required changes. Nothing could be more difficult, but changes must be made.

Third--Even when a city activity is capable of being directly managed in a "Digital Discipline" fashion, it is still important to select the appropriate form of institutional architecture for the job. It is essential to define specific objectives and goals and to relate the resources required to each area of management activity. The planning-programming-budgeting technique--though no panacea--can be helpful here. Objectives should serve as targets for achievement and not be treated as fixed and immutable commitments. Objectives (like NASA's moon landing) are vital, however, for two purposes:

1. They provide a vital focus and communication tool for continuing discussion among the many forces at work in the urban environment. Through

this discussion the objectives themselves can be flexibly altered and upgraded with changing conditions and available resources.

2. Goals are also a necessary prerequisite to the use of the powerful tools of systematic management which are being demonstrated and further developed now in business and government.

A vital consideration in creating the appropriate institutional architecture for complex management tasks is a realistic appraisal of the resources required to achieve the goals, and the creation of appropriate organizational mechanisms for close control of these resources. This organizational mechanism will probably have to be innovative in terms of its level and placement in the city structure and the nature of its authority. Much more attention must be paid to experimentation, communication, organizational interactions and real-time feedback of results, rather than to line operating authority alone.

Fourth--A fatal flaw in a complex human enterprise operating in the modern environment of technical and social change is to freeze its institutional architecture. "Horse and buggy" institutions and jurisdictional boundaries must be overhauled and updated. We must get on with this task even without a guiding theory. We should also get to work on a useful social theory. It had better be one which not only permits, but encourages experimentation and feedback in the mechanisms of urban management, and which allows for failures in the experimental process. Almost everything that happens in a city happens to all its citizens. It is perhaps fortunate

that city residents are inevitably becoming more concerned and involved. This provides the urban manager with a "sputnik-like" opportunity to marshall public concern now into a new commitment to an urban renaissance in America. As with the space program, new federal and local management institutions must be created based on the realities of today's metropolitan areas. Major resources must be administered under close control, orchestrating the best talents of universities, industry and government to apply the great power of modern science, technology and management.

Meanwhile, America should continue to forge ahead boldly in space. Our new space achievements will further spur us on to create here on the good earth tomorrow's great new urban society.

THE CITY OF MAN, from James E. Webb's Speech before the 43rd Annual Congress of Cities, Las Vegas, Nevada, December 5, 1966

Through our space program we have developed a very great capability to know what is happening to a human being when he is subjected to unusual conditions. Now what is the point of this for the city? Mr. Peterson, I think, has made it very clear in the statement he read from President Johnson. He said that it was very important to learn to apply the things we know "at the point of impact." Now the work that has been done with (Captain James) Lovell and other men permits some patients entering a limited number of experimentally equipped hospitals in this country to be so monitored that the effect of the emergency actions taken to save their lives can be immediately known -- a feedback on what is happening at the point of impact, within the body of one human being. This kind of feedback of what is happening at the point of impact is already proving what it can do in saving lives. It illustrates how the equipment developed to meet the hostile conditions found in space is useful here on earth, and it emphasizes the large range of benefits we can obtain from concepts and methods we have developed. The men and women, scientists and engineers, who develop this equipment and design the systems through which it is put to work, are not burned up between here and the moon. They remain in their laboratories and factories, better equipped to work on other problems. Most of them live and work in cities.

How did these workers get their know-how?

First of all, they looked at the history of the technology of the ocean. They saw that the predominant force in the affairs of men on this planet, and the inspiration of the human mind as to what could be done . . . was related to the control of the technology of the sea, the mastery of the sea, the ability to use the sea to travel around the world.

We know that Henry the Navigator bribed Portuguese sailors to go farther and farther down the West Coast of Africa until Diaz found the Cape of Good Hope in a caravel in 1487. But the feedback was very slow. It took five years before Columbus used the same kind of ship to come to America. It was five years after that, or ten years from the time Diaz rounded the Cape and knew the sea route to India was open, for two ships to sail that route and bring back the spices and other products of India, bring them back and make enough profit on them to pay for all the previous expeditions. It took a ten-year cycle of feedback to know that the exploration that found the way around the Cape of Good Hope could make this new ship, the caravel, earn a good profit.

But in any event, the control of the technology of the ocean was the predominant force in the affairs of men and in the concepts held by men as to the reality of this planet, earth, and this universe for 13 generations -- some 400 years.

The Wright brothers came along in 1903 and mastered a new environment, the air, by means of a new technology. They opened a new frontier which became a predominant force in the affairs of men, but it only lasted two generations, some 60 years. Now we are just one-third of one generation into the Space Age and we already are looking at the possibility, through the development of space technology, that about $83 billion per year could be reaped by the human race in long-range benefits on a world-wide basis with a very substantial portion in the United States. This is not my figure. It is that of a distinguished American company in a study of what could be done with this new technology.

The key to it, ladies and gentlemen, is feedback. That's my point. We have, in the space program, chosen not to create large government laboratories which were required in military programs for security classification purposes, and by the Atomic Energy Commission. What we have done is gone to the campuses of the universities of this nation and said, "We need more understanding about the earth and the sun. We need to know more about the effect of the radiation that comes from the sun on the earth's atmosphere. We need to know more about how the ionosphere that we use to reflect our radio signals can be used for other purposes and what its danger is to astronauts flying in it. We need to know how rapidly solar cells on satellites can give adequate electric power, not only for scientific satellites but also for satellites

that detect the existence of a nuclear explosion in another part of the world." Such satellites are flying today, and they're powered with solar cells, which scavenge their power from space . . .

. . . There are today on the campuses of some 150 universities about 8,000 NASA-supported scholars, researchers, graduate students, technicians, and laboratory people studying in areas of basic scientific knowledge needed by the human race. . .

They are further developing the kind of research on materials that permits us now to issue . . . our 1,000th technical brief to American industry, to everybody who might want to use it . . . .

So I simply want to point out to you that the feedback into American life of even such simple things as bearing materials is having a large effect on the capability we have as a nation. This feedback comes from a strong, hard-driving advance of science, of the acquiring of new knowledge, of the support of men who want to pursue knowledge for their intellectual interest and because they believe it's necessary to have knowledge to educate the next generation.

We've learned much about feedback and control out of the total engineered systems and concepts which are required for space work. . . . You've got to have instant feedback if you are going to use a very large rocket of the kind that flew Lovell . . . If it falters or turns off course, you can lose the whole effort that you put into it. So we do look with the greatest of care at how we can make sure that we

get a feedback from the system so as to make any necessary corrctions during the period of instability (before it achieves velocity). This modern miracle of technology, which is the space booster, cannot operate without that kind of feedback.

Now, interestingly enough, the designer of systems to meet every other new large requirement, whether it involves the cities, or whatever it may be, is facing today the same conditions we had to face in solving that problem. What are they? Once you are at the cutting edge of science and you conceive new things, once you have engineers trying to make new things that designers conceived, you then must develop the components of your system and provide the resources needed by those who do research in support of the development. No longer can you have a general idea and then go to work and cut and fit and try. You've got to have the kind of computer analysis that has permitted us to design, build, test, and fly large new airplanes like the C5A. From work in our simulators at our Ames Research Center in California, we have already fed back to the manufacturer the fact that the airplane itself, while a good airplane flying at high speed, leaves something to be desired as an airplane for the pilot to land. The manufacturer has changed the configuration so that the airplane would be better in the landing configuration -- and this before a single airplane was ever built.

We take the mathematical information from the designer and feed it through simulators and computers, so we can know before we build a machine what it will do in several different forms or configurations. Of course, we must ultimately fly and find out if our information, our prognostications, are true, and that's the next step.

You must have development in components, whether they are engines, or gyro systems, or stabilized platforms. You must also put the components together, as a bread-board model, to make sure that the total performance of this combination of complex things is not different from what you thought you would get when you put them all together.

It <u>is</u> true that large systems act differently than the sum of their parts. This is an essential element in developing these large systems, and I believe it is a very important lesson to learn for the American city. If you are going to apply not only your own funds, not only the efforts, hopes, and dreams of your citizens, but also the money that comes from the Federal Government, or is collected through other forms of taxes, no longer can you assume that if you proceed up the road you can correct the course by flying by the seat of your pants. You have to develop a form of feedback that lets you know what is happening and how much of a course correction is required . . . If I had to make a speech of one word today, it would be "feedback," because there's absolutely no way these very large systems can succeed

and be efficient without being internally designed to correct their course, correct their performance, and to test out whether the performance that you hoped for is in reality what you're going to get.

. . .

Let me take just one other quick cut at this process which is very new. It not only involves those 8,000 people in the universities that were not there just a few years ago, but it involves over 400,000 working in factories of 20,000 American companies. Ninety-five percent of every dollar coming to the space agency for either aeronautics or space or electronics research, or materials research, moves outside the agency. We are a management agency. But we do have enough in-house know-how to know how to spend this 95 per cent, and this is a terribly important thing. I do not know of a single American city that has an adequate research effort, an adequate laboratory with enough in-house capability to know whether it really can get the needed results from outside contractors and outside university people.

. . .

I do want to make this point: If you believe that science must go forward, that technology must come from it, that you must come to a point of using that technology, then you must have enough management to employ the present institutions in our system. It's too hard to create new institutions. You've got to use existing ones, wherever you possibly can. We have used the universities and we have used

American industry. At the same time, we created enough in-house capability to get an efficient job done and to know what is in that rocket and how to control it when we are about to fire off Lovell or another man. . . .

Now, what is the radical reconstruction that may be considered in connection with how cities can do the things that will give them success and incur the minimum of disappointment, heartache, and frustration in the process? I've already stated that I believe you must have a fully engineered system, completely thought through, and with a feedback built in that permits you to get the signals needed to make the decisions, to use human judgment on the critical matters, and to separate those signals from a large amount of other information which might be needed sometime but is not needed at the moment. You have to have a built-in system that can give you all that you may need but which eliminates what you don't need at any given time, and lets you focus on the things you've got to make a decision about.

In NASA we face this business of what to do next in seconds, and we make the decision to either go around the earth or to splash down in about 12 seconds on the average after the spacecraft passes Bermuda.

Now, it seems to me that if we are going to consider this kind of thing for the City of Man we must learn the art of government as well as to use modern systems. We must learn how to do public administration that will bring to the fore the essential ingredients of judgment at the critical point of presentation of very complex matters to the

elected representatives of our people. We must learn to report whether or not the thing we started out to do is, in fact, being accomplished. Furthermore, we must do it with the TV cameras on us. This is not an easy job of management, but it can be done. Look at what we have done in the space program. We have put together a 10-year program to not only land on the moon, but to develop the capability to operate in any way we need to out as far as the moon with men, and to go out to the planets like Mars and Venus and thus improve our knowledge of the earth . . . .

In this process we are faced in the space agency, as you are in the cities, with the consideration of all the main effects and all the side effects of what we do. This is why I direct your attention to the urban university. One of the things in NASA that we've tried to do is to understand the major side effects. We financed a study by the American Academy of Arts and Sciences to start an effort to determine what society should think about when it thinks of the space program. The first book was on the comparison of the space program with the railroad industry and, incidently, we're using about the same number of people in the development of the space program that built the transcontinental railroad system. The second book was on the subject of social indicators and the statement made as to their objective was not different from what political leaders, statesmen, and

administrators are going to have to face. It said this, "We have taken as our concern the notion that NASA or some comparable agency will intend to establish a system of feedback for detecting the range of consequences in its actions and for guiding future actions." They point out that they have taken quite a range and I believe this is not very different from what you are going to be concerned with in the City of Man. Here's the range that they say we must try to get from indicators that will let us know how we are doing: "The changes in man's conception of himself and of God; the almost incredible consequences of vastly expanded communications by our satellite communications system; improved short and long range weather forecasting; month to month surveillance of military installations throughout the world, including virtually immediate detection of hostile missile launching, and contact with bodies, higher, lower or sideways from us, or, if there's no contact, speculation and concern over the possibility of contact; the drain on our economy and military strength, or stimulus to our economy and military strength; competition with the Russians, or cooperation with the Russians, or some combination of the two; the drain on skilled and scientific manpower; changes in attitude toward education and towards stupidity; revolutions in medicine via new knowledge via telemetry; new substances and use of computers for diagnostic purposes; whether the rapid progress being

made there -- revolutions in data processing and retrieval -- will be stimulating to our system of higher education, or a disruption of our system of higher education."

I simply point out that this kind of analysis is going on as a result of the fact that man has decided to use qualities of the air and space that were not known a very short time ago . . . .

If not out of order, I would like to give you one quotation from a man who works for the New York Port Authority. Now I know that's not an element of local government as you normally consider it, yet I do think it is important. This is a little book written by Harvey Sherman, and I give you just two simple quotations.

He points out that the most important reasons for poor performance or failure in major things affecting large economic and social systems is inertia or social lag. He says: "Programs, key people, or other conditions have changed but the organization has not kept up." It's this pattern of public administration and organization to use these forces that I believe Mayor Tate had in mind when he said, "Federal funds alone will not do the job." Now, Sherman points out two other things. He says: "Another major reason of failure is the inadequacies in organization theory. . . the theorists have given us many principles, but these principles frequently contradict each other and organization theory has not told us under what condition each applies." Thinking

of that in terms of this tremendously complex thing we call the American City and the analogy between machines and economic and social and political systems, in a time when men like Walter Heller are talking about fiscal dynamics, I cannot escape the conviction that dynamics is the thing we work with. We have to work with motion. We get stability only from motion. But we must have an administrative machine, an organization that can handle these forces in motion. Here's what Sherman says about this, and this is my concluding remark:

"The rapidity of technological change since World War II as compared with all of history before that time is so much greater than the rapidity of organizing to meet this change that the problem we now face in organization may well have changed in nature from one of adjusting organizations to meet present conditions, that is, maintaining equilibrium, to one of adjusting organizations to meet future unknown conditions, that is maintaining desired disequilibrium."

I'd like to make this last point. The Wright brothers succeeded because they chose to know the air in which they had to fly and to know that the air was not something that you could work with without having a machine that was maneuverable and not so stable that it could not adjust to changing conditions. They knew that a man had to be there, namely, a Wright brother, to make that transition from the

horizon or other reference point that he could see or that he could feel as he went up and down, and that the controls had to be fully integrated. This concept has been moved with a vengeance to this business of going out into space where we will use machines that have roughly the equivalent power of 6,000 Boeing 707 airplanes to place men in space . . .

I submit that these concepts do have some value for you and I hope very much that as time goes on, in building the City of Man, while we will not be able to tell you what men should dream about or what kind of city they really want, I think we will be able to tell you how to design a system, if you're willing to try to do it, that will include the kind of feedback that will let you know how man and his environment react, just as the doctors are now beginning to get an indication of how one patient reacts to the administration of drugs under a very critical condition where life and death are at stake.

Draft/Hawthorne

NASA Management Speech Excerpts for Hubert H. Humphrey

THE PROBLEM OF POWER, from James E. Webb's Speech, "Can A Great Society Administer Itself," before the American Society for Public Administration, Washington, D. C., April 15, 1966

. . . It may surprise you that a person who has to try to build a transportation system to the moon would have included in his briefcase a little book by Lord Radcliffe, the title of which is The Problem of Power. It seemed to me, as I thought about about you were going to do while I was away and what I would have to do when I got back, that it was essential to consider the relation of administration to the use of power by administrators, under proper measures of restraint, but without such measures as would make the power ineffective. I would like to give one or two quotations from this book. The first is the very interesting statement: "What kills ideas is disillusion."

Are we disillusioned today when the tremendous power of science and technology and education are bringing us the capacity to do so many things that we've never had the opportunity to even consider before?

Here is a paraphrase of another passage: criticism is to test, not to destroy values. It seems to me that we must have criticism in any organized society that rests on participation and consent by any large numbers of people. We must have criticism, but it seems to me that today administrators of large programs find criticism used frequently not to test but indeed to destroy some of the values which are sought. We have now on our university campuses what the scientists call a sophisticated understanding of the atomic processes and we are about to have a sophisticated understanding, in their words, of the life processes. Practically all the disciplines on the campus are involved in the make-up of this sophisticated understanding and can help spread that understanding beyond the campus, and yet much of the criticism that we find in the daily press, in many of the mass media, in much loose commentary, in the matter which impinges on our senses every day, does not give a full and fair presentation or provide a test of values. Much of it is devoted to those things which are either controversial or spectacular. This is probably more true of the space program than any other.

Where does the citizen turn in such a situation to find criticism to test, not to destroy values? I was asked this last night in a question and answer period by a young high school student. He asked, "How can I judge the issues that relate to the matters you are speaking

about?" My answer was: "Today I have suggested here in your state that the university as an institution could become a trusted source of information for the ordinary citizen, for the government official, indeed for those who need a true, total multi-disciplinary input to help meet their responsibilities. This would give a pull upward rather than downward to the lowest common denominator. I do not mean to belabor this, but in our society if administration is to have a climate with which it can do its work it seems to me that we must somehow, somewhere, find the kind of trusted source of information which has been lost, resulting in some of that disillusion that Lord Radcliffe referred to as "the deadly killer of ideas."

Perhaps I can say that to me it seems, as you conclude this conference, we face what might be called an imperative. It is that every member of this society and every public administrator, as we return to our jobs and our preoccupations and the thoughtful review of ideas which always comes after a meeting like this, should focus on those things that give perspective. Perspective is certainly the important ingredient for leadership and it is very hard to come by. It's rather interesting, in that, coming back today from Denver, I went back to the Public Administration Review and read Dr. Waldo, whom, I understand, you honored last night, and ran across this very interesting statement about reorganization and the reorganization movement in public administration. He says that "it's an interesting question

whether any of the research findings and new ideas of the past two decades are having any significant role in the reorganization attempts in this decade" -- a strange lack of perspective on the part of someone. Part of the imperative for the profession of public administration today is to get a perspective that makes it necessary to consider the research findings of the past 20 years and the new ideas that have come from them.

We in the space agency have had to put together in a short five years a fairly large endeavor, one that involves 448,000 men and women and about 20,000 industrial companies (prime and first and second tier subcontractors). This is all administered by a relatively small group of civil servants who have adopted the concept that each program manager must be technically qualified to make judgments in the three basic areas: as to whether to remove a limiting factor through increased costs, or lowering the performance requirement, or through stretching out the time. He has to constantly make decisions as to time, cost, and performance and he must integrate his work with others in the total system that involves all these thousands of men and women. In the process of developing this process or method of administration, we have tried to get help from various academic institutions who might develop a base of theory that could broaden our understanding and concepts, or at least get a feed-back from our efforts toward the kind of general theory that might help the next fellow . . .

I think we're all going to find in administering the Great Society that the power of administrators must be very great to accomplish the job that has to be done. You all know, of course, that at the end of the War 20 years ago we had debated as to whether atomic energy could be entrusted to any single administrator or to our military services, and the decision in both cases was negative. We set up a commission which had to serve the military and reap all the other benefits. We set up a General Advisory Committee of scientists to keep the commission under control and we thus fractionated the power and lost many of the benefits that could have been achieved. We always worry about power, and yet without power you are not going to put these large, technically-oriented programs underway and steer them to a destination and land them safely. So if power is to be used and if we believe in the division of power in our government, it would seem to me that Radcliffe's statement that "power is good or evil according to the vision that it serves" is directly related to the theme of your Conference and President Johnson's strong advocacy of what I would call a concept. The Great Society is indeed a concept, a concept of a means toward an end and not the end of a journey. It is not our destination. It's a continuing effort of a democracy to separate the desired signal from the noise in a very complex and turbulent situation. It is an ability to follow that signal and it is not just a passing political promise.

Electronically, we've learned a great deal in a very short time about separating an important signal from the noise that previously obscured it. In space we've even been able to use a 10-watt transmitter to get pictures of Mars back over 136 million miles, which required the separation of a good deal of noise from the signals.

In our political processes, there is an analogy to this. We still listen a great deal to the noise and haven't learned to listen through the noise for the signal. But there is a signal in the concept of the Great Society and it is that the epoch, the journey, the concept, the means, is what we must concern ourselves with if we expect to arrive at the destination. I think I can say for the President, although he has not expressed it in these terms or authorized me to do so, that his purpose and his goal, his concept of the Great Society program, is to bring into being a climate -- a climate within which our free society can follow to its full promise and see the future of all mankind with a potential for a rich and eternal harvest of individual fulfillment and collective creativity. It is not an end and no one can say the complete end, fully described, must be an ingredient in the decision to proceed.

Those of us who are public administrators face a very real responsibility. The concepts, the ideas, the practical vision of this Great Society concept, this program, this journey, represents the cumulative wisdom and efforts of a number of generations, the

generations of Americans who have lived throught this century's decisive middle years. It falls to us right now in this generation in the field of public administration to implement this legacy. This is a challenging task and a grave responsibility regardless of the field or level at which we perform that labor. We are trustees in this profession of the best of American thought and we are the implements of the best of it. There are none others who can so fully implement it.

It seems to me that we should ponder the suggestion (Dwight Waldo's) that we think of ourselves as members of a profession with working relations with all disciplines and in a new environment, not only outside the campus of a university, but on the campus. It seems to me that in many ways those who have had to carry the responsibility for very large action programs and have sought help from universities have too frequently been told that the university could furnish an economist, or physicist, accounting expert, or almost any kind of expert, but if you wanted seasoned wisdom that involved an evaluation of what a member of those disciplines could contribute to understanding in a particular matter, you should turn elsewhere, or take steps yourself to bring them all together and evaluate their views and arbitrate their disagreements. I'm not sure that the university is going to be the only place in our society where a multi-disciplinary, sophisticated understanding of the atomic processes and the life processes will exist, but this

inability to furnish from the campus something that the campus itself (and I include the faculty and the administration) would be willing to say, "This is the best our institution can do," is a grave matter to public administrators. I think nothing less is going to be required. Perhaps I can illustrate that by saying in my own case, I've been asked by the President to go to Western Europe and to talk about whether those nations may wish to invest about 100 million dollars or more in a probe to Jupiter or to study the sun and, in the process, involve their scientists on their university campuses so as to revive the strong urge of Western Europe to participate in the abilities the rocket engine gives man to move out from the earth, and to measure those things that heretofore could not be measured, and achieve understanding of the universe which could not heretofore be achieved. Many think that in Western Europe today some of the glue that's held NATO together is no longer holding very firmly, that fear of the Russians and hope for American dollars or hope for other benefits from an associatio with America are not as binding as they were and that the concern of what they call the "Brain Drain" is pervading society. The vastness of our large undertakings in science and technology are hardly known and the ability which we have developed to administer very large efforts is so hard to understand that on first acquaintance fear or deep concern is frequently the first reaction to the question: "Will I become personally involved in such a process?"

Now, where will any administrator find help in making the judgments involved in bringing 200 million people in the developed areas of Europe together with our 200 million, maybe adding 100 million in Japan, and working together to use science, technology, engineering, and management to capture the benefits now open to mankind? And where can we get help to devise an interface between this use and the millions who live in those vast underprivileged areas like Southeast Asia, Africa, and Latin America? All of this is perfectly possible, but somebody's got to do it, and public administrators are going to be involved. The wisdom on which actions can be based is not now available in any form which can be assembled for use. But certainly on the university campus, the disciplines that are there, the ability to do research and teaching, and the moderating and strengthening influence of the presence of large numbers of graduate students could provide something of the greatest value to those who have to undertake these great actions.

Where is the mechanism, how can it be done, and can members of the faculty subordinate some of their desires to exploit their personal fields of research to ask how their institutions can be strengthened as an institution in society with a closer coupling with the real world? If any of you have any ideas to help me with that, I'd be very happy to have them. Not only must we move along with taking men to Mars, Venus and to the Moon, but we've also got to ask how millions of people can

learn from this experience those things that will make for them a secure, stable and better world within which human beings can move ahead.

. . . .

I am aware that the experience which we have had during the past five years in NASA is in many ways simply the first major effort not cloaked with secrecy, such as atomic energy and defense programs have had to be cloaked, and operating on the concept -- which I believe to be correct -- that we could strengthen and use the institutions available in our society rather than to create new ones and that we could develop systems of administration that were self-correcting. By way of illustration, we have created a management system in Huntsville, Alabama, that involves a quite sophisticated ability to put the work of about 10,000 companies together. The level is about one billion, eight hundred million dollars of work a year. We have a system which focuses in one major control room the information not only from PERT (Program Evaluation and Review Technique), but from Critical Path Analysis, Companion Cost Systems, and the various other complicated ways to permit you to make a judgment as to whether you should overcome a limitation by spending more money, or taking more time, or reducing your requirement for performance. This has to be done on thousands of items every day. But we do it. We have a reporting system that feeds in from the contractors' plants into this management system. It is an administered system, but it is so administered so as to be self-corrective insofar

as possible and to permit the human judgment to focus only on those things where human judgment must be applied. It is this concept of creating self-policing, self-correcting systems, much as a designer builds stability into an airplane, that is involved.

Can we take a concept that comes from using this self-correcting principle that we've learned from ships and airplanes and automatic pilots and apply it to a completely new thing? Space, let us say, or the Great Society, or to focus on the problems of millions of people massed together in a large urban center? . . . .

If we think of this kind of new condition that we must face, then we may ask ourselves, what is the role of the public administrator in the light of all of this? With these powers, these limitations, these concepts coming into play -- but also with the seething mass of humanity all around the world, not very many of them happy today--we have a strong requirement for effective administration, precision in the use of public power, for prediction, for planned use of limited resources.

It would seem to me that the 91,000 units of government in this country would certainly be touched to some extent by this kind of challenge. In public administration we will meet this challenge of unititing science and technology and engineering and administration just as we've had to face it in the space program. It seems to me that the public administrator in this period must somehow rise above these techniques and these limitations of science and technology and find a broader, a wiser, a more

universal type of approach. He must be a bigger, broader person than has been required in the past because the forces he must work with are so much larger, and yet so much more complex; so hard for the citizen to comprehend. Somehow he must command respect and following that will convert criticism from destruction of ideas to clarification and perfection of those ideas. He must learn to use even criticism effectively, as I see it. I believe his performance will be measured not by how he does the routine, not by repetitive operations, but by the scope and sweep of his vision and adjustment to some forces that will be beyond his ability to predict or controld; also his ability to ride the crest of the wave, that wave of the incoming tide of tomorrow that is now bringing in the fruits of a vital and vigorous society.

Perhaps I could say that, in public administration, to do this we must not only have this kind of vision, but we must begin to attract the kind of young people who want to work with people who have this understanding, who are broadly based with respect to many disciplines and have colleagues in others, and who are professional in their approach. These young people must be better prepared. They must get better training on the job if they are not better prepared when they start, if modern administrative tools are to be effectively used by society.

Tonight I have been told by some of you that there has been a slight undertone of concern or pessimism or feeling that somehow our

field could not compete with others, that the profession could not reach the standards it must reach when the attraction of jobs in physics and chemistry and various areas of computer work was providing more money and that in a sense there was something here beyond our control that would limit what we could do to meet these needs. I hope we will not go home with that idea. It seems to me that we in this organization must preach and practice and have faith in the vital and the exciting and the challenging and decisive role of public administration in facing tomorrow and indeed that there is something bigger in the minds of young people today than the amount of a stipend for a fellowship. There is a way if we approach these problems in the broadest possible way and develop our own capacity to deal with them. They will have the ability to see this, to be inspired by it, and to join with us and to prepare themselves for participating with us in this large enterprise.

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