

NASA BRIEFING ON SPACE STATION

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Closing Remarks

by

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Professor Bondi, Professor Puppi, ladies and gentlemen, the briefings you have been hearing in the past two days have obviously been designed to help in your consideration of a future participation in the programs that have been described here. All of the speakers have tried to emphasize that these briefings are a part of a continuing process which must go on with very much enhanced exchanges of information to permit you to develop the base which is required for decision-making.

We are particularly fortunate to have a very good background for this consideration. The elements of that background are, I think, well-known to you but they are important to mention again. We have a background of tested associations over a decade. Those associations have produced a large number of quite meaningful joint projects. Their names are familiar to all of you -- San Marco, the Aeriels, FR-1, the ESRO satellites, a long list of individual experiments, sounding rocket programs, the lunar sample analysis program, the testing of application satellites, and so on.

This cooperation is continuing. We can expect in this and the following years the launching of FR-2, Aeriels 4 and 5, San Marco C, several German satellites, and a new cooperative Dutch satellite which will be brought under agreement tomorrow in The Hague when Dr. Paine signs the agreement there. I should mention in particular that this background includes also projects of some considerable magnitude, notably project Helios, for a pair of German probes to the sun, in a 100-million dollar project.

So we bring to the propositions here some experience, some tested associations and some ability to work together on fairly sizeable enterprises. This kind of activity will continue in the present program framework and, undoubtedly, in the future framework too. At the same time, we need to understand that the framework will undergo some changes as the new facilities which have been discussed here, come on line and begin to be used as the principal means of doing business in space.

The important new opportunities for international participation clearly lie in the distinctive and advanced features of the programs that have been described to you. Those distinctive features are, first, the technological development and use of the reusable transportation system and the space station itself and, secondly, the exploitation of manned flight for research and practicable applications. As we approach these possibilities, we should recognize that we have, in fact, already made some progress in developing a basis for serious consideration of the possibilities of participation. In October 1969, Dr. Paine began his series of visits to the capitals of countries with the most active space programs. Also in October, when the second quarterly space station review was held, we took the step of bringing international audiences for the first time into NASA's internal management reviews of future programs. In March of this year, international audiences participated in NASA's internal reviews of the space station and space shuttle programs. Also in March, President Nixon made his statement on space policy, highlighting our interest in attracting international participation in the major programs of the future. In April, in particular, Dr. Paine continued informal discussions with your Ministers of Science, helping further to define thinking on both sides with regard to the possibilities which have been opened up for us. In April, both ESRO and ELDO indicated that they would be sending permanent representatives to Washington to maintain liaison with NASA on both the shuttle and the space station programs. Also, in that period, and continuing since, both ESRO and ELDO sent teams through the States to visit NASA centers and NASA contractors in order to increase their information of both programs. In May of this year, ELDO reported its intention to engage in conceptual studies of a space tug and ESRO recorded its plan to carry out conceptual studies of a space station module. We are most gratified that these concrete steps have been taken. Now in June, we have this briefing which I think is unprecedented. In July, we will have a similar briefing on the space shuttle.

Beyond this list of early steps, there are a number of specific activities of which you might wish to take particular note. Beginning July 17th, there will be a shuttle technology review at the NASA Lewis Center. Its purpose is to continue examination of the prospects for sharing the supporting research and technology which needs to be emphasized in conjunction with the development of the shuttle and the space station. On July 26th, NASA will begin an internal Summer Study of its own priorities for future space science programs. Because of the interest which has been generated in the Post-Apollo program, we have invited a number of your distinguished colleagues to join us in this ordering of priorities for future work in space science and earth science. Among them are Professor van de Hulst, Professor Bondi, Professor Massey, Professor Blamont and others. We feel very privileged that these people will join us in this attempt to develop a long range view as to which scientific objectives should be given priority status for future programs. While this is directed at NASA programs, it cannot help but be of interest and importance to you for your own ordering of scientific priorities in your national and regional programs.

On September 9th, we will begin a process at the NASA Ames Center which is specifically related to determining the requirements which experimenters will have in the space station program. Mr. Mathews, Mr. Lord and Mr. Johnson, have referred to this, but let me repeat it again for you. September 9th, we will have what we are calling a Space Station Symposium at the NASA Ames Center. It will focus on the space station system, on procedures for handling candidate experiments, and on requirements which experimenters will hope to see designed into the space station so that they can do the scientific and practical research they would wish to conduct in the future. In that Symposium, panels with U.S. and international representation will be established in the three basic areas which Mr. Mathews described yesterday. The panels will continue their work throughout the winter and prepare a report by May of 1971. That report will be provided to the National Academy of Sciences as a basis for a full length Space Station Requirements Study in 1971, to which again international participation will be invited. We will be writing to Professor Bondi to formalize invitations to you to participate in this entire procedure.

That procedure should be understood as a principal means of making certain that the space station is well-adapted to its purposes. It will be a most useful activity for you, but it is not the only means of approaching participation in the future space station. It is an early means and an organized means, but there will be other means and some of those will be suggested as I go along.

I think it is clear from this brief review that technical coordination on the opportunities before us is proceeding quite sensibly. It is moving forward, it is substantive, and we are most gratified that it has generated concrete possibilities for significant participation -- as manifested by your tug and space module studies. The question then is how might we institutionalize future technical relationships in these programs? Those of us who are responsible for the institutional arrangements must face up to the challenge of this question. We must begin to say what can be said at this very early time to contribute constructively to the ultimate organization of cooperative projects.

Before I suggest how we might institutionalize various types of participation, I would like to make some preliminary statements. What I say on the subject is exploratory rather than definitive and certainly it is subject to further discussion. At the same time, there are some basic principles which have already been enunciated and which we must expect to follow however we structure our relationships. First, we have made quite clear that we are speaking of a literal kind of cooperation in which each participant supports (funds or finances) his own participation. Second, institutional arrangements must be consistent with good management. Managers must be permitted to manage, and institutional arrangements must not interfere with that process. As an R & D agency, NASA feels this is terribly important, and I think it will be important also to serious experimenters and contractors. Third, we should provide for an exchange

of technical information which is fully appropriate to the participation which materializes. We must also recognize that provision must be made for equivalent access to the facilities which international participation might bring into being. Certainly, we would like to establish the broadest possible participation. This means that a multilateral form is much to be preferred, but until it develops we would not exclude bilateral relationships. Finally, it seems to me extremely important that we avoid discussion of institutional arrangements in the abstract. Inevitably, in an abstract discussion, different points of view are hard to resolve because the assumptions on which they rest are not reached by the argument. Quite frankly, abstract discussion of institutional arrangements should be avoided like the plague. It is much better that we address ourselves to substance and content:- when it is determined what you are interested in doing, it will be much easier to understand each other and to establish institutional arrangements appropriate, for specific projects. This implies that there may be different kinds of projects with different institutional arrangements for each and that these may exist simultaneously or in sequence.

To ensure that I am understood correctly, let me review my preliminary remarks:- what I am saying here is purely exploratory; nevertheless, some basic principles apply. They are (1) self-funding of participation, (2) management integrity, (3) adequate exchange of technical information, (4) equivalent access to space facilities, and (5) the broadest possible participation. Then, I have said that we should put content before form and shape form to content.

Now I will proceed to suggest different types of possible participation and the institutional approaches which seem appropriate for each. I have categorized the types of participation in my own way, but, of course, it is not the only way that this can be done. I have listed studies, supporting research and technology, the development of essentially separable elements of a total system, the development of essentially integral elements of a total system and, finally, utilization or use. I have chosen these because, in fact, there are real and current interests in each one of them. Let me suggest in gross terms what sort of institutional or organizational approach might be taken for each of these categories.

Studies, conceptual or otherwise, can be conducted jointly or separately. In either case, the problem is really one of coordinating what the two sides study. The objective is to exchange or jointly produce work statements for the studies, to review jointly the progress of those studies, and together to consider their results and the next steps. It seems to me that the Joint Coordinating Group, co-chaired, is an organizational arrangement which is adequate to the problem. Program and project management personnel would sit on these coordinating groups, with such industry representation as they might decide was appropriate. Studies can be either in-house or contracted, of course, but any industrial contractors used for studies would be free to associate with or sub-contract to industry on the other side, purely on their judgment of the business merits of the association.

Supporting research and technology, fundamental research in technology required for development programs, presents a very similar organizational program. Here we are talking usually of hardware studies instead of paper studies. But I think that the same kind of coordinating mechanism could be established. The two sides could then understand the tasks each feels is important, each could take up those tasks on its own, and jointly monitor their progress and results. Indeed we are considering in a very preliminary sense with our ESRO and ELDO authorities just such an arrangement for supporting research and technology. In addition, where such work is undertaken by an international participant, we would want to provide for that participant's representation on the NASA panels which were described here earlier today; that is, the panels for structures, materials, power sources, and so on, which are coping with the requirements for technology for the space shuttle and station programs.

Turning now to the development of major, separable elements of a total system, let me illustrate what I mean by separable items. By definition, each side can, with relative independence, contract for such major items to its own industry. We have had precisely such separable tasks in our cooperative satellite programs where the European side has contracted with European industry for the development of a satellite, while we have contracted with American industry for the provision of a booster. The interface aspects of the two have been coordinated with uniform success. Now, I believe that the space tug and the space station module in which you are currently interested could qualify very well as separable items. The tug with the shuttle constitute a total space transport system but each could, in effect, be contracted separately. Each would have to be brought into proper interface relationship with the other and with the space station. Similarly, the space module and the core space station could be contracted with relative independence, in Europe and the U.S., but would have to be interfaced with each other and the transport system. This, as I have said, presents a requirement for coordination like that in our cooperative satellite projects of the 1960's. Therefore, to our own experience with projects of smaller magnitude, it would seem to me again possible to use the same Joint Working Group pattern with which many of you are familiar, bringing together project managers from both sides as co-chairmen, supported as necessary by project people in government centers and in industry. Their function would be to monitor total progress, to assure interface compatibility and to assure satisfaction of tests and acceptance of flight articles. Independent contractors on each side, so far as we are concerned, could sub-contract to contractors on the other side, again on purely business grounds.

Now we turn to the development of integral systems. To illustrate, this might include the development of some part, element or subsystem of the shuttle itself, such as structural elements of the shuttle, propulsion elements, life support systems, control systems, and so on. Clearly independent contracting is not possible in such cases. The integration requirements are too severe. If we make the realistic assumption that NASA would bear the main burden for the development of the shuttle, it

then seems to us that the relationship in such a case requires a U.S. prime contractor with European sub-contractors. The European sub-contractors would be funded by their Governments. Now, if we are to protect the principle of management integrity, it seems obvious that the U.S. prime contractor must have some effective voice in the release of funds by European agencies to the European sub-contractors.

Now we turn to utilization. Here we have a wide range of possibilities. At the simplest level, we can continue to encourage the submission of proposals for individual experiments by scientists abroad for flight in NASA missions. Experiments would be selected on their merits and incorporated in the flight missions with the funding support of institutions in the experimenter's own country. This would continue what we call our Flight Opportunities Program. If we are talking about larger packages, (equivalent to satellites but not necessarily packaged as satellites because the new way of doing business in space will change), then we have to provide for the integration of the package and its launching. Here we have two familiar resources. If there is sufficient mutual interest, there is a basis for a cooperative launching in which no fee is required. If there is insufficient mutual interest to warrant our contribution of a launching, such a launching is nevertheless available on a reimbursable basis.

Where men are concerned in utilizing the space facilities of the future, it should already be clear that we are prepared to accommodate astronauts of other countries in these programs. With respect to pilot-astronauts, we assume that there will be an interest in training pilot-astronauts in conjunction with some expectation to use them for your own experimental or applications objectives. We would be very happy to cooperate in that kind of training, and we would be prepared to see pilot astronauts fly the space shuttle after a test period establishes the operational status of the vehicle.

With regard to experimenter-astronauts, we would assume that your interest in sending an experimenter into space would be integrally related to his experimental interests. Such an experimenter would, in our view, come as part of a "package" along with an experiment which required his presence or which benefited from his presence. All this can certainly be contemplated. I could go on into joint operations programs involving data acquisition and even contingency recovery and launching of the shuttle vehicle, but I don't think this is necessary. All these things can be structured according to the need and interest. On the other hand, it has been made clear by many of the briefers that we would welcome participation in the use of the new space facilities on a more extensive basis -- not only in the conduct of experiments, but also in the planning of missions, in the review and selection of proposals, in the consideration of results, and so on up to the degree that your participation and interest warrant. In this case, a broader relationship is clearly indicated. What I have tried to say here is that one can imagine three or four basically different types of participation in future programs and, that for each, there is some seemingly appropriate and perhaps quite different pattern of organization.

Some concluding observations may help put all this in focus. I think it clear that more than one type of relationship can be undertaken at one time or in sequence -- developmental and experimental relationships, for example. Therefore, more than one type of format could be negotiated in the same or different time periods. These could be brought under one governmental umbrella or more, as the circumstances warranted. It would depend on whether relating the different sets of participation was constructive and made sense. Multilateral, or bilateral, or both arrangements could be set up, although we greatly prefer the first.

Now, I think this has been the first public discussion of modalities or methods for organizing possible relationships in major future programs. The prospects for misunderstandings and overly-rigid interpretations of this discussion are quite good! I would like to achieve a uniform understanding that we all have meant to put before you concepts and constructs which are sure to evolve further. More than that, we are inviting your participation in the evolutionary process itself. Perhaps the most important point is, again, that institutional considerations should be taken up in connection with specific types of projects and programs and should not be discussed in the abstract.

The final word I have to say relates to timing. Some of you have asked, when should you consider that decisions must be taken in Europe with regard to any participation that you might decide is within your interests. We have been talking here of a great many different things: studies, research, development, experiments, and so on. Each has its own time scale. Experiments which are not required for the first flight of the space station are essentially open-ended in time. You can get in at the beginning or later. However, as you move up in scale and in the degree of relationship between any interest of yours and the space station itself, time considerations change sharply. For example, if your studies point to space station modules like an astronomy module (which is complex and has complex interrelationships with the core station), then you begin to require development periods which are virtually identical to the development time required for the space station itself. In this case, your decisions ought to be becoming clear by the end of this year.

More broadly speaking, the scope of participation can be greater the earlier it is established. As time progresses, the scope for participation in basic decisions and in the major development programs will inevitably diminish. NASA has made every effort to open the question of participation at the earliest time, but studies, designs, contracts and budgets move forward steadily. I think this is well understood and need not be labored more.

Gentleman, I hope that this brief preliminary discussion of possible arrangements for major international participation will prove helpful to you. I hope also that NASA's briefing on the space station itself in these past two days has been informative, and that it has been stimulating. Do remember that nothing you have heard is cast in concrete, and that no drawings, designs or words should suggest closed doors. There are no closed doors here. The doors are, in fact, all open wide. I believe, we all believe, that we have very exciting possibilities before us. I hope that we will move steadily forward towards realization of these possibilities.