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DRAFT #2/Dr. McLucas/29 July



MEMORANDUM FOR THE RECORD

SUBJECT: Decision on EOI and FROG

The ExCom is trying to draft a memorandum to send to the President requesting a decision on whether to proceed with EOI as expeditiously as possible or whether first to develop a FROG system and then do the EOI at a more leisurely pace. They are considering the options of going EOI only, EOI with some delay with FROG filling the gap, and, cursorily, the option of delaying the EOI purposely by a couple of years, keeping technology going and proceeding with FROG immediately. The advantage of the last alternative is that the development of FROG would be completed before one takes on the development costs of the EOI. Somewhat the same effect could be achieved in one of the earlier options if an overall ceiling were placed on EOI and the associated data relay satellite.

*

The assumption behind all of these options is that we need a near real time system rather badly and are prepared to spend a year to get it. It is further assumed that the differences between the options are based on some uncertainty as to just how urgently the President and the

have
* How about some words on the omission of an option to go FROG with only tech analog for EOI, since that's what we get too on page 6.

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principal users of such systems think we ought to move ahead. All of the options would give us a near real time capability by 1976 at the latest. Several of them would provide near real time either in '74 or '75 depending upon one's assessment of the likelihood of meeting the proposed schedules. I think that if one is convinced that we need the near real time systems, then the options which we have proposed are not all that bad. On the other hand, there are a number of people who feel that we have become over-sold on what near real time systems will be able to do for us. A lot of the impetus for the near real time came about a year ago when we were involved in the Suez business. We were asked how rapidly the Egyptians were building up their SAM defenses and it was a matter of days before we began to get any significant data that could be used to assess the actions of the Egyptians. The first coverage we obtained was U-2 coverage. This took about a week to begin to materialize. Later we got satellite coverage and we discovered that the ^{search}~~SEPTIS~~ systems was providing coverage that could tell the extent of deployment but could not analyze it with any degree of accuracy. We had to go to our highest resolution pictures, namely the GAMBIT photos, [redacted]

[redacted] Even the U-2 pictures were not good enough to make

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this distinction because they were taken with the airplane standing off considerably to one side of the area of interest. Thus we got some firsthand experience which indicated that pictures should be of roughly one foot quality to answer the questions

The Suez situation led us to examine a number of potential crisis situations in which the U.S. ^{could be} was seriously involved. Something like seven or so situations were examined, and it was decided that in all cases the near real time systems could be of use if they had a response time on the order of 12 hours. Systems which responded in, for example 24 hours, could lead to the use of two day old data in the various studies that would be going on in Washington, and it was felt that a two days ~~delay~~ delay in some cases could cause decisions to be made without the necessary information. At the same time, I do not believe that any of the situations examined were such that we would actually have wanted to take action. Rather, it was a question of making decisions about the U.S. attitude that would be expressed to various parties, rather than decisions involving any military or diplomatic initiatives.

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In many cases that one can think of, such as the invasion of Czechoslovakia, overt evidence such as the location of troops ~~was~~ ^{was} not a direct clue to Soviet intentions, because the troops were already massed in an exercise situation. Only through COMINT or some such channel could one find out what the actual intentions of the invasion forces might be. Typically, COMINT systems operate in a more nearly real time mode than do photo systems. Of course photo systems and COMINT systems operate in a symbiotic relationship. In any case I don't think we have definitely shown that having a near real time photo systems is going to make any dramatic change in the way the government decision process operates.

If one happens to be a skeptic on this point, then none of the options that are proposed by the ExCom would meet his desires. If one feels that the case is yet to be made, then he would like to see near real time systems tried out at as low a cost as possible to see what they'll actually do for us. Once such systems were operating, the data would be made available as soon and as frequently as possible in certain crisis or near-crisis situations. Over a period of a few years we would get a feel for what the systems were accomplishing for us. We would also have the opportunity to modify such systems, and

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to modify the way we handle the data they produce, to make the data more useful. Eventually one could evolve toward an optimal system. But this is a conservative approach. It is based on the assumption that we are getting essentially all the data we need now, that the current systems, GAMBIT and HEXAGON, can easily be programmed to be up in the air all of the time, 365 days a year, at essentially the annual cost we are now experiencing. If one looks at the overall budget situation that faces the country and the Department of Defense, and takes into account that we have not proved the case for near real time, then it seems reasonable that he would conclude that the thing to do is to go the least costly route. This would involve developing the FROG system, not on a crash basis but within the 30-36 month schedule. Such a schedule would permit the early introduction of FROG. It would provide us with near real time information and would reduce the costs of current GAMBIT operations so that the net add-on to photo systems costs would be held to a minimum. It is quite likely that FROG could be operated in the future for the same price as the current GAMBIT so that it might very well be that the only outlay which had been made above what we are now spending would be of the order of \$200M, the one-time development cost of FROG. It

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seems to me that at least one of the Presidnet's advisors ought to be asking him to consider this kind of approach.

The options that are now being looked at by the ExCom all include eventually going to EOI, which is a [redacted] proposition. While I think there is very little doubt that the system can be built and that it will operate more or less as advertised, there is considerable doubt in my mind as to whether the configuration that we have chosen is the optimum. One will not know until after he has flown it for some time whether it is the optimum. Neither will one know exactly how much money we are committing ourselves to when we go for the EOI. It is a fairly complicated device, and all devices of similar complexity in the past have turned out to cost a great deal more, sometimes several times as much, as the original estimate. I think we have made considerable headway in the last couple of years in first demonstrating that the EOI system will probably work and second, in modifying the system configuration to the point where it (a) stands a good chance of replacing GAMBIT, (b) stands a good chance of providing a greatly increased area coverage, and (c) has good growth potential [redacted]

[redacted] These are all to the good. There's a question in my mind as to whether further delay would be fruitful in causing

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the system to evolve further. Nonetheless there is no doubt in my mind that as we begin to use the system we will find ways in which it could be improved. It is just impossible to imagine all the situations which will face us in the future and how we might want to respond. A great deal of learning takes place as one begins to use such systems. We had a good example last year over the Suez when the stated requirements of USIB did not even call for targeting the Mid-East in preference to the Russian missile sites when we had satellites on orbit. It is hard for me to believe that this was a very urgent requirement if we weren't even willing to divert a small fraction of our coverage from the missile fields. And yet this was one of the situations which has led to the need for the near real time system.

John L. McLucas

** New way of using the data*~~TOP SECRET~~

DEPARTMENT OF THE AIR FORCE
OFFICE OF THE UNDER SECRETARY

MEMORANDUM

Jul 29 '71

John McL



Here's the second draft of the memo to the President. I have incorporated most of your suggestions. I have not however incorporated the bulk change in the last section because I had difficulty interpreting the wire sent me and I could not reach you Tuesday night. I suggest you include these comments at the next review.

Bob N.

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ON READOUT SATELLITES

This memorandum presents an issue for decision concerning our plans for acquiring a photographic satellite system for Two systems are under consideration involving differences in dates of initial availability, overall capabilities, and levels of immediate and future costs.

The Issue

As you know, the National Reconnaissance Program is supervised by an Executive Committee consisting of Mr. Packard, Mr. Helms, and Dr. David. For a number of years the Committee, and the intelligence community in general, has recognized that a major deficiency existing in our photographic satellite systems is their inability to return pictures quickly in time of crisis. Therefore, we have been alert to new technological developments which might allow us to fill this gap in our program. A little over two years ago, it became apparent that progress in the technology of solid state sensors presented us with a feasible opportunity. As a result, we started a deliberate, well-funded technology program to build the Electro-Optical Imaging (EOI) readout satellite that Dr. Land recently discussed with you.

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This system can send good quality pictures [redacted]

[redacted] as they are being taken with very little delay
although it may take [redacted]

[redacted] It will enhance the overall capability of
our photographic reconnaissance program. As is true of all
photographic satellites, it cannot see through clouds nor see
at night [redacted]

[redacted] It must, therefore, be kept in mind that any photo-
graphic system, even if it performs up to the most optimistic
projections, will give us only limited photographic coverage
of many areas. For example, the probability of seeing a given
ground point in North Korea at noon during July is twenty percent
because of cloud cover. Repetitive sampling improves the
probability of success.

The EOI system uses a very large telescope and fixed
arrays of light sensitive solid state elements to measure
light intensity of a ground scene. The picture is sent through
a sophisticated relay satellite to a complex data processing
system which will provide a picture in Washington within a
[redacted] after it is observed by the satellite. We have
invested over [redacted] in research on the technology and the
components, but a substantial development effort will be
required to make the complete system available. The most
optimistic estimate is that the system could be in operation

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before 1975. We do not believe this is realistic and recommend we not count on having an EOI before 1976 at the earliest.

In preparing the budget for 1972, we were requested to investigate the possibility of having a near-real-time readout system as early as possible to cover crisis situations that might arise before the EOI was ready. After examining a number of alternatives, we concluded that the best way to have a readout system at the earliest date was with the Film Readout GAMBIT (FROG). This system would use components of the present GAMBIT satellite. The system would record the ground scene on film, develop the film in the satellite, scan the film with a laser beam, and send this picture information by electrical data link to an Air Force New Hampshire ground station twice a day when the satellite passes overhead. Pictures would be available to us in Washington 12 to 24 hours after they were taken by the satellite.

The FY 1972 budget decision by the ExCom was to develop the FROG on an urgent schedule to be available in 1974 and continue the EOI development so it would be available by 1976 or shortly thereafter. This recognized that the EOI was potentially a better system but that there was a big engineering and development job yet to be done. This decision recognized that the FROG involved less uncertainty and clearly could be made available sooner. It also recognized that 12 to 24 hours for picture availability was probably adequate for most crisis situations.

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Events that have occurred since we made this decision now make it clear that this plan which involved the initial development and operation of FROG followed in a couple of years by the EOI would have such budgetary impact over the next five years or more that it seems unwise to pursue this course:

Senator Ellender has told us that he would not agree to a budget which includes both these programs and that we should choose between them. His letter is enclosed as Attachment 1.

Even without this specific problem, it has become clear that we are going to have to plan for a reduction in the overall level of the FY 1972 intelligence budget and we have a number of high priority programs that must continue.

Even if we survive the FY 1972 budgetary problems, inevitable budget pressures in FY 73 and beyond would make it difficult to justify carrying two costly programs.

We, therefore, now believe it may be impracticable to contemplate building both these systems. However, since any other plan may delay to 1976 or later a readout capability, we request your decision as to which course of action we should follow.

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CONTROL SYSTEMAlternative Courses of Action

We believe there are four alternatives for you to consider. (The costs of our photographic reconnaissance programs through 1980 for each of these alternatives are shown in Attachment 2.)

Option 1: Procure FROG now for launch in early 1974 and in December 1971 procure EOI for launch in 1976. This is the option in the FY 1972 budget now before Congress.

Option 2: Procure FROG now for launch in early 1974; delay EOI for two years so that the first EOI would be launched in 1978.

Option 3: Procure EOI only for launch in 1976. This is a modification of the program which we had been pursuing for the past two years and have presented in previous budget submissions.

Option 4: Attempt to procure EOI only before 1976 by undertaking a crash program.

This is the recommendation of Dr. Land's panel.

Further discussion of these options is provided below. Before elaborating, the following additional points are significant:

1. Some members of the intelligence community feel that procurement of FROG will either delay for a long period or completely prevent further work on the EOI satellite because of

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budgetary and other factors. Therefore, they feel that Option 2 is not realistic. Other members of the community, however, feel that a properly phased procurement cycle can provide the EOI satellite late in the 1970s with the FROG operational in the meantime.

2. The addition of either EOI or FROG to our satellite photographic capability will enable a reduction in our need for our present photographic satellites. This will to some degree compensate for the increased cost of these new satellites.

Option 1: Start Film Readout GAMBIT system procurement now with February 1974 IOC; start Electro-Optical Imaging system procurement in December 1971 with June 1976 IOC.

(This is the FY 1972 budget request.)

This option would make available through the Film Readout GAMBIT system the readout and crisis capability on an interim basis in February 1974 and until inception of the Electro-Optical Imaging system capability in June 1976 or later. The Film Readout GAMBIT system development cost is estimated to be \$187M and annual estimated costs are \$100M per year based on two-plus launches per year at \$41M each. The estimated development cost of the Electro-Optical Imaging system, the relay satellites, and the ground station in this

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option is [] and the estimated annual operating cost is [] based on [] per year with greater than [] [] expected vehicle life.

This option will give us the earliest possible readout and crisis capability and provides for the potentially more responsive and productive Electro-Optical Imaging system capabilities on a reasonable schedule. The option presents difficulties, however, as it requires major resource allocations in FY 1973 and FY 1974 and elevates the NRP budget level to or above [] from FY 1973 onward. Moreover, the option is explicitly contrary to Congressional advice and would require strong defense.

Option 2: Start Film Readout GAMBIT system procurement now with February 1974 IOC; postpone Electro-Optical Imaging system procurement decision until December 1973 and carry out further technology development ad interim.

This option would make available through the Film Readout GAMBIT system the readout and crisis capability in February 1974 and would delay the potentially more responsive Electro-Optical Imaging system until about 1978. The estimated development cost in this option of the Film Readout GAMBIT system and its ground station is \$187M and the estimated annual operating cost is about \$100M, the same as Option 1. The estimated development cost of the Electro-Optical Imaging system, its relay satellites, and ground

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station is [] and the estimated annual operating cost is [] based on [] per year. These costs are somewhat greater than those in Option 1 because of the longer development time and a larger allowance for inflation.

This option has utility if there is an urgent need for the readout and crisis capability but it applies budgetary restraints to the NRP, especially during FY 1973 and 1974. In addition, the option is apparently responsive to Congressional advice to choose one of the two systems this year but there might be a problem in obtaining funding later (see Attachment 2). The option has the disadvantage of postponing for an extended period an attempt to attain the inherently great potential of the Electro-Optical Imaging system with an IOC no earlier than 1978.

Option 3: Start Electro-Optical Imaging system procurement in December 1971 with level funding by fiscal year and with IOC about June 1976; terminate Film Readout GAMBIT system design activities. (This resembles our previous budget requests.)

This option pursues Electro-Optical Imaging system procurement alone on a recommended level of funding not to exceed [] per year until system IOC. With such a funding discipline it appears that an IOC could be expected no earlier than mid-1976. The estimated development cost of the Electro-Optical Imaging system, relay satellites, and ground station

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in this option is [] and the estimated annual operating cost is [] based on [] per year. These costs are different from Option 1 because of differing constraints.

This option has utility if there is not an urgent need for this improved readout and crisis capability. The option applies fiscal restraints to the NRP budget, keeping budget levels at or below [] in FY 1973 and FY 1974 and allowing for an orderly development schedule. In addition, the option responds to Congressional advice concerning the choice of one of the two systems offered.

Option 4: Start Electro-Optical Imaging system procurement in December 1971 in an accelerated program with possible December 1974 IOC; terminate Film Readout GAMBIT system design activities. (This is the Land Panel recommendation.)

This option corresponds to an urgent effort to attain the Electro-Optical Imaging system capability at the earliest practical date but has significant risk of schedule slippage and cost overrun. The estimated development cost of the Electro-Optical Imaging system, its relay satellites, and ground station is [] assuming the development can in fact be done in a shorter period, and the estimated annual operating cost is [] based on [] per year, the same as Option 3.

This option is simply Option 3 accelerated to the earliest possible date. The option has difficulties in that it has

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significant possibility of cost overruns and schedule slippages. It could be vulnerable to subsequent Congressional action and require strong defense because it requires well over in each of FY 1973 and FY 1974.

Recommendation

The NRP Executive Committee agrees that the U. S. should move toward acquiring the EOI system at some level of funding. EOI is in fact the intelligence imaging system of the future. It has almost open-ended possibilities for growth both in image quality and in image processing. The Committee disagrees on the urgency and its associated risk and on the price worth paying in attaining this capability. We are, therefore, presenting this issue to you for your decision.

The ExCom recommends Option 3 because it develops the best capability current technology can offer on a reasonable schedule while relying on our presently operating satellites. If you believe there is an urgent need for this capability at an earlier date, we recommend Option .

David Packard
Chairman
NRP Executive Committee

Attachments

1. Ellender Letter
2. Cost Data

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I prefer Option 1 _____
 Option 2 _____
 Option 3 _____
 Option 4 _____

_____ The President of the United States

_____ Date

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