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~~NRO~~ NATIONAL RECONNAISSANCE OFFICE
WASHINGTON, D.C.

THE NRO STAFF

15 September 1969

Colonel Allen

MEMORANDUM FOR CAPTAIN GEIGER RRS

SUBJECT: The Rationalization of VHR

PROBLEM

Why is there no viable rationale for very high resolution (VHR) satellite photography?

BACKGROUND

Several high-powered studies have attempted to establish a case for VHR photography, mostly in support of MOL. A number of these (e.g., the Foster Study /Ad Hoc Evaluation Group/) have made innumerable arguments, many of which were fairly impressive. Taken together, they ought to have made an unshakable rationale for VHR. That they have not made a sufficient case to justify MOL is a matter of record. Whether they have made a sufficient case to justify funding any other VHR development is a matter of doubt.

DISCUSSION

There are two different sets of difficulties in rationalizing VHR: structural and procedural. The former are inherent in the problem and should be understood, but must be lived with. The latter are perhaps less important, but can be ameliorated.

STRUCTURAL PROBLEMS

The first of the structural problems derives from fundamental economics--there are always an unlimited number of claims on an always limited set of resources. Therefore, VHR must compete for resources and priority with other desirable goods and services. It will always be inherently difficult to get complete community, let alone DCI, support for VHR when there is the possibility that VHR funding might come at the expense of not meeting more pressing requirements such as search and surveillance. Given a secure KH-9 program, support for meeting technical intelligence requirements with VHR might be more forthcoming.

Speaking of economics, a brief digression may be profitable to consider the economic nature of intelligence. NRP intelligence is usually a free commodity to a principal ultimate consumer, the military commander. Since he does not have to pay for this useful commodity, he will demand it within limits imposed only by his appreciation of political and technical feasibility. Should a commander be forced to choose between a squadron of aircraft and a knowledge of enemy troop disposition, he might choose in some circumstances to forgoe the intelligence for the additional force. In this same way an analyst eager for VHR detail forced to choose between meeting his technical intelligence and surveillance requirements, might conclude he would miss a surveillance capability more. The conclusion from this excursion into the economic obvious is this: Lowering the cost of a program that meets search, surveillance, and technical intelligence requirements increases the chance of having the VHR component of that program approved by those to whom intelligence is not free. (In principle, the same benefit could be obtained by increasing the amount of total resources available.)

A less obvious aspect of this question of economics and the priorities it engenders is the question of requirements fulfillment. Let us say that genuine, universally agreed valid intelligence requirements are set up that are met by a VHR system 100% twice a year. It may well be that the intelligence community will prefer to see a lower cost and higher frequency KH-8 system meet 80% of these requirements quarterly. The intelligence community cannot be expected to make this sort of decision without experience on both sides, and asking them to choose the unknown over the known is difficult.

The second problem is the difficulty in defining very high resolution requirements. Requirements statements are a product of experience and there has been very little experience in VHR over denied areas.

[redacted] has written a definitive memo on the definition of VHR which clearly shows the flexibility of the term. The heart of the problem is structural. Each intelligence target in the overhead reconnaissance inventory has a range of resolution requirements corresponding to what is desired to be known at any given time about that target. These requirements vary for a given target and a given time, but they range down to the equivalent of parade photography (UHR?). The time that VHR is required for a given target complex, such as a submarine basin, is not generally known until after the photograph has been taken.

Partly as a consequence of this problem, there has never existed a consolidated list of actual targets requiring VHR.

The third structural problem is a product of the first two. Given a requirement for VHR on a specific target, at what point does further resolution in overhead photography become less desirable than some other input to the EEI's (in the larger sense of such elements)? [redacted], taking a poll of FTD analysts and PI's, determined that, in their opinion, photography of [redacted] resolution would be required to satisfy essentially all of the EEI requirements for some 1637 intelligence targets selected to give a representative sample of all intelligence target categories. Even, however, if one were to take this statement (or the entire poll results) as a valid point of departure in establishing VHR requirements, there would be no way of determining for all classes of objects at all times the relative value of overhead photography at increasing resolution versus (1) photography of indeterminate resolution from a side aspect (elevation view) and (2) collection of some entirely different element of information input, such as infrared signature or radio frequency emissions. Thus, there is some limit for any intelligence target beyond which increasing resolution of overhead photography is less rewarding than investment in other collection means. The limits vary but are probably in the HR range for many targets much of the time.

The final structural difficulty could be a problem were it not for compensatory DIA regulations. It will be mentioned for the record. There could be, without these procedures, justified fear that the listing of a resolution requirement for a given target will prejudice, if too low, any future improvement in resolution of that target, and, if too high, frequency of future coverage. No PI wishes to put himself in such a position. Because of this, changes up and down are permitted without prejudice. However, target acquisition in a high capacity system, such as DORIAN, is likely to be more closely related to target importance than target resolution requirements. Since such a VHR system would be operated in a largely surveillance mode against many targets not requiring VHR coverage, there is that much less support for a VHR capability with low requirement/use efficiency.

PROCEDURAL

One of the primary procedural problems, and probably the most difficult to get around, is the traditional tying of

requirements to capabilities. This has the effect to establishing firm requirements for firm systems and weak requirements for potential systems. It also tends to sink the system down to the requirement with the system. In the MOL case, VHR got tied too tightly to the justification of a manned system.

These observations are not meant as critical of the requirements-capabilities tie because, as it has been properly commented, one should not get in the habit of specifying requirements which cannot be met. Nevertheless, this has created specific problems. The PI's and analysts have experience with KH-4, KH-7, and KH-8 photography. They know how to specify requirements in that context. VHR photography from a satellite platform is essentially unknown to the grass-roots of the community and has thus failed to generate that demand for the product which could be expected to result from exposure to it.

One of the chief culprits here has been the project BRAINSTORM management, which initially failed to calibrate the cameras used in acquiring the data and is laggard in disseminating the results to the community for assessment of resolution requirements.

The second procedural problem is the possible prejudice generated by the nonsense in previous VHR justifications. For example, one of the most prestigious of these, the Ad Hoc Evaluation Group Study, tried to pad the argument for VHR. Because of the sacrifice of quality of argument for quantity, the study contained erroneous resolution information for both KH-8 and DORIAN and stated that VHR would solve the silo hardness question--when we don't even know the answer for our own silos. As another example, the recent SP statement of VHR requirements misinterpreted [redacted] EEI poll.

In fact, this is probably not a serious problem, since it may be safely assumed that most of the high level decision makers have not waded through any of the details of these reports. Nevertheless, such errors are not harmless in that they create a bad impression on those that do read them and provide ammunition to the Selins and the Sorrelses. The lesson here is not to raise, let alone force, an issue which cannot stand vigorous analysis.

A third procedural difficulty is caused by the disproportionate support given by various parts of the community in formulating VHR target requirements. This effect has produced an imbalance in the listing of requirements. FTD

was given two years lead time to develop DORIAN target listings compared to the less than six months for the Army and Navy, and hence, the air and space weapons requirements are much firmer than are the statements in the other categories. (The reason for this was that MOL was an Air-Force-only program for too long.)

On the subject of target listings, the request for VHR target listings for DORIAN that went out from DIA to the community neglected to specify listing format. The results were consequently too various (magnetic tape, punched card, different coordinate systems) to combine before the program was killed.

The final problem is associated with implied inflexibility in the statement of requirements. Often a requirement will be stated in terms of a target, such as an airfield for experimental aircraft, unconditionally requiring VHR, when actually the VHR is only required when a new aircraft or missile is at the field. By explicitly recognizing conditional VHR requirements and the possibility of preknowledge of a target condition, one may develop more realistic requirements, easier to satisfy. Such as-needed VHR requirements might be met by a modified GAMBIT using the first bucket return to spot the VHR targets and by restricting the VHR activity to the last few revs, timed for good weather in the target areas.

SUMMARY

The reasons for our current lack of feel for the value of VHR and the failure of its rationalizations are structural and procedural. Structural problems include competition for resources with projects conceived to be more urgent, a lack of definition of VHR requirements and a lack of determinability of where VHR ought to be traded for other information. Procedural difficulties are probably less important and include the requirements-capabilities tie, the past misinformation associated with VHR, the lack of coordinated community support, and implied inflexibility in the requirements statements.

RECOMMENDATION

That future statements and studies on the value of VHR keep the above structural problems in mind and attempt to solve the procedural problems in their formulation.

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