CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
Imagery Analysis Service

IMPACT OF A NEAR-REAL-TIME COLLECTION SYSTEM ON CIA'S IMAGERY ANALYSIS NEEDS

A Preliminary Study By the

Imagery Analysis Service

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CONTENTS

OBJECTIVE

To meet CIA's needs for imagery analysis during the forthcoming era of highly advanced reconnaissance sensors including a near-real-time imaging satellite system.

ASSUMPTIONS

A Near-Real-Time (NRT) Imagery Satellite System will be employed by the intelligence community by the mid-1970's, perhaps as early as January 1974. Such a system will be essentially as described in the CIA Imagery Study Group report (Inlow Report, BYE-1445/69, 9 June 1969).

Other satellite reconnaissance systems (KH-8 and KH-9) will continue to be employed during this period.

I. WHAT IS IMAGERY ANALYSIS?

1. By 1974 imagery analysis will have come of age in CIA, so to speak, having developed for some 21 years since the original P.I. component was formed late in 1952. Over the years, however, imagery analysis has not been adequately defined or understood in spite of its increasingly valued role in intelligence.

2. Imagery analysis is an intelligence analysis activity which utilizes overhead photography and other imagery as its primary source material and supports the production of finished intelligence. Imagery analysis is not finished intelligence, nor is it merely processing of a raw intelligence source. It lies somewhere between the two. It draws on a variety of technical skills as well as specialized substantive or geographic knowledge. At its best, it provides the timely analysis and reporting of conditions and events of intelligence significance, for subsequent all-source evaluation and analysis.

3. What makes the modern-day P.I. a professional "Photographic Intelligence Officer" or "Imagery Analyst," as he is now described? As in the past, his initial task is to interpret or translate photographic information into a form which can be readily understood and used by others. In this he is not unlike a cryptanalyst or translator, even though he works with photography while the others work with signals. To fulfill his responsibilities, the modern-day imagery analyst must be trained and equipped to use complex, high-performance optical instruments to extract and interpret the maximum information imaged. Some photointerpretation functions could perhaps be done by machine (e.g., a cloud scanner, or a target recognition device), although probably at great expense. But beyond these are other functions which cannot be automated. These involve the uniquely human abilities of a trained professional to react to an infinite variety of situations, using photographic information stored in his mind as well as his files. He reacts by analyzing the imagery, applying logic and experience and drawing conclusions. When imagery is the primary or most important source of intelligence in a given situation, then the role of the imagery analyst becomes much like the role of the intelligence production analyst. Yet it is not a role which can be taken on by analysts who are not trained and not in constant practice. The ability to identify the meaning of small tonal changes within an image requires considerable

experience and, despite the use of specialized optical devices, in the final analysis the eye and mind of the expert are the sensors which must recognize and react. The professional imagery analyst knows his subject matter and can apply the information he derives from imagery to broader intelligence problems. Inevitably then, as he gains experience, he becomes in effect an intelligence analyst using imagery.

4. Maintaining and further developing a corps of professional imagery analysts such as we have described is no easy task. It calls for selection and training specifically designed to develop analysts who can give substance and meaning to the great volumes of imagery acquired and who can use their information, files, and experience to draw conclusions about its significance. To hold these people and maintain their productivity, opportunities for them to advance and improve themselves have to be provided within the framework of a career development program attuned to their particular needs.

5. An understanding of imagery analysis as a professional research and reporting activity, with the characteristics and attending needs we have described above, should be regarded as an important step in planning for exploitation in the NRT era.

II. HOW DOES IAS MEET CIA'S DEPARTMENTAL IMAGERY ANALYSIS NEEDS?

6. CIA's independent needs for imagery analysis--those needs not satisfied by interagency exploitation efforts under the National Tasking Plan--are currently being satisfied primarily by the DDI Imagery Analysis Service. The bulk of these needs for imagery analysis and related services exist in the production offices of the DDI and DDS&T, where finished intelligence is generated. IAS supports the special projects and studies of these offices, assists in the preliminary assessment of the intelligence content of newly collected imagery, makes independent evaluations of imagery on critical intelligence questions, and develops and tests hypotheses and new exploitation techniques. IAS also meets the needs of DDP operations requiring imagery analysis support, and provides assistance overseas. During FY 1969, IAS performed some 55 percent of its work for DDI offices (primarily OSR and OER), 21 percent for DDS&T (primarily OSI and FMSAC), and about 6 percent for DDP, with 10 percent distributed among DCI, ONE, NIPE, and other consumers. In addition, IAS contributed 8 percent of its effort to the COMIREX interagency exploitation program, on behalf of CIA.

7. CIA's departmental imagery analysis needs are presently being met by a CIA component separate from NPIC, so as to assure this Agency and the DCI of the following:

a. An Independent View. "(CIA) must support the Director of Central Intelligence, developing its own positions and contributions over a broad range of critical intelligence problems.... In this intelligence role, Agency production components receive direct support from the Imagery Analysis Service..." (TCS-508/68, Guidelines for the CIA Imagery Exploitation Requirements and Reporting Process.) The need for an independent view is greatest during crisis periods or when critical issues are at stake.

b. A Second Look. The information content of imagery currently being collected is so high, and the demands placed on the NPIC imagery analysts for immediate reporting on a growing list of targets are so great, that there must be a "second look" to insure complete, accurate, and timely reporting. This second look by IAS consistently yields

important new intelligence information. During FY 1969 IAS analysts made the initial identification of numerous single-silo ICBM sites, a number of SA-5 complexes, a major new nuclear target, and countless other contributions to the accuracy and timeliness of this readout. Discoveries such as these often constitute fresh ground being broken by our analysts at a time when NPIC is under the weight of their first- and second-phase exploitation responsibilities. So as to avoid confusion to the community during this initial readout period, items found by IAS are passed to NPIC for immediate dissemination. The spirited competition generated among imagery analysts on both sides, by IAS exercising this second-look role, helps to insure accuracy and timeliness in reporting.

c. Responsiveness and Flexibility. A small organization, committed almost entirely to supporting CIA, can apply its efforts--and shift them when necessary--according to CIA needs and priorities without impinging on the needs of other agencies or depa rtments. This requires a close working relationship with requesting offices and divisions.

d. Meeting Covert Needs. Imagery analysis support to the clandestine services varies from transportation or area studies for covert operations to providing imagery analysts for duty overseas. This support requires handling of sensitive information within CIA channels exclusively.

e. Experimentation and Innovation. The DDI has directed that IAS conduct research or experimental work in imagery analysis so as to develop and test hypotheses and new exploitation approaches. New

[redacted]

8. The following imagery analysis tasks are typical of recent work done by IAS in response to the imagery analysis needs of CIA components:

a. Analyze or Study In Depth. In-depth analysis of the imagery is the task most often requested in our current requirements. It supplements the interagency program for imagery exploitation on a national basis. Appropriate measurements are routinely provided as an integral part of this in-depth analysis of the imagery by IAS analysts.

We expect, as we will show later, that this task will fall more and more to IAS and the other departmental imagery analysis organizations as NPIC faces new responsibilities and increasing workloads brought on by the KH-9 and NRT programs.

b. Describe Changes or Activities. Current tasks of this sort supplement the immediate readout and mission indexing performed for the community by NPIC. In the NRT era one can reasonably expect that those doing the initial exploitation will have to report briefly on more targets, much more often than is presently the case in mission-oriented first- and second-phase reporting. As a result, IAS and the other departmental imagery analysis organizations will probably be tasked to provide imagery analysis on a more comprehensive basis which would take into account related targets, events, or activities of importance to their individual agencies or departments.

c. Describe Basic Features. This task has for the most part been taken over by the interagency program of basic reporting. We see the need for basic reporting dropping before the NRT era. Most of the important targets should have been treated in basic reports by that time, and updating may be accomplished without the issuance of a new hard-copy report.

d. Measure in Detail. This task goes beyond the normal mensuration provided in routine exploitation or analysis. It involves the precise, detailed measurement of structures, objects, or component parts which are of particular concern to an individual CIA requester. IAS receives photogrammetric support from NPIC on such tasks as well as having a significant in-house capability through the use of its own mensuration equipment on-line with the NPIC computer. This task, dependent largely on KH-8 coverage, is expected to increase with improvements in the system, some of which are already occurring.

e. Search. Most imagery searches presently conducted by IAS are relatively small-area searches associated with information from another source in the hands of our requester. Such tasks will probably increase in number when KH-9 inputs begin to provide search coverage of improved scale and resolution over large areas. This need should level off or decline once a good photo base is established, probably before the NRT era.

f. Illustrate. IAS is often asked to illustrate imagery-derived information of importance by means of an annotated photograph, vugraph, engineering drawing, sketch, or briefing board without a prepared text. This is a method by which the imagery analyst can visually communicate his findings for convenient use by other CIA components. This task, also frequently requested, can be expected to increase and will probably necessitate the development of faster and more varied methods of communicating pictorial information to key Agency officials as well as intelligence analysts.

g. Experiment with New Methods or Techniques. Imagery analysis experimentation now constitutes a relatively small portion of our direct support work in IAS. For CIA to realize the most gain from substantial investments in new collection systems, we must devote a greater effort to developing methods or techniques for applying imagery to the intelligence problems of our Agency customers.

h. Provide Consultation. This task is accomplished by a variety of means such as meetings with substantive specialists or consultants, face-to-face discussions at the analytical level, and--more and more--secure-line telephone communications. In the NRT era we expect the trend toward prompt answers being required with increasingly short notice to continue. Images will very likely be transmitted electronically for viewing and consultation on a near-real-time basis. As at present, great care will have to be taken by IAS management to insure that the interpretations being passed by imagery analysts via the consultation mechanism are adequately validated and correctly reflect the best judgment of IAS.

i. Provide Coverage Information. This is no longer a frequent request. Coverage information should be machine-retrievable in the NRT era.

III. WHAT ARE THE KEY CHARACTERISTICS OF AN NRT SYSTEM?

9. By the mid-1970's, we can expect that a variety of satellite imagery collection systems (KH-8, KH-9, and electro-optical sensors), will provide high-resolution coverage in great volume, on a host of targets, and with unprecedented regularity. The electro-optical, or near-real-time (NRT) system will in some measure add to the volume, but by the time it arrives, the community will have acquired considerable experience with handling the massive quantities of satellite imagery provided by the KH-9 system. When we have learned to cope with the KH-9, the sheer volume of NRT should not be insurmountable. The significance of NRT, instead, is that certain of its characteristics are so different from present satellite collection systems that NRT will revolutionize present imagery exploitation concepts.

10. A near-real-time (NRT) system, as presently envisioned,* will employ advanced electro-optical technology in a satellite to collect rays of sunlight reflected from a target, convert them into electrical signals, and transmit the signals (probably via relay satellites) to a ground receiving and relay station. There they will be temporarily stored and then selectively transmitted (i.e., not necessarily in the order received) to a processing/exploitation center. The imagery can be reduced to hard copy, probably resembling present KH photography, but electrical transmission of high-precedence imagery and viewing on special displays--cathode ray tubes. for example--may also prove feasible.

11. The USIB has suggested that an NRT system which meets the design characteristics specified below will be able to satisfy a significant segment of the surveillance requirements currently foreseen:

a. Image Quality. Two-foot resolution at nadir.

b. Ground Area Imaged. A minimum of 3 by 3 nautical miles at nadir [redacted] if feasible, for conducting limited search.

* References:
a. The "Inlow Report" (BYE-1445/69) dated 9 June 1969.
b. NRO briefing at the EXRAND meeting of 10 September 1969.
c. USIB Requirements for an NRT Imagery Satellite System (USIB-D-46.4/30).

c. Continuity and Target Access. Continuous on-orbit capability and the ability to provide daily access to all COMIREX targets in the Communist countries.

d. Imaging Capacity and Rate. Capability of returning [redacted] frames of imagery per day against the COMIREX target distribution--mostly monoscopic, some stereo. 15-20 frames per day against dense target concentrations.

e. Reliability. High probability of having at least one imagery satellite on orbit and functioning at all times.

f. Imagery Delivery Location and Time. Initial interpretation and exploitation in [redacted] with some imagery available for initial interpretation within [redacted] after sensing.

g. Tasking Response Time. Such that targeting can, when necessary, be based on information read out from a previous pass on the same day.

h. Data Transmission Security. Insure that unauthorized interceptors will be unable to reconstruct more than a small amount of degraded imagery.

i. Growth Potential. Favor concepts and hardware that will permit long run growth in terms of both the quality and quantity of imagery obtained.

12. The optical system of the NRT is expected to utilize a [redacted] mirror to achieve a [redacted] focal length, and to provide ground resolution of about two feet (at nadir) from an altitude of approximately 280 nm. The system will be designed with a capability to obtain a minimum of [redacted] frames of imagery per day--some in stereo--against the COMIREX target distribution. This would provide an annual camera-operations rate 3.5 to 7.0 times that of the KH-8 during FY 1969.

13. Target distribution and target selection both have a major influence on the pointing maneuvers required of the satellite. Unlike the KH-8/9, [redacted]

degrees in both pitch and roll--providing access to targets out to 300 nm in any direction--an agility of considerable importance in extended areas of high target density, such as Tyuratam or Moscow. The total time required per frame (depending upon repositioning time) varies from 7.0 to 25.0 seconds. During this period the vehicle moves some 28 to 100 nm along its ground track. Since it passes over the Eurasian land mass 8 to 9 times per day (in an orbit which shifts about 3.5 degrees per day to the east and repeats the pattern after seven days), a target accessed on one pass is accessible several other times each week. For example, at 53 degrees north latitude, which is near the middle of the target distribution for East European targets, each target would be accessed five times per week. The total number of frames which can be acquired per pass depends, of course, on the repositioning maneuvers required between successive photographs.

14. Elapsed time from acquisition to receipt of the image at a ground viewing station is dependent upon the technology employed in the operational system. It could range from [redacted] up to approximately 12 hours (one satellite and one U.S. ground receiving station). Conceptually, delivery to the analyst could take place [redacted] after sensing if necessary--for example, during periods of tension or crisis. Routinely, imagery acquired over Eurasia during daylight would be received and processed in [redacted] between the hours of 1700 and 0600 (at an assumed rate of about [redacted] per hour) and would be ready for analysis during the regular work day.

15. A comparison of some key NRT characteristics with those of the KH-8 and KH-9 may be found in Table 1. While these will affect the quantitative impact of the NRT system, the main features of the NRT which are likely to revolutionize exploitation concepts are:

a. Daily delivery of new imagery.

b. Large and flexible target access capability.

c. Rapid reprogramming on the basis of daily take.

d. Capability for frequent repetitive coverage.

16. The CIA study group assigned to take a first cut at the implications of NRT (the Inlow group) judged that the existing practice of three-phase exploitation will not apply to an NRT system. Instead, imagery

exploitation at several rates of response is anticipated: (1) immediate initial scan for crisis activity and retargeting support, (2) normal current intelligence reporting--perhaps within 24 hours, and (3) routine surveillance or in-depth analysis at considerably slower rates. In every case it will be necessary to scan and report in verbal form the significant intelligence information contained on each frame for collection guidance and for the exploitation data bank. Thus, although immediate readout, indexing, and detailed analysis will still be required at various stages, the old concepts of first-, second-, and third-phase exploitation, originated in World War II and applicable to all systems in which film was recovered in batches, will have to give way to concepts more appropriate to a continuous-delivery system. IAS' contribution to NRT exploitation concepts is contained in Section IV of this paper.

17. A decision on ground facilities and procedures will have to be among the first major decisions on an NRT system as a whole. In concept, the principal ground facility would be a large multifunctional complex with extensive processing and communications equipment. It would receive incoming telemetry and electronic imagery data from the ground receiving and relay station, probably via a dedicated microwave system. After extensive electronic processing to enhance the imagery and correlate identification information, the data would be processed into a form permitting visual analysis. The original images produced could be negative or positive and could be duplicated by conventional means. While the distribution of imagery in electrical form would necessitate extensive communications equipment a limited capability of this type may be feasible. But permanent storage of the imagery on film rather than in electronic form may prove advisable due to the unmatched ability of film to store large amounts of data in a small space.

18. Collocation of primary imagery exploitation components and departmental units in a single exploitation/processing center would, according to the Inlow report, offer an opportunity to improve efficiency and minimize the cost of operation of an NRT system by permitting the use of automated dissemination techniques, sophisticated materials handling systems, machine logging and record keeping. The question of centralization or decentralization of exploitation activities will depend to some degree upon what new exploitation concepts are adopted for the NRT era.

TABLE I

CHARACTERISTICS OF SATELLITE COLLECTION SYSTEMS

IN THE MID-1970'S

(NRT Data is Tentative)

	KH-8	KH-9	NRT
Mission life	14 days	30-45 days	
Operational altitude	77 nm	90 nm	
Camera type	strip	pan	
Focal length	160 inches	60 inches	
Ground resolution (design goal)		2.7 feet	
Scale at nadir	1:35,000	1:110,000	
Imagery acquired	5,000 feet per RV	52,000 feet per RV	
Target access area (from nadir)	30 nm x 160 nm rectangle	up to 335 nm across track	600 nm circle
Swath width (at vertical)	5 nm	53-335 nm	3 nm
Format size	9.5" x variable length	6.6" x variable length	possibly 5" x 5" or 9" x 9"

IV. WHAT EXPLOITATION CONCEPT IS APPROPRIATE TO THE NRT ERA?

Exploitation Based on Needs, Not on Collection Cycles

19. Having looked at the characteristics of the NRT imagery collection system described in the preceding section of this report, we can begin to hypothesize how exploitation might be carried out in the mid-1970's. We believe it is important to approach this from the standpoint of what is needed, rather than allowing the peculiarities of the collection systems to dictate the speed, frequency, and volume of all exploitation activities. It is clear that mission-by-mission reporting will not be meaningful in the case of NRT because of its capacity for regular, daily delivery of new information. But should the kinds of information that take on meaning only after an extended period of surveillance be reported daily? We think not. In fact we see a danger in reporting which is too frequent. The viewing and reporting of small changes on a daily basis might in certain cases obscure significant long-term developments which were revealed only through the accumulation of subtle differences over time. In our opinion, exploitation requirements should be based on the need for information on a specific topic, target, or area and not on the frequency of coverage. For example, we have witnessed conditions during which there would be a requirement for daily exploitation and reporting on military activities along the Sino-Soviet border. On the other hand, information obtained daily during a critical phase of construction of a reactor building might require only monthly summaries or even longer-term reporting. Requirements for exploitation can and should be developed independently of the collection requirements. In the NRT era reporting immediately on every target, each time it is imaged, would become a meaningless exercise.

Types of Functions Envisioned

20. From the Inlow Report and from the initial USIB requirements established for an NRT system, we can begin to see various types of exploitation functions which will need to be carried out, and to distinguish between those which will be required immediately, frequently, or for which a periodic requirement (daily, weekly, monthly, etc.) can be established:

Immediate (within 8 hours)

a. Strategic Warning/Indications.

b. Crisis Monitoring.
c. Coverage Evaluation/Screening.
d. Retargeting Support

Frequent (each time covered, or within 48 hours)

e. Monitoring Strategic Arms Limitation/Disarmament Treaties (SALT-Monitoring).
f. High-Priority Target Surveillance.
g. Current Intelligence Support.

Periodic (at specified intervals, weekly, monthly or as required)

h. Other Target Surveillance.
i. Basic Exploitation on New Targets (as required).
j. Basic Exploitation Updating (as required).

Ad Hoc Activities

k. Supplementary Information.
l. In-depth Studies.
m. Experimental Imagery Analysis.
n. Covert Applications (CIA).
o. Tactical Military Applications (DoD).

21. The first three of the above categories are self-explanatory, but a word on the nature of Ad hoc activities seems appropriate here. Ad hoc activities are non-periodic, non-recurring exploitation tasks in direct support of CIA and the other individual USIB-member agencies. These needs vary from one agency, service, or department to the next and usually cannot be programmed in advance. Generally this type of imagery analysis support is aimed at supplementing or going beyond interagency exploitation to satisfy unique departmental needs. It also permits CIA to develop an Agency position on important topics and to formulate contributions which might otherwise not be forthcoming.

Who Does What?

22. Obviously we must continue to conserve imagery analysis resources and avoid unnecessary duplication in the exploitation effort. Let us therefore look at all of the activities above and attempt to determine (1) which will require an authoritative interagency appraisal, (2) which can be

provided as a common service to the intelligence community, and (3) which should be carried out departmentally. Table 2 (page 22) provides a conceptual plan for these activities. Figure 1 (page 23) illustrates the functional relationship we see for the various elements involved.

Interagency Activities

23. Certain of the exploitation functions which we have described are of such potential significance that we feel that they will require a coordinated appraisal by the combined efforts of the several imagery analysis and intelligence production elements of CIA and DIA. We have called the activities which culminate in such an appraisal Interagency Activities. Strategic warning/indications and crisis monitoring would obviously qualify for such an appraisal. In many instances the needs of current intelligence may also require exploitation in this manner, depending on the vehicle to be used for its dissemination and the audience for whom intended. As with CIB contributions today, major items of current intelligence importance would undoubtedly require rapid coordination with State and DIA. With respect to the SALT-monitoring function, we can foresee many potentially controversial issues arising which we feel could best be handled through interagency coordination.

24. We think that it is appropriate that NPIC should have a primary role in these interagency activities. The Center's exploitation group (IEG) is jointly staffed with CIA and DIA personnel, and NPIC is already providing the bulk of the imagery-derived current intelligence support for the community. With its large resources, the Center is in a position to offer support on topics such as strategic warning/indications and crisis or SALT monitoring.

25. The ability of imagery, including NRT, to help solve classic strategic warning/indications problems is considered to be limited, but crises of the sort where NRT information can be effectively applied may occur several times per year. To be effective in such crises, the NPIC readout would have to be accomplished on a near-real-time basis, that is, immediately following image processing. On items requiring immediate exploitation, this would mean that within a few hours of imaging by the sensor system, an NPIC readout would be communicated to both CIA and DIA. This would require NPIC to maintain an around-the-clock readout capability to support the Watch Office and SIDO system. On items requiring frequent

but not immediate exploitation (most SALT-monitoring and current intelligence items) the NPIC readout could be accomplished during normal working hours, but it would still need to be communicated as soon as it was available to both CIA and DIA.

26. CIA intelligence production elements (perhaps a full-time assessment team or staff) would rapidly review critical items on the basis of NPIC or SIDO alert, with CIA departmental imagery analysis resources on call to provide additional support and independent views if necessary. DIA would have the same opportunity for review. The resulting appraisals on items of immediate significance would receive interagency coordination much as CIB items are presently coordinated. We envision that there will be a need for coordinating groups to effect the necessary coordination between CIA and DIA as well as with State and others primarily concerned with functions a, b, e, and g. In so far as possible, we feel that existing instrumentalities or coordinating mechanisms should be utilized; for instance, the NIC on warning/indications items and the existing interagency group which reviews CIB contributions on current intelligence matters. Some such mechanism would be required also to coordinate the results of individual agency exploitation on SALT matters. Crisis-monitoring teams would have to be formed on an ad hoc basis much as they have in past crises. But--with imagery arriving night and day, seven days a week throughout the year--there would have to be an imagery watch function which would provide for rapid and effective communication of alerting information to responsible production elements, departmental exploitation components, and interagency coordinating groups.

27. A provision for housing such coordinating groups, teams, or task forces should be considered in planning for processing/exploitation facilities.

Common Service Activities

28. In the interests of efficiently exploiting the continuous flow of imagery which is expected from the NRT system, we envision certain functions being performed, primarily by NPIC, as services of common concern to the entire intelligence community. Two of these activities coverage evaluation/screening and retargeting support (activities c and d, Table 2) would require rapid response and immediate feedback to the tasking system. Activity c refers to scanning the imagery to evaluate system performance, but it is possible that this function could also serve as a means of identifying unusable imagery and eliminating it from further

reproduction. Retargeting support may require the participation of skilled imagery analysts who, because of their experience and familiarity with specific targets, can quickly evaluate the interpretability of acquired imagery. Both of these common services would necessitate close coordination with collection authorities.

29. Target surveillance is an exploitation activity which seems particularly applicable to the common service concept. It is a function which should be accomplished at a frequency commensurate with exploitation requirements (see paragraph 19). High-priority targets should be scheduled for readout each time they are photographed--within, say, 48 hours of the receipt of imagery. Thus, the intelligence community would be alerted to any significant activity at important target locations, and supplemental analysis could be performed departmentally as necessary. Recognizing that such activity may at any time be of current intelligence interest, we have included current intelligence support (g) as another common service function in Table 2.

30. In the NRT era surveillance of other (lower priority) targets would be reported out on a periodic basis, e.g. weekly or monthly, according to the requirement established for specific target categories. This differs sharply from present second-phase exploitation which requires NPIC to do mission indexing and OAK Supplement reporting on vast numbers of targets. It would altogether supersede these mission-by-mission second-phase activities now comprising so much of NPIC's workload. Of course regular surveillance of these targets would be maintained, but reporting would be carried out periodically according to an agreed-upon schedule.

31. It is envisioned that NPIC will continue to provide other common services which support exploitation, just as they do now (see Figure 1). These functions include: mensuration and ADP support; photographic reproduction; information and printing services; research and development; commo facilities; and other services such as administration, logistics, and security.

32. While we expect a greatly reduced need for the interagency basic reporting program by the mid-1970's, some new reports and occasional updating may be required. If so, this common service activity will probably continue to be shared by NPIC and the other designated imagery analysis organizations.

Departmental Activities

33. The several agencies which will participate in the exploitation of NRT imagery represent diverse interests and responsibilities. We have identified five exploitation functions which we think the agencies concerned should perform using departmental resources, because of these diverse interests. These functions, shown in Table 2, are: (k) the development of supplemental imagery-derived information; (l) preparation of in-depth imagery analysis studies; (m) experimental imagery analysis; (n) covert applications for imagery analysis (CIA); and (o) imagery analysis having tactical military applications (DoD). Current intelligence support (g), which is also listed as a departmental activity, must be considered in a different light from the principal departmental functions. It is a function which we think will continue to concern all elements of the intelligence community, and we have indicated this in Table 2. We think that much of this function will be handled as a coordinated interagency activity, yet there will be instances when current intelligence support will need to be provided departmentally.

34. All five of the principal functions are performed by departmental resources at the present time. We think the need for these particular services and the desirability of performing them on a departmental basis will extend into the NRT era. Of these five activities the first three are probably most needful of elaboration; the last two are considered self-explanatory.

35. The term "supplementary information" is meant to describe the bits and pieces of information which can fairly readily be derived from imagery (i.e. without requiring in-depth analysis) but which, for one reason or another are not reported in the initial readout. Most often this information is not reported initially because the pressure of time is too great for it to be included or because it may not be of interest to the community in general, or because it has been overlooked. Supplemental information may arise from several of the sources shown in Table 2, but most often it is derived from a departmental appraisal of high-priority targets--the "second look" described in paragraph 7b of this study. Supplemental information can also arise from departmental exploitation of secondary imagery sources, such as attache or clandestine photography, where in most cases no common service exploitation is performed.

36. The term "in-depth analysis" refers to the most comprehensive job of imagery analysis which can reasonably be performed upon a given subject. In-depth analysis is usually required to substantiate or facilitate detailed investigations being undertaken by a particular agency. Such an analysis generally requires a lengthy period; it makes use of all available imagery, collateral information pertaining to the imagery, and specialized equipment such as precision comparators. In most cases these analyses are sharply focused, reflecting the current requirements of the parent agency. As a consequence the work is often not of general interest or applicability. Much of the in-depth analysis undertaken in the NRT era would be for the same purposes as presently (e.g. imagery analysis required to develop an Agency contribution to an NIE), while new requirements might also emerge such as supporting independent CIA analyses on SALT problems.

37. Experimental imagery analysis represents the attempt to develop new exploitation techniques which will enhance the value of the imagery. This is logically performed by departmental exploitation components, whose needs are a reflection of the analytical problems confronting individual agencies.

38. As stated earlier, we anticipate that in the NRT era NPIC will have a major role in interagency activities and that NPIC's common service responsibilities will be greatly expanded. Barring a major increase in personnel, we think the Center will have to reduce considerably the number and extent of the in-depth studies it undertakes. In this sense, NRT will intensify the problems which NPIC will face with the advent of the KH-9. Thus, the departmental imagery exploitation elements should be prepared to assume increased responsibility for exploitation activities of this kind.

TABLE 2.

CONCEPT FOR IMAGERY EXPLOITATION IN NRT ERA

EXPLOITATION FREQUENCY	INTERAGENCY ACTIVITIES 1/	COMMOM SERVICE ACTIVITIES 2/	DEPARTMENTAL ACTIVITIES 3/
IMMEDIATE (WITHIN 8 HOURS)	a. STRATEGIC WARNING/ INDICATIONS b. CRISIS MONITORING	c. COVERAGE EVALUATION/SCREENING d. RETARGETING SUPPORT	
FREQUENT (EACH TIME COVERED, OR WITHIN 48 HOURS)	e. SALT-MONITORING g. CURRENT INTELLIGENCE	f. HIGH-PRIORITY TARGET SURVEILLANCE g. CURRENT INTELLIGENCE SUPPORT	g. CURRENT INTELLIGENCE SUPPORT
PERIODIC (WEEKLY, MONTHLY, OR AS REQUIRED)		h. OTHER TARGET SURVEILLANCE i. BASIC EXPLOITATION ON NEW TARGETS j. BASIC EXPLOITATION UPDATING	
AD HOC			k. SUPPLEMENTARY INFORMATION l. IN-DEPTH STUDIES m. EXPERIMENTAL IMAGERY ANALYSIS n. COVERT APPLICATIONS (CIA) o. TACTICAL MILITARY APPLICATIONS (DOD)

DEFINITIONS:

1. INTERAGENCY ACTIVITIES -- ACTIVITIES INVOLVING A COORDINATED INTERAGENCY APPRAISAL BY THE COMBINED EFFORTS OF SEVERAL IMAGERY ANALYSIS AND INTELLIGENCE PRODUCTION ELEMENTS.
2. COMMON SERVICE -- ACTIVITIES WHICH CAN BE PROVIDED AS A SERVICE OF COMMON CONCERN TO THE ENTIRE INTELLIGENCE COMMUNITY (BY NPIC OR, IN THE CASE OF BASIC EXPLOITATION, BY THE RESPONSIBLE IMAGERY ANALYSIS ORGANIZATION SO DESIGNATED).
3. DEPARTMENTAL ACTIVITIES -- ACTIVITIES WHICH ARE AIMED AT SATISFYING INDEPENDENT NEEDS AND PRIORITIES OF A PARTICULAR AGENCY OR DEPARTMENT.

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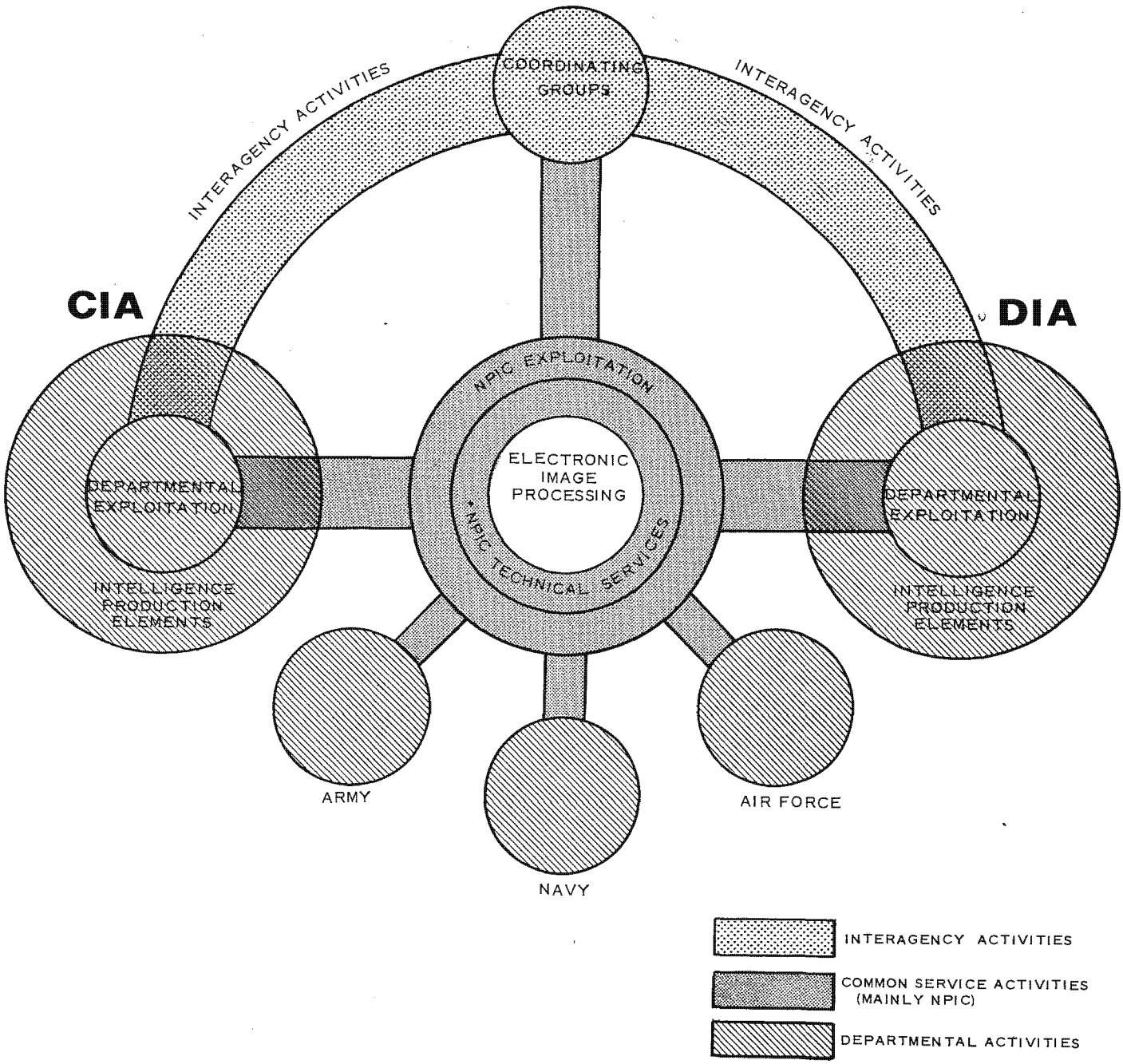

* NOTE: NPIC TECHNICAL SERVICES INCLUDE R & D, MENSURATION, PHOTO REPRODUCTION, AND OTHERS.

FIGURE 1. FUNCTIONAL RELATIONSHIPS IN THE NRT ERA.

V. HOW SHOULD CIA MEET ITS DEPARTMENTAL NEEDS IN THE NRT ERA?

39. Careful consideration has been given to the methods by which CIA might seek to provide for its departmental needs. We have examined three alternatives dealing with the existence and management of CIA's departmental imagery analysis resources in an NRT environment.

Alternative A -- Have NPIC Absorb IAS Resources

40. From the NPIC point of view, this might be considered desirable. NPIC would acquire in one move roughly a hundred well-qualified imagery analysts. This is of some importance, since imagery analysis resources are scarce, and NRT will aggravate this scarcity. Absorbing IAS would cost NPIC nothing since IAS is already housed in Building 213, drawing upon the Center for a percentage of the basic services needed.

41. The intelligence production offices of CIA would be the principal losers if IAS became a part of NPIC. With the time demands of NRT added to the volume pressures of the KH-9, a departmental unit within the NPIC structure would inevitably become submerged in the larger responsibilities of the Center, leaving insufficient resources available to answer departmental requirements. Before IAS became independent in February 1967, NPIC routinely borrowed IAS (then IAD) senior analysts during first-phase readout activities and applied their talents to the production of NPIC products. During these periods IAD's ability to perform its primary responsibility, timely and comprehensive departmental support to CIA, was very limited. If IAS were to become part of NPIC once more, there is good reason to expect that a substantial portion of the CIA departmental resources would again be drawn off to perform NPIC activities.

42. Another serious problem would be the resultant loss to CIA of its independent point of view on the type of questions where IAS can now contribute a separate opinion. Undoubtedly a single opinion would be forthcoming from NPIC even in cases where different views might otherwise have been surfaced. This single opinion, whether or not in support of departmental requirements, would need to be acceptable to the CIA-DIA management structure which governs NPIC. Such a constraint would not represent the best interests of CIA.

43. Both of the situations described above contributed to a working environment which CIA management found unacceptable in the past. This problem was solved when IAS was established as an independent organization early in 1967.

Alternative B -- Have the CIA Production Offices Absorb IAS Resources

44. Although IAS could conceivably be transferred as a unit to one of the production offices, this approach is considered impractical since advantages to that office would be gained only at the expense of other CIA consumers. During FY 1969 IAS provided imagery analysis services to a dozen different CIA components at the office and staff level, as well as meeting the preliminary assessment needs of the DDI and DCI and fulfilling the CIA commitment to the community for basic reporting. Because of these diverse needs within the Agency, it is essential that no single office be allowed to monopolize these services.

45. Distributing IAS resources among the production offices concerned has also been considered. In an NRT environment we think the production offices will require more departmental imagery analysis services than they presently do. Much more imagery will be available, and NPIC will be heavily tasked with carrying out its various common-service imagery analysis activities as well as performing a key role in interagency activities. The production offices of CIA are unable to provide their own imagery analysis now, and considering the nature of imagery analysis as presented in Section I of this report, we think that production office analysts neither can nor should be expected to double as imagery analysts in a near-real-time era. As to the possibility of solving this problem by giving each production office part of IAS' present resources, it would be very difficult to make an equitable distribution of these resources among the many offices and staffs, not to mention DDP. There are many substantive areas with which several offices are concerned, but there is a limited number of imagery analysts who are knowledgeable in each area. Such a move would also create serious problems with respect to the effective utilization and maintenance of specialized equipment, would hamper training and career development of imagery analysts, and would impede the interchange of information and ideas among imagery analysis separately assigned. It would interfere with the substantive review of output by qualified senior personnel, and hinder the maintenance of high professional standards. In short, it would seriously degrade the quality of the support now provided by IAS.

Alternative C -- Maintain an Independent IAS

46. Under this option IAS would remain an independent organization responding to CIA's needs for departmental imagery analysis. This alternative appears to offer the most effective and economical method of meeting these needs. In contrast to the alternatives previously examined, this would assure the Agency of an independent view, a second look, in-house support for sensitive or clandestine needs, and a prompt, flexible response to the individual needs of the intelligence production offices in an NRT environment of daily collection and exploitation.

Location of IAS

47. Having concluded that CIA should maintain an independent Imagery Analysis Service, we have given some consideration to the best location for IAS in the NRT era. In doing this, we have looked at the extent to which collocation is important to the various technical services provided to IAS by NPIC, including mensuration support, photo reproduction, printing, film vault, ADP, information services, and equipment maintenance. Of these, the only one which presently requires IAS present in Building 213 is mensuration support. IAS must have access to computers to perform on-line mensuration with its own instruments. NPIC could continue to provide many of the other services to IAS at a distance as it now does for other external organizations such as DIA, FTD, and Navy in the Basic Exploitation Program.

48. We cannot be certain whether IAS will require the same types of supporting services in the NRT era. This will depend upon the requirements presented by such a system and upon technological developments in related fields in the next several years. Developments in the field of dry-process photo reproduction, for example, may make IAS less dependent upon the NPIC photo lab. This would be particularly true if this improved capability coincided with developments in the fields of data retrieval and electronic display of imagery, requiring less production of permanent photo materials. Likewise we anticipate the development of secure means for querying computers remotely, which should permit organizations located at a distance to use the NPIC computers for real-time mensuration support.

49. With all of these developments making IAS less dependent on physical proximity to NPIC, and to a degree more self-sufficient, we think that by the mid-1970's it would be feasible for IAS to terminate its collocation with NPIC if that turned out to be advantageous to CIA.

In considering alternative locations for IAS, some among us feel that IAS and the production offices of CIA would work much more effectively together if they occupied a common location, while others here see no particular gain in being collocated with their counterparts in the production offices. The difference of opinion is related to the variety of subject matter with which our people deal: those working in scientific or technical areas of specialization believe the advantages to be gained from collocation of imagery analysts and intelligence production officers outweigh the disadvantages of separation from NPIC. Those working in non-technical and military fields, on the other hand, see more to be gained from continued collocation with their counterparts in NPIC.

50. The question of a future location for IAS can only be raised in a most preliminary way here. The resolution of such a question may depend largely on what course is taken with regard to the processing/exploitation center described briefly in the Inlow report. If there is to be a large multifunctional building to house all of the major elements invoived in NRT processing/exploitation, then the improved environment of such a building, designed specifically to meet the needs of the NRT era, might well be the deciding factor.