CENTER ROUTING SLIP

FROM				DATE 29 Jan

TO	INITIALS	DATE	REMARKS
DIRECTOR			
DEP/DIRECTOR			
EXEC/DIRECTOR	2		1/30
SPECIAL ASST	/	M	1/30
ASST TO DIR			
HISTORIAN			
CH/PPBS			
DEP CH/PPBS			
EO/PPBS			
CH/IEG			
DEP CH/IEG			
EO/IEG			
CH/PSG			
DEP CH/PSG			
EO/PSG			
CH/TSSG			
DEP CH/TSSG			
EO/TSSG			
CH/SSD/TSSG			
PERSONNEL			
LOGISTICS			
TRAINING			
RECORDS MGT			
SECURITY			
FINANCE			
DIR/IAS/DDI			
CH/DIAXX-4			
CH/DIAAP-9			

Remarks:

For Comment

1-2 John —

Here is the schedule for the ADP briefings for _____

I have given a copy to _____

We will need to know whether or not you will give the briefing or _____ In either case we will need a script.

al

File
Gen. Briefings

Declass Review by NIMA/DOD

IP FM 30 (12-69) - OBSOLETE PREVIOUS EDITIONS

TRANSMITTAL SLIP	DATE 28 n 70

TO

ROOM NO. 6N212	BUILDING

REMARKS:

Per our telecon.

FROM:

ROOM NO. 2F24	BUILDING Hq

Briefing Schedule for [   ]   25X

(Information Processing)

Tuesday, 10 Feb.   I. OCS
1000-1130 hrs.
(2E-29, Hqs.)

    - Uses of ADP:

      .. Intelligence File services
      .. Scientific applications
      .. Administrative record keeping (SIPS)
      .. Signal processing
      .. Time-sharing service

    - Hardware (installed and planned)

    - Problems and issues

Tuesday, 10 Feb.   II. CRS
1300-1400 hrs.
(2E-60, Hqs.)

    - Uses of ADP:

      .. AEGIS document storage and retrieval service

      .. Rapid Search Machine (RSM) for fast search of
         substantive files of analysts

      .. [   ] for visual display of military   25X
         deployment patterns.

      .. Converted EAM files

    - Hardware (installed and planned)

    - Problems and issues

Tuesday, 10 Feb.   III. RID
1415-1515 hrs.
(1D-4124, Hqs.)

    - Uses of ADP:

      .. Document locator system

      .. [   ] device for automatic picking   25X
         from microfilm file

      .. Special Files (GICS)

      .. Automation of Main Index to counter-intelligence
         biographic files (status and outlook)

    - Hardware (installed and planned)

    - Problems and issues

Wednesday, 11 Feb.
1400-1500 hrs.
(6E-0708, Hqs.)

IV. NPIC

— Intro.

- Uses of ADP:

  .. Imagery measurement *Met. Trap too.*

  .. Computer-generated reports on target
    coverage data

  .. PI document storage and retrieval service
    (Minicard-to-microfiche)

- Integrated Information System (IIS) impacts

- Hardware (installed and planned)

- Problems and issues

— Prospects

Wednesday, 11 Feb.
1500-1530 hrs.
(6E-0708, Hqs.)

V. Recap discussion with [   ]

25X

Briefing aids ?

Management Info System

[   ]

25X

SECRET

11 February 1970

X1

Briefing -- ADP

X1

Intro

X1

Chief, Automated Information Division.

- Describe uses, plans, hardware.

X1

- Problems, issues & directions.

- NPIC contribution -- community.

- PI, with emphasis on rapidity. (1st/2nd & 3rd phase)

- Also, objective & best-qualified judgments,
including measures, & backup to field.

- Publication services.

of list.
- Central photo records.

- Tech R&D & photo science.

- The Players (for reference)

- IEG

- PSG

- TSSG

- In-laws & Kissing Cousins

- IAS

- DIAAPP-9

- SPAD

- (NSA, CIA, DIA)

X1

- Uses.

- Measurement.

- Target coverage data.

- Document storage & retrieval.

- IIS

- Hardware

X1

- Problems and issues.

- Recruiting and advancement.

- Some internal imbalance of resources & workload.

- Security.

- Users delay time.

- Connection with NSA.

X1

-- Directions

- Intimate interplay capability.

    (open Shop Programming)

    (PI aids, editing aids)

- Generate own software.

- Management & resources applications.

- New collection systems, new data handling problems and opportunities.

- Better hardware.

- People sharing with other ADP components.

PROBLEM AREAS

The most serious problem facing AID today is the Division's grade structure. In 1967 AID's predecessor (the Information Processing Division) had 121 ADP positions with an average grade of 9.1. Today, three years later, AID has 123 positions with an average grade of 9.0. Since we cannot compete with private industry for skilled programmers/analysts, our recruitment philosophy has been to hire college graduates and give them on-the-job training in ADP. We are convinced that our recruitment philosophy is sound; we have about twenty talented junior programmers to prove our point. However, we have lost a disproportionate number of our junior programmers (even by industry standards!) because our grade structure (and, consequently, our journeyman level) peaks at GS-09. We have hopes that our proposed grade restructuring will be favorably received by management, thus alleviating this problem.

There is presently an imbalance of resources and workload between the branches in AID. We are convinced that the solution to this problem lies in a realignment of resources and not in an increased T/O. We are taking steps to correct this imbalance; more importantly, we are attempting to build greater flexibility into the AID organizational structure to accommodate future shifts in workload.

Security in a computer-based system continues to be a complex and frustrating problem. A determination of what constitutes a secure system (in terms of procedures, software, and hardware) is needed if NPIC is to make a meaningful contribution in the exchange of information. NPIC has

been advised that the multi-level security problems will not be resolved in the foreseeable future. In all probability, we will not be participating in the COINS experiment.

As increased emphasis is placed on open shop programming and the remote access system, the need for accurate, intelligible user documentation produced in a timely fashion will rise sharply. We have not been successful in recruiting technical writers capable of translating the jargon of the computer professional into meaningful instructions for the user. Additionally, we need to develop and enforce documentation standards. This is particularly significant in the computer field which is characterized by high employee turnover.

Our most serious technical problem results from our success in developing a viable remote access system. Usage of the system has grown to the extent that, if the trend continues for another six months (and we have every reason to believe that it will), the system will be incapable of satisfying user demands. We have already experienced job queues as high as 40 and response times in excess of 30 minutes during peak loads. We have initiated action to improve our job priority structure, to optimize utilization of random-access mass storage, and to seek a better method for using the two central processors and associated core.

GENERAL DIRECTIONS

To meet the challenges of the future, we intend to place increased emphasis on the development of advanced operating systems. We are aiming at developing a new approach to the manner of inter-connection and the allocation of functions between the two 494 central processing units. The system must provide for bringing the full computational capabilities of both central processors to bear during peak load situations, and also provide for maintenance of essential functions in the event of failure of any non-singular hardware element of the system.

Open Shop Programming

It is our conviction that a substantial number of professional personnel assigned to the Center will have sufficient background and training in the use of computers to be able to write computer programs to deal with many of the specific problems that may confront them in the course of their duties. We intend to provide a mechanism that will permit these individuals to exercise their capabilities on their particular areas of professional expertise. To a very substantial degree we have already developed such a tool in the form of higher-level languages available for use by all Center personnel from remote terminal devices located throughout the building. FORTRAN and COBOL will both be available by the middle of FY 1971 at upwards of 100 terminal devices. The operating system which now interleaves up to 25 programs will be extended to minimize restrictions on programs and also to incorporate scheduling algorithms better suited to the characteristics of the Center's workload.

Information Storage and Retrieval

The Integrated Information System (IIS) will be installed during the first quarter of FY 1971 and will, for some years to come, be the Center's "workhorse" for storing, manipulating and retrieving substantive information. During the period we intend to devote considerable effort to upgrading this system. In addition, we plan to develop a capability to satisfy a long-standing requirement to search the free text of documents. Our current systems, including the IIS, are based on formatted files. Many of these files (e.g., the IDF and EPDF) contain unstructured abstracts, remarks, and notes. Our only current method of retrieval of information from these loosely-structured fields (or fields of free text) is to call for the entire field.

We anticipate increasing emphasis in the next five years on some form of a community computer network. Our experience with the COINS experiment and the input/output philosophy of our operating system will facilitate our participation in such a network.

Scientific Services

Up to this time, our priority effort in the scientific area has been on the Real-time Photo-measurement System. Because of our success in this development, we feel we can now afford to divert some of our scientific analyst/programmer resources to tasks which had been relegated in terms of priority. These tasks include support to the Center's research, development and engineering effort in such fields as pattern recognition and digital image manipulation, and the application of computer-assisted analytical techniques to the imagery interpretation process.

13

Resources Required

We presently own the two UNIVAC 494 central processors and the two banks of core. We intend to lease additional core in FY 1972. No other major acquisitions are planned until FY 1976 when we will probably replace our UNIVAC 494's.

The major functions of AID can be accomplished without an increase in the number of positions if we are successful in obtaining a substantial increase in our average grade and in achieving greater internal flexibility to adjust resources to match shifts in workload.

Given the grade structure we intend to propose in the near future, AID anticipates no need for large-scale contractual support during the planning period. We will continue to contract with UNIVAC and IBM for the maintenance of our ADP equipment. We will also budget for a modest level (three to five manyears) of software support. As stated earlier, our experience with software contracts has been less than satisfactory; the costs of such services are excessive and the end products are, at best, no better than we could produce ourselves.

NPIC'S USE OF ADP

INTRODUCTION

The major purpose of the National Photographic Interpretation Center (NPIC) is to exploit multi-sensor imagery, primarily black and white photography, in support of the national intelligence effort. To fulfill this responsibility the Center conducts, on designated USIB-tasked missions, a preliminary and rapid analysis of newly acquired imagery in response to priority requirements. This is known as first-phase readout. It also performs a systematic review, known as second-phase readout, of all newly acquired imagery to produce summaries and indexes of available imagery for community use. In addition, NPIC conducts comprehensive studies of imagery in specified substantive areas to meet detailed requirements of the community. The product of these exploitation efforts are in the form of hard copy reports, cables, briefing boards and ADP listings which are disseminated throughout the community.

The Center also provides certain services of common concern to other PI organizations as well as the Intelligence Community at large, including photo-measurement support, photo reproduction support, printing and dissemination services, and maintenance services for certain imagery-related information files of common interest. The Center has extensive facilities to provide these services which can be drawn on by the community to reduce the duplication of efforts.

In addition to the above imagery analysis tasks and related services, the Center engages in research and development to improve its own production and procedures, as well as to benefit other imagery exploitation organizations.

In carrying out its responsibilities the Center relies heavily on the use of automatic data processing (ADP) tools and techniques. This paper discusses the current and future roles of ADP in NPIC.

ADP SERVICES PROVIDED

The Center is operating a remote access computer system with a current inventory of 74 remote devices making the computer directly available to

5X1 users throughout [   ] The remote devices range from relatively simple teletypes and line printers to highly sophisticated query consoles, display devices and photo-measurement equipment. For the most part, users utilize programs and files developed by the Center's ADP facility--the Automated Information Division--as a service of common concern. However, they are able to (and presumably will with increasing frequency) exercise the option of developing their own programs and files for applications unique to their needs (e.g., "one-shot" statistical analyses, math models). To accomplish the latter, the user has access to a FORTRAN compiler.

In addition to operating the ADP equipment as a service of common concern, the ADP facility provides both systems programming and applications programming services. Systems programming is concerned with the development and maintenance of the so-called computer executive system. Since the system concurrently provides remote batch and remote real-time services in addition to the traditional batch processing (i.e., from the computer room itself), and is already handling an average of 1,000 jobs a day, job scheduling and control are of critical importance.

Applications programming is provided by the ADP facility as a service of common concern and can be broken into four broad areas:

scientific services, information storage and retrieval services, report

generation services, and management services. Major capabilities avail-

able to users are briefly as follows:

Scientific Services

The major effort in this area is the Real-time Photo-measurement

System. With this system Center photogrammetrists and imagery interpreters

can, through the use of remote photo-measurement equipment, determine

accurate distances, heights, azimuths, geodetic coordinates and areas from

overhead photography in either a real-time or batch mode. A capability

for making plots is also available. Another effort of considerable magni-

tude involves the development of a system of programs to make detailed

measurements of objects (e.g., missiles) from ground photography acquired

along parade routes. An extremely complex batch processing application,

the system is in final stages of checkout and should be declared operational

in the near future.

In addition to the photo-measurement applications, the Automated

Information Division is currently supporting the Center's efforts in

the field of image assessment through the use of Microdensitometric

techniques. A set of programs to aid in image analysis and evaluation

is nearing completion which will permit measurement of film granularity

from edge traces. Additionally, it will allow analysis of exposure

characteristics and processing of the film.

Information Storage and Retrieval Services

Under the National Tasking Plan, the Center has responsibility for

maintaining four major files of common concern to the imagery intelligence

community:. the Installations Data File (IDF); the Mensuration Parameters
File (MPF); the Exploitation Products Data File (EPDF); and, the Objects
Data File (ODF).

The Installations Data File is presently a magnetic tape file con-
taining pertinent reference and descriptive information on approximately
30 thousand installations of interest to the intelligence community.
Updated as a result of new information gleaned by imagery interpreters
from photography received in[   ] the file has grown to where
it currently contains information stored on 18 magnetic tapes. Under
the Integrated Information System, which has been under development for
several years and will be operational in 1970, this file will be placed
on random-access mass-storage devices (UNIVAC FASTRAND drums) permitting
imagery analysts to store, manipulate, and retrieve information from
the file in near real-time fashion.

The Mensuration Parameters File is an operational computer-based
file containing the necessary parametric information (e.g., height and
attitude of the camera station at the time of image exposure) for making
accurate measurements from overhead photography. Within [   ]
the file provides the Real-time Photo-measurement System with the requisite
imagery parameters for making measurements. The file is also supplied
to National Tasking Plan participants outside[   ]in magnetic
tape form.

The Exploitation Products Data File is an index of all imagery inter-
pretation products prepared by National Tasking Plan participants with,
as appropriate, abstracts of those products. Data for the EPDF is presently

provided by a combination of two older systems, the All Source File and the Minicard File. A computer-produced hard-copy report of file holdings is sent to NTP participants on a quarterly basis.

COMIREX has not yet completed criteria for the Objects Data File.

Report Generation Services

Primary emphasis to date has been devoted to those imagery inter-pretation reports which must be prepared and disseminated with urgency. Included in this category are OAK Reports (for satellite photography) and World-wide Immediate Photographic Interpretation Reports (for air-craft photography) prepared in response to COMIREX requirements for information about a selective list of highest-priority targets. These reports, commonly referred to as "first-phase reports," can now be produced from remote terminals in the imagery interpreters' work area through the use of the central computer. The information is concurrently used by the central computer to update the Installations Data File.

Management Services

The Center was one of the forerunners in the development and use of a computer-based management information system. While the system has provided the Center with a useful management tool, it has not served management as well as anticipated. Center management is currently re-assessing its information needs. Depending on managements' findings, the present system will be upgraded or a new system will be designed.

A number of small files (e.g., the Center telephone directory and equipment inventories) are maintained by the Automated Information Division. A modest capability exists for the application of operations research techniques, but to date little has been accomplished in this area.

HARDWARE

We are currently operating with a dual UNIVAC 494 system. Each central processor has 131,072 30-bit words of core and a memory cycle time of 750 nanoseconds, overlapped. Our peripheral equipment includes six FASTRAND drums, three 1782 drums, three high-speed printers, four 1004 units (card reader, punch, and printer), twenty tape drives, one paper tape reader, two paper tape punches, and one Concord plotter.

Remote devices, of which there are currently 74, are used throughout 5X1 _____ (see Attachment 1). The comparators and plotters are used by the Real-time Mensuration System. All other devices are used to initiate any suitable remote batch program. The DCT 2000 is comprised of a low-speed printer, card reader and punch. Largest user is NPIC's Imagery Exploitation Group (IEG), with 39 devices presently on-line. NPIC's Production Services Group (PSG) and Technical Services & Support Group (TS&SG) account for another 12 devices. The other 23 devices are 5X1 used by three _____ host-tenants; CIA's Imagery Analysis Service (IAS), a Defense Intelligence Agency detachment (DIAAP-9), and the Special Army Detachment (SPAD).

OPERATING SYSTEM (SOFTWARE)

The system has the ability to have several real-time programs and up to 25 worker programs running concurrently under the control of the executive program (RUM). There are two real-time programs, the Real-Time Mensuration Program (RTMP) and the Analytic Real-Time (ART). Jobs are scheduled and run in order of arrival within priority. The scheduling algorithm takes into account such things as priority, core and peripherals required.

Our security system is based on the philosophy that we restrict the use of programs, service requests, and files to particular stations. Station security is the responsibility of the component where the station is located. Computer security is effected by a combination of the features available on the UNIVAC hardware and special precautions in the construction of the software.

RUM is an interrupt-actuated executive. Every interrupt is either processed completely or logged for later use prior to returning control to the interrupted activity. An interrupt may indicate serious failure such as loss of power or a less critical hardware malfunction from a particular peripheral unit. An interrupt may come from a remote device indicating that data has been received for one of the real-time programs. RUM lists these interrupts and activates the appropriate real-time program. The lowest priority of interrupt allows a worker program to communicate with RUM.

The Real-Time Mensuration Program (RTMP) provides the capability
of obtaining instantaneous and accurate measurements of objects dis-
cernible on photography. It can compute distances, heights, azimuths,
geodetic coordinates, and areas of objects. Additionally, it can produce
plots on remote [   ] plotters. The parameters required for the compu-
tations can be secured automatically from the Mensuration Parameters
File. Examples of these are altitude, pitch and roll of the vehicle at
the time the frame was imaged.

The Analytic Real-Time (ART) controls the handling of data from
the remote communication devices used for loading of batch (worker)
programs. It is the job of ART to pack data received from the remote
devices and store it on the FASTRAND drum. When all the data for one
job is available, it will forward to RUM a request for the job to be
placed on the queue. It will furnish the data, as requested, to the
worker program. In a similar manner, ART controls the output of worker
programs to the remote-devices.

PERSONNEL

As exhibited in Attachment 2, which shows the number of positions
by skill type, there are 125 positions in the Automated Information
Division.

Approximately 40% are programmers or analysts, about half of which
are mathematicians. Nearly one third of our staff is made up of equip-
ment operators but we have no responsibility for equipment maintenance,
Almost 15% are production control specialists.

We have considered as management the Division Chief and Deputy and
the four Branch Chiefs. Currently we have only two technical editors.
Our administrative positions comprise about 8% of the Division.

As increased emphasis is placed on open shop programming and the
remote access system, the need for accurate, intelligible user docu-
mentation produced in a timely fashion will rise sharply. In order to
assure that AID can meet this requirement an increase in the number of
technical editors is anticipated. This increase should be offset by
a decrease in the number of people required to do keypunching, production
control and operate EAM equipment. Thus, we intend to maintain the
current strength of the Division.

CONTRACTOR ASSISTANCE

Currently we have contracts with four organizations. Three of these are in support of the Integrated Information System (IIS) development.

5X1 [   ] is charged with assisting in training, configuration control, test and evaluation of programs and their relationship in the IIS, and a systems reliability study.

5X1 [   ] is writing seven IIS programs, [   ] 25

5X1 [   ] is writing two programs for the IIS and is responsible for keeping specifications current with the evolution of the system.

5X1 Another [   ] task, outside the IIS, is to design a system to "drive" a Photon Photo-typesetter. In addition, [   ] 25 is under contract to assist in the design and development of programs for imagery quality evaluation using Microdensitometric techniques.

It has been the experience of AID (and its predecessor, IPD) that contractual support for systems analysis and software development is frequently less than satisfactory. Besides the exhorbitant cost involved, a substantial investment of the talents of AID personnel is required to oversee the evolution of the design of the program.

All of the above mentioned contracts should be terminated within the next fiscal year. Maintenance of ADP equipment is performed by

5X1 [   ] under contract.

AREAS OF INTERFACE OR COORDINATION WITH OCS AND OTHER ADP COMPONENTS

For the most part, the problems which AID faces in the years ahead are problems which are common to all ADP facilities. We intend to play an active role in the exchange of information and ideas regarding these problems. One subject of immediate and, presumably, common concern is that of ADP security.

In the best interest of the Agency and of the ADP professionals, a formal program of cross-training and rotational assignments should be initiated between the various ADP components.

NUMBER OF POSITIONS BY ADP SKILL GROUPS

Number	Position Title
22	1) Computer Operator
7	2) EAM Operator
12	3) Keypunch/Flexowriter Operator
0	4) Equipment Maintenance
3	5) Systems Programmer
16	6) Applications Programmer
8	7) Systems Analyst/Designer
0	8) Micro-photography
6	9) Management
11	10) Administrative/Clerical & Other
15	11) Production Control Specialists
2	12) Technical Editor
23	13) Mathematician/(programmer or analyst)
125	