EXCOM 82-7002
DDCI

3 February 1982

MEMORANDUM FOR: Executive Committee Members

FROM: EA/Executive Director

SUBJECT: Agenda for 10 February 1982 Executive Committee Meeting: Information Handling

1. The Executive Committee will meet on Wednesday, 10 February 1982, at 1000 hours in the DCI Conference Room for a progress report on the information handling strategic planning effort. The attached paper will serve as the basis for discussion.

2. Your endorsement will be requested for the information handling goals developed during the first phase of this planning effort. A succinct list of the goals appears in the table of contents. You might also want to focus on the areas identified as requiring concentrated planning and engineering (pages 22-25) and the items identified as having significant budget impact (pages 26-27).

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Attachment

cc: Inspector General
Comptroller

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EXCOM REVIEW OF IHSA STRATEGIC PLANNING FOR IHSs

This is a progress report to the EXCOM on the Strategic Planning effort for the Agency information handling systems. It presents and briefly discusses the goals as developed in the first phase of the effort. In the next phase the strategic-level implementation plans for achieving these goals will be developed, contingent upon any specific guidance the EXCOM may choose to give.

An overview of the goals is available in the following Table of Contents.

In the interest of a succinct presentation, common Agency abbreviations have been used throughout. Should the reader find any that are unfamiliar, he can refer to the appended Glossary and Definition sections of this paper.

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EXCOM REVIEW OF IHSA STRATEGIC PLANNING FOR IHSs

I. Introduction

The first phase of the strategic planning process focused on user goals - what services Agency professionals needed and expected from its information handling systems (IHSs) in the 1985 through 1989 time period. The first phase effort has been completed and is documented in two sets of papers: the staffing papers that provided background at the initiation of each of the five working groups, and the reports by the chairmen of these groups. Copies of these papers and reports have been issued to all working group participants, the Strategic Planning Steering Committee, and other interested individuals. There is, of course, some overlap among the groups since a definition of completely independent subject areas involving such a complex subject was not possible. There were also some gaps. The IHSA staff has endeavored to resolve such concerns, and present in this report a single, coherent definition of the goals.

As a whole, the goals have major implications with respect to the Agency's capabilities, methods of operation, personnel planning and budgeting. Before making a significant planning investment in how we are going to meet these goals, it is important to have them reviewed by senior management, and revised, as may be found desirable. A full appreciation of the implications of these goals will not be available until further planning more specifically illuminates the implementation approaches and their associated schedules and costs. These will be documented in the draft Strategic Plan, and a review with respect to commitment would be appropriate when the draft document is available.

To provide further insight into the product of this strategic planning effort, a tentative outline of the IHS strategic plan is provided. It is expected that in subsequent years the plan will expand, with the addition of sections presenting current resources and investments, IHS personnel planning, and impact on Agency operations.

II. Strategic Planning Phase I Results

A. Overview

The goals were developed in the first phase of the strategic planning for IHSs in terms of five, reasonably independent areas of user concern:

- o Information Handling Facilities
- o Continuity and Contingency
- o Technical and Scientific Facilities
- o User Productivity and Support
- o Information Protection and Management

These areas were defined and selected to provide a small number of coherent subject areas to which users could effectively respond in a working group context.

The implementation aspect of the strategic planning will be developed in terms of functional areas for the provision of services - provider areas. The set defined has been structured to be coherent with respect to provider concerns, and is:

1. Architecture of Agency IHSs
2. Office Automation
3. Processing Systems
4. Carrier Systems/Telecommunications
5. Administrative Systems
6. Message Handling
7. Scientific and Technical Facilities
8. Information Management
9. Security

This list does not necessarily represent the complete set of provider areas that will ultimately appear in the strategic plan, nor is it immutable.

The goals resulting from the Phase I effort are mapped from the user areas into the provider areas and presented in that format. This presentation of the goals provides visibility with respect to the strategic plan that will be developed, a prime concern of this review. It will be seen that some of the user goals are applicable to a number of provider areas, reflecting the fact that provider areas are not coherent with respect to user concerns.

The implementation planning for this program has to be sectioned in well-defined segments such as these in order to have a structure to support the ultimate product definition, specific schedules, milestones and budgets that can be evaluated and committed to by management. An aspect of being coherent with respect to service areas is that, generally, specific organizational units can assume the implementation responsibility.

These are not nine separate provider area problems, however. It is essential that these areas be addressed as components of an integrated network. The IHSA staff will carry the responsibility for the coordination and integration of the design elements of the Agency's IHSs via its principal concern with:

- o system architecture
- o robustness
- o standards and specifications
- o intelligence community compatibility

These activities will be conducted in parallel with the planning for and implementation of the service areas. What will result will be an iterative allocation and refinement of goals between the system considered as a whole and the separate provider areas.

Even though the goals are stated specifically, it was recognized that there has to be flexibility in implementing the planning. There are, for example, significant uncertainties pertaining to the capabilities and cost/performance characteristics of off-the-shelf hardware that will be available in the planning period. In addition, we have just started to plan for the way in which IHSs will modify the office work processes and organizations. Before major new block investments are made, development and verification of the structure and function of the systems needs to be pursued via prototyping. While such prototyping projects have not been identified at this point, it should be recognized that there needs to be a vigorous program of prototype investigations relevant to major new investments. Prototyping is a high risk activity, the intent of which is to avoid much larger mistakes. We should expect a certain failure rate of prototypes and be prepared to fund them.

Following the goals definition in this section is the identification of areas for which significant focused attention is required in the near future by Agency line organizations. These are, generally, complex areas which we, as an Agency, are just beginning to address. They frequently involve the conjunction of existing Agency systems and new commercial technology, some of which is in a state of rapid developmental evolution. From such attention there should come significant refinement of the strategic level goals and implementation plans.

To provide a very rough indication of the budgetary implications of these goals, there is next an identification of those that appear, at this point, to require incremental increases in a continuation budget. That is, acceptance of the these goals will produce an increase in the IHSs budget, beyond the inflation level. Quantitative assessment of the value or benefit of such increased investments will be performed as design and implementation proceed. However, the assessment is not simple, because only part of the benefit is the elimination of manual tasks. The rest is the provision of the needed, enhanced individual corporate capabilities.

B. IHS Goals for the Implementation Planning

There was articulated in all of the working groups a perspective that the Agency should be automated as quickly as practicable to provide a significant advance in productivity. Several drivers for the strong demand for automation were identified:

- o An improvement in quality and timeliness of Agency products is required to meet rising intelligence demands.
- o The technical sophistication of required operational and analytic processes is continously and rapidly increasing.
- o The old solution of adding appropriately skilled manpower to meet added responsibilities is becoming much less viable.
- o The Agency has a substantial amount of precious manpower performing routine tasks which are amenable to automation.

In addition, there seems to be a broad perception now within the Agency that personal access to the productivity-enhancing functions of IHSs gives individuals the ability to be much more effective. This added a high degree of personal interest to the expressed urgency for providing IHSs functionalities broadly within the Agency.

The provision of technical capabilities is not solely a responsibility of the providers of services. Users must be involved in the budgeting, planning, designing, and implementing of these services so that the resultant capability achieves the user's goals. The following goals emphasize the provision of technical capabilities. Continuous user involvement is required to achieve these goals.

The goals for the implementation planning phase of the IHSs Strategic Plan are summarized by the nine provider areas, which follow.

1. Architecture Goals of Agency IHSs

The Information Handling Task Force (1980), and others, concluded that it is necessary that the Agency's Information Systems fit into a larger system definition - an overall system architecture. The need has been reaffirmed in the current strategic planning effort. Some of the underlying reasons are:

- o The user community requires access to the growing number of IHS services through a single work station.
- o Increasing volumes of electronic information, residing in various computer centers, and more widely shared, will have to be accessible to larger user communities.
- o The concept of an electronic work station at the fingertips of each employee providing access to central and distributed

computing facilities for both domestic and overseas users requires a carefully integrated system.

- o Increasing dependence on information services demands superior reliability and responsiveness. Processing centers should be able to back each other up.

- o The users require commonality in the man-machine interface.

The requirement to integrate individual Information Systems into a larger system is a corollary to the Office Automation Goal. The objective is to provide each Agency employee transparent use of the Agency's processing facilities. These facilities can reside at four levels:

- o Host processing in the cluster centers
- o Communications processing
- o Distributed processing
- o Terminal and local processing

Future integrated system components must be able to operate in a stand-alone, decentralized mode, or as fully integrated elements of a more centralized system. For example, a nodal processor may be functioning with a number of work stations and peripherals, and be called upon to provide host access for several users through a communications processing environment. Communications is a key ingredient in binding the components into a larger system.

To provide such an integrated environment, the following architecture level goals are defined:

Goal 1.1: Provide Reasonably Facile Interoperation of All the Major Centers, Facilities and Extra-Agency Facilities

The centers (RCC, SCC, NDS, and shortly, SAFE), should be capable of interoperation using such facilities as MERCURY, MHF, METRONET, MPS, APARS, ETECS, and COM (Computer Output Microfiche). Interoperation with extra-Agency facilities via the same user terminals will be required. Implied is compatibility of the lower level protocols.

Goal 1.2: Provide a Reasonably Homogeneous Environment

Integration of the IHS operations of the Agency requires that the functionalities hosted on the centers and facilities comprise a homogeneous environment. This implies a homogeneous set of major utilities, software language, communication formats and higher level protocols.

Goal 1.3: Provide Reasonable Standardization of Hardware, Documentation and Procedures

The appropriate level of standardization is ultimately a management judgment: too much, unreasonably limits competition and forecloses the benefits to be derived therefrom; too little, means excessive required

investments in compatibility engineering and O&M support. It also implies a reduction in security due to the increased number of functional entities which can cause breaches and the increased number of contractors required for O&M support.

Goal 1.4: Provide an Architecture to Take Advantage of Standard Commercial Products

The affordability of the goals depends very heavily on our ability to use standard commercial products. Of particular concern in this regard are systems software products, such as DBMSs; applications software products, such as budget analysis/display or time series analysis packages; and terminal equipment.

Goal 1.5: Increase Overall IHS Availability to the 0.995 Level by 1989

In a fully automated office environment users will be singularly dependent on IHSs as tools to do their work. When the system is not available, they will not be able to do production work in the paper environment, as is now the case. Accordingly, the "tools" must be available. To meet the 0.995 availability goal the number of single points of failure must be reduced, hardware availabilities must be increased, and a true overall availability reporting mechanism must be in place. The following measures are perceived as fundamental to achieving these objectives:

- o A total, end-to-end, availability reporting program
- o Individual system/component monitoring
- o Stressing availability in budgeting and designing
- o Establishing reliability/availability criteria as a part of hardware/software/system procurement

2. Office Automation

There are two principal dimensions of the office automation concern: the universal provision of electronic work stations, and the facilities that would be provided through them. The first is important in terms of making broadly available the general productivity enhancement that automation offers and of achieving the "paperless" office environment. Eliminating most of the paper, however, has to await the completion date of office automation. Whenever a relatively small percentage of those needing terminals are without, the paper will continue to flow, and the cost saving benefits of reducing it will be deferred.

Our current process of achieving office automation is more a bottom-up than top-down process. Terminals and functionalities are generally provided in response to needs stated by organizational units. The procurements are individually justified by requesting organizations in relatively small lots. The facilities to support the terminal

installations are provided individually, as each terminal installation is made. As a whole, it is a relatively expensive and laborious process which has little chance of providing, in a timely manner, the capabilities needed for full office automation.

The goals for office automation are:

Goal 2.1: Management Commit to Plan and Execute the Acquisition and Integration of Office Automation into the Agency by 1989

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The goal of full office automation by 1989 is compatible with what other agencies and the private sector are planning. For example:

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- o In a recent Yankee Group study, they projected that: "Today in major firms we find 1 terminal for every 25 employees. By 1986 we will have 1 terminal for every 10 employees; by 1990 we will have 1 terminal for every 3.5 employees". These are numbers averaged over all types of firms, most of which have major manufacturing operations requiring a very low ratio of terminals to employees.

Even if these goals and projections are judged optimistic, they reflect a rapid, universal movement towards a new operational environment for the office. Suppliers are moving quickly to fill the needs of this burgeoning market. Even with the accelerated pace, the Agency will lag the leading edge sufficiently that it should be able to capitalize on commercially funded R&D supporting the movement, avoiding the necessity for any substantial RDT&E investment.

As a part of the management commitment, the Agency should develop a master plan for office automation. The procurement of terminals and facilities for office automation can then be justified one time to the Executive and Legislative monitors of the Agency's programs.

Goal 2.2: Provide the User a Single, "User Friendly" Environment

There is a very clear and strong perception on the part of many users that a single, user friendly environment is required. There will be enough complexity in variety of functions needed, that an additional dimension in the variety of environments would be overwhelming. Users pointed out that the imposition of improperly developed automated systems can be just as difficult and frustrating to deal with as the inefficiencies of manual systems.

The term 'single environment' reflects a number of requirements. These are:

- o The command language (which includes such things as sign-on, sign-off), utilities (editor, file manipulation commands) and common application programs (word processing, electronic mail) should be standardized so that they operate identically whether the user is dealing with a stand-alone terminal, a terminal attached to a local net, or a terminal attached to the mainframe. (NSA appears close to implementing such an environment by standardizing on the UNIX-type of operating system, that now operates on micros, as well as host computers. DoD is developing such an environment in the context of its Ada language development.)

- o Users demand that a single, multi-functional terminal be capable of interfacing securely with the multitude of systems, such as SOLIS, NDS, VM and SAFE, that exist today.

In addition, users identify the 'user friendly' requirements to be:

- o convenient access to terminal and output devices (terminals on the desks, output devices nearby)

- o terminals/systems that are easily learned and easy to use (structured and menu driven to eliminate complexity, minimal keystrokes, elimination of repetitive and menial tasks)

- o response times and data rates that support the normal user workpace - terminals should allow the user to work at least as fast with the screen softcopy materials as he would with comparable paper materials

- o feedback that is responsive - error messages and other forms of advisory output should be intelligible, not codes requiring reference to manuals

- o functions that are integrated - information once entered should not have to be rekeyed when being passed to another functionality

Goal 2.3: Provide Productivity Tools

The user thinks of a workstation in terms of the job-related functions it can perform. Users stated that all of the information handling functions listed below would be valuable to a significant number of Agency personnel:

- o Electronic Mail
- o Automation of personal management functions
- o Computer Assisted Instruction
- o Teleconferencing
- o Personal Computing
- o Access to VM and MVS (or equivalent)
- o Personal and group filing systems
- o Access to central DBMS's
- o Knowledge-based systems
- o Management support systems
- o Administrative DB systems
- o Access to outside nets and data bases

In addition, IHS professionals need tools to increase their productivity. These include: report writers, code generators, specification and code validators, and code library systems.

Goal 2.4: Provide Training, Documentation and Support for IHS's

With the growth of Information Handling Systems and the introduction of major office automation projects, resources for training and user support have been severly taxed. Additionally, many organizations find that operational demands severely limit their ability to send their key personnel away to needed but lengthy courses. The objectives that support this goal are:

- o to assure that training and user support are thoroughly and adequately addressed early in system developments

- o to develop standards for the types of documentation required of IHS systems and to standardize commonly used applications such as command languages and editors

- o to develop automated and consultative, user instructional tools to alleviate the classroom training requirements

3. Processing Systems

The primary functional nodes of the Agency's IHSs consist of the Washington area cluster computer centers - the RCC, SCC, NDS, 4C and shortly, the SAFE Computer Center. Additionally, there exists several smaller computer sites, [redacted] and specialized computer systems, such as TADS. Specialized operations, operating systems limitations, and security/compartmentation considerations are factors that may lead to new cluster centers in the 1985-1989 timeframe. 25X1

The primary requirements for these centers have been, and will certainly continue to be, to meet the capacity and service needs of the users that they directly support. In the 1985-1989 timeframe, meeting these requirements will depend more and more on the ability of these centers to interoperate. Users will increasingly need access to services and data resident in other cluster centers. Providing this access places additional demands not only on the communications network, but on the originating center as well. With the rapidly increasing number of on-line users, the resultant net performance expectations represent a major advance over today's capabilities.

Consequently, the requirements that will carry much greater weight as we move into this timeframe are: interoperability, availability, homogenity and robustness of these systems. Most of the goals relevant to these requirements will take time to develop because of their strong mutual interdependence. They are outlined in the following paragraphs.

Goal 3.1: Provide Capacity to Meet the Needs of the Agency

Of the two general categories of services offered by these centers - specialized services created by major designated projects or systems, and general services (VM) - the latter is more readily predictable on a strategic basis. The capacity growth for general services has been characterized by continuous growth. Major designated projects, on the other hand, can come at any time and generally budget independently for their processing capacity. Thus, the strategic planning concern is with general services and such major projects as have already been designated.

The historical rate of increase in demand for general processing has been high - on the order of 20 percent per year. It is projected to go even higher, driven by greater systems access through office automation, and the expanding ability of Agency professionals to capitalize on the capabilities of such systems. Accordingly, if the accelerated office automation goal is accepted, an increased annual capacity growth requirement of something in the range of 25 to 30 percent seems likely. As systems such as CRAFT and SAFE come on-line, and start to interoperate with the general service systems, we need to determine the overall capacity parameters (processing power, response times, on-line storage, data rates) to ensure the quality of service the users need. The development of the overall capacity growth requirement for 1985 to 1989, and its allocation to the various centers, is currently being studied.

Goal 3.2: Provide On-Line Storage Capacity and a Corresponding Access Methodology to Meet Real-Time User Needs

On-line storage is projected to grow at least at its historical 20 percent per year rate. Vast amounts of information will need to be directly accessible via the work station. This includes operational support data, historical information, reference data, "open source" data and literature, personal and organizational files, data bases, work files, correspondence, imagery and voice. While technology is providing increases in storage capacity, it is unlikely to keep pace with the dramatic increase in needs. Data processing facilities will need to be designed to accommodate the growth through both the acquisition of new DASDs and the exploitation of new technology. Care must be taken in the development of processing facilities that the increasing levels of DASD I/O per computer do not produce a degradation of IHS responsiveness.

Goal 3.3: Develop Processing Center Architectures That Support Agency Homogenity and Robustness

The RCC and SCC currently provide processing service availabilities of about 0.97. While quite high with respect to current technology, such values will not be adequate to support full office automation. Evaluations of the needs with full office automation indicated a need for an availability for on-line services of about 0.995, the value to which SAFE is being designed. This increase represents an order of magnitude increase in MTBF and a significant reduction in MTTR over the values obtaining today.

To achieve these availabilities, current knowledge points towards procuring system components with much better individual availabilities, and developing architectures that reduce the number of single points of failure and provide better recovery characteristics.

Improved robustness requires detailed contingency planning. To the maximum extent practicable, the centers should be able to back each other up. This requires some degree of homogenity and the ability to handle computer-to-computer communications as well as user-to-user and user-to-computer communications.

Specific recommended steps towards greater robustness include:

- o Identification of critical IHS functions and services, and current IHS vulnerabilities
- o Development of a coordinated IHS contingency plan, using such guidelines as FIPS 87
- o Substantially increased utility availability (power, cooling, water)
- o Provision of a remote ADP backup facility

- o Institution of a regular, contingency testing plan to assure designed robustness

Additionally, a remote ADP backup facility, if designed properly, can provide the robustness our Agency systems need when operating under stressed conditions.

4. Carrier Systems/Telecommunications

The ability of an intelligence organization to perform its mission depends on the responsiveness of its communications system. The Agency's existing communications system is a slow-speed, narrative teletype network, portions of which are technically obsolete. The network is difficult to operate, expensive to maintain and unable to meet certain service demands.

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Goal 4.1: Provide Carrier Systems/Telecommunications Which Have the Capacity and Flexibility to Meet the Agency's Service Demands

A set of programs, collectively called Recapitalization, has been identified to ensure the Agency's communications system is responsive to user needs. The objectives of Recapitalization are to:

- o Increase the network transmission capacity through a combination of improved satellite (up to 19.2 Kbs), high speed lease lines, medium-speed (300-600 Bps) high frequency radio and user-friendly, emergency communications systems.

- o Provide greater data transfer through replacement of the message and data switches by a packet-switched data network.

- o Provide greater hardware and operator efficiency through introduction of new, high speed cryptographic and terminal processing equipment.

- o Increase the capacity and robustness of the Washington area communications system, applying packet-switching network technology.

- o Provide other services such as secure voice, facsimile and automatic dissemination and distribution.

Full operational capability (FOC) of Recapitalization will provide the capacity to support documented and perceived Information Handling requirements through 1989. However, analysis of traffic over the past ten years shows generally an exponential growth. Projections for the future are for an increased rate of growth, both in volume and types of service. This escalation of information exchange dictates that IHSs be designed for expandability, much in the manner of industry's value-added networks (VANs).

The goal is to allow expansion through systematic component replacements, significantly postponing the necessity for future major system replacements such as Recapitalization.

Goal 4.2: Provide an Overall Carrier System Availability on the Order of 0.995

Accomplishing this goal requires that all elements of the system have individual availability well above the 0.995 macro figure. It is, however, premature to assign a high, firm performance goal without further assessment of current system availability measurements. The communications nodal processing centers conform nicely to availability measurements - taken as an entity they "fit" the standard IHS model. Alternately, achieving an accurate measure of availability on the myriads of individual transmission links around the world and domestically is more difficult and complex - they do not "fit" the standard model. It is, therefore, necessary to base calculations of availability on technical failures of components which provide MTBF and MTTR statistics. Operational factors such as propagation anomalies should be considered separately in availability calculations for individual communications links.

Major communications programs which will impact on the architecture have design specifications supportive of the availability goal. The specified availability of the MERCURY network is 0.997 at less than 50 percent of full capacity loading. When fully stressed (100 percent loaded) the specified availability is 0.98. For the SKYLINK SC-3 terminals the availability design goal is 0.995.

Goal 4.3: Provide Security in Carrier Systems

The necessity for protecting all communications links is recognized. Communications security aspects need to be considered in the planning, design and operation of communications systems. The goal is to provide communications carrier systems with multi-level security features and reduced emanation profiles. Assurance of these attributes will continue to be provided through rigorous testing and validation of hardware and software, physical and technical inspections and thorough analysis of documented failures or compromises.

5. Administrative Systems

The great importance of administration systems is sometimes obscured by the Agency's operational imperatives. In fact, administrative functions

have high priority; personnel evaluation and assignment, pay, contract reimbursement, and budget planning and reporting, for example, all have rigid submittal/action dates. Administrative functions also are currently absorbing a significant portion of the Agency's precious personnel resources, both on a dedicated and a collateral basis. Most of this manpower is used in the performance of routine, manual tasks. The investment required to take advantage of the capabilities of IHSs to alleviate this administrative workload burden is substantial, and the currently funded pace of implementation is perceived as inadequate for the scope of the required effort.

Many of the needed pieces of administrative automation have already been put in place. Principal among these are PERSIGN, MEDSIGN, ICS, CONIF, FRS, GAS, and tailored registry systems. Currently under development are LIMS, ASAPS, ACIS and expansion of PERSIGN and registry systems to meet the needs of directorates and offices. The pace and scope of these developments falls far short of that required to meet the goals, however, because the resources are not currently available to support an integrated, properly paced approach. A significant commitment is required to provide facile interoperation of the systems we now have, expand the ones we now have to meet user needs, and to develop the new ones required.

Goal 5.1: Automate Manual Administrative Tasks

The Agency today still has a significant amount of manpower dedicated to routine manual processing. In some areas, we seem to have gotten to the point where the increasing complexity of the processes threaten to overwhelm the ability of manual techniques to cope. LIMS and ACIS are representative of badly needed automation projects that are designed to provide the required automation.

One of the advantages of developing a large terminal network is that many manual tasks, which by themselves could never justify the equipment expenditure, can now be automated. With an installed network, tasks such as preparing T & A's, travel vouchers, training requests, personnel evaluations, requests for library services, and use of on-line consulting/support services can be efficiently executed electronically.

Goal 5.2: Develop a Set of Interoperating Systems

Users expressed not only a requirement for improved automated administrative systems, but also a concern that the large administrative systems existing and being built be mutually compatible. This compatibility is vital to alleviating substantial manual processing otherwise required to interoperate. Eventually, the goal may be to have a fully integrated set of systems, that is, sharing a common data base and having integrated software. If appropriate, that would be a goal for the 90's. For the 85-89 time period, addressing a set of independent, interoperating, systems would be a major accomplishment.

6. Message Handling

The message handling functions of the Agency are a principal element, and to a certain extent, determinant of its architecture. The requirements of access security, compartmentation, speed, accounting and process management bear heavily on the architecture of the totality of message handling functionalities.

Goal 6.1: Provide a Cohesive, Architecture to Support Message Dissemination and Distribution Functions

The Agency is evolving towards a layered, or hierarchical, architecture for its dissemination and distribution systems. At the top is CDS, to be supplanted by MHF. Then there are the dissemination and distribution systems in the various centers, such as MPS, SAFE dissemination, and APARS.

The allocation of functions and accounting data flow among such hierarchical functionalities needs to be determined to develop a single, integrated environment.

To minimize costs, every effort will be made to develop the plan around standard interfaces and formats; institution of the proposed IHC standard Intelligence Reporting format for electrical messages with automatic conversion of "outside" traffic is a prime objective.

Goal 6.2: Centralize Message Accounting and Flow Management

To provide required audit trails, transaction records should be retained at all switching centers. However, a continuously updated, complete message accountability and flow management record should be maintained at and available from the principal and "highest order" message switching node in the system. This will assure integrity of operations by making available a full record of reference data on the complete message handling process at one central location.

Goal 6.3: Utilize Computers for Management of Access Control

Message access will be computer controlled based on dissemination criteria that is provided in the following sequence: a) system controls (compartmentation and higher order security controls); b) originator instructions (message type and/or slug line, pass to, exclusive for, etc.); c) content of the message (key word search, subject area, etc.); or c) user requirements (search and retrieve). There will be sufficient IHS interconnectivity to provide to the user a homogenous message handling capability which will rigorously enforce message access restrictions while providing access to authorized messages in a timely and efficient manner.

7. Scientific and Technical Facilities

A requirement for a major advance in the Agency's Scientific and Technical analysis capability is foreseen for the second half of the 80's. In this time period the design of office automation systems will be largely

complete, and the general population of professional users will be moving beyond office automation functions to sophisticated use of information processing services in the Scientific and Technical areas.

As with office automation, support will be required for a diverse group of users in many organizations, all of whom will need advanced "tools," adequate system response, and the support of knowledgeable personnel. The Scientific and Technical functionalities required have similar underlying aspects - they require the services of highly skilled, technically oriented personnel and information processing power which is orders of magnitude greater than that needed for general purposes. Services which are integrated into our architecture must be flexible and, above all, be responsive to operational and analytical needs.

The goals within the Scientific and Technical area are:

Goal 7.1: Develop a Centralized Capacity to Provide Scientific and Technical Services Which Are Responsive to User Turnaround and Throughput Needs

Scientific and Technical processing power is going to be a major factor in meeting user needs. Much of the scientific and technical processing is currently dispersed, running on a variety of machinery. Amalgamation of much of the scientific and technical processing hardware resources appears highly desirable to deal effectively with the character of scientific and technical processing: very high capacity requirements for relatively short periods of time. Increasingly, users are likely to find that they do not have the budgetary resources available to afford the power needed on a segmented basis.

In addition, there are special characteristics of scientific and technical software which can be exploited only by special hardware such as vector manipulators or data base machines. Such special machinery provides scientific and technical processing power for a much lower cost than processing power on general data machinery. Its integration into an overall environment will probably require a significant investment, however, and it will require a cadre of highly skilled professionals to help users exploit it. When it will be procured and what types of special machinery are appropriate has to be determined through thorough technical analyses.

Goal 7.2: Provide a Compartmented Environment

Much of the scientific and technical data is extremely sensitive; it is raw data, cannot be sanitized with respect to sources and methods, and its very existence and character reveal areas of Agency interest and intent. As a consequence, it needs to receive a high level of compartmentation within the processing environment.

One of the major concerns, therefore, is limitation of contractor access. Careful consideration should be given to isolating "development" and "production" through the provision of separate systems, because

contractors will always have extensive access to any development environment. This may mean additional equipment investments, but is a much more difficult budgetary problem if pursued on a dispersed rather than a centralized basis.

There will always have to be contractor access for maintenance. However, with a highly skilled cadre of professionals supporting and operating the facility, there can be high assurance that contractor maintenance personnel can be prevented from exposure to extremely sensitive information and methods. In addition, an isolated environment, such as a separate center, would limit such contractor access to only the types of equipment and processes needed for the scientific and technical processing - a more limited set of contractors than is needed in a general data processing center.

Goal 7.3: Facilities Which Provide for General Scientific and Technical Support

Among the facilities that will be needed are:

Interactive Graphics:

The goal is for the Agency to have a universally available general Interactive Graphics capability, both black and white and color. This will include providing "off-the-shelf" tools for application to particular needs, being properly documented, having simple interfaces and meeting performance criteria. This capability will provide for the comprehension and understanding of the aggregate significance of the ever-increasing amounts of information pertaining to a given subject.

Among the capabilities needed are:

- o Generation of two and three dimensional displays
- o Statistical presentations
- o Signal processing presentations

A Structure for and a Set of Specific Interrelated Models:

A usable set of models in the military, economic, and political area which predict future events and display the consequences of specific stimuli is required. These need to be relevant to problems of increasing scope, accurate, and interrelated when required. The consequence is that they are projected to be one to two orders of magnitude more complex than today's models.

Artificial Intelligence and Knowledge Based Systems:

The Agency will need the capability to install and use Artificial Intelligence mechanisms and Knowledge Based Systems. This will enable users to integrate these functions into their operations/decision processes to meet particular needs within time constraints. The use of special computers, experimental (possibly proprietary) systems, and ease of their integration will be provided.

Computer Aided Design:

The goal is to have an integrated Computer Aided Design capability to support the following:

- o Reverse engineering of foreign hardware
- o Map generation, processing, and annotation
- o Architectural design, storage and update, e.g., physical plant layout, wiring, piping, space allocation
- o Publication layout and design
- o Management support/project tracking displays, e.g., PERT-type planning tools, operations tracking

These will be linked to the appropriate data sources and permit the rapid manipulation of information into the desired form and format.

General Utility Software for Technical Application

In the analysis and development of systems, especially technically oriented ones, there are often needs for a variety of complex software functions. Included are such processes as matrix analysis, statistical analysis, optimization and optimum seeking techniques, and image processing. A library of these processes should be acquired, documented and maintained so that users can readily apply them.

Goal 7.4: A Cadre of Skilled Professionals in the Scientific and Technical Area

The Agency will need a staff with the specific skills necessary to provide Scientific and Technical facilities, services and consultation. External dependency will be more restrictive and a cadre of experts is needed to provide user services in a timeframe significantly shorter than today.

Access to these facilities requires a carefully planned architecture. Processing power will be needed at the proper "node" or "center", capacity

for adequate information transport will have to exist, and prompt technical assistance in implementing the correct portions of readily integrated functions will be essential. The Agency must be in a posture which permits the timely integration of Scientific and Technical facilities (including newly available, commercially vended functions) into its "mainstream" if user needs are to be satisfied.

8. Information Management

In the later half of the 80's it is expected that the Agency's internodal and interorganizational use of information will sharply increase. Additionally, the bulk of the anticipated requirement is for real-time response to diverse user needs originating at electronic work stations. Provision of such capabilities requires that the information be managed in an efficient manner so that the IHSs are not overwhelmed with on-line storage of vestigial data, redundant data and data base update and synchronization problems.

Because information will accumulate at an ever increasing rate provision must be made for its storage for immediate use and subsequent removal to an archival repository. The policies which will control this must be set and the capabilities to provide the required information management provided.

Goal 8.1: Provide Flexible, Powerful, User Friendly Data Base Management Systems

Users will require DBMSs which permit them to efficiently create and maintain data bases. The range of needs in power and type dictate that commercially available DBMSs be available and supported. Such DBMSs should be hardware manufacturer independent so that Agency management may specify Agency standard DBMSs in development contracts. Inverted, hierarchical systems, such as ADABAS and IDMS, and relational systems, such as ORACLE, which run on a variety of hardware are examples of the current types that may be able to meet these needs. They will be more user friendly and feature those characteristics most often needed by users - responsiveness, transportability, installation ease, upward compatibility, and minimal maintenance. Additionally, a wide range of specific functions will be required, for example, report writers, graphics output, external loading, and, mathematical capability. It should be recognized, however, that the more powerful DBMSs will probably always require professional expertise because of the complexity and power of their capabilities.

A concomitant aspect of providing and supporting current technology commercial DBMSs on our central systems is that obsolescent ones have to be dropped. Supporting a DBMS requires the dedication of O&M resources and continuous training of new users in the use of the DBMS. As a consequence of resource limitations, it is practical to provide and support only a limited set of DBMSs. Thus concomitant with the provision of new DBMSs is the requirement to convert files on old ones to new ones.

Goal 8.2: Develop a Set of Pertinent Data Standards

Data standards are needed to provide for the interoperability of systems, the avoidance of needlessly duplicative files, and the ready transfer of information between systems and organizations. The first priority is in the administrative area because standardization of administrative data definitions is essential to interoperation of these systems. This will be more difficult with respect to operational and intelligence data because community interests frequently obtain. A more deliberate approach is required for data standards in this area, setting a priority framework based on specifically identified interoperability benefits. It should be recognized that widely varying applications of data will frequently preclude standard definitions in the operational area.

Goal 8.3: Provide an Effective, Agency-wide, Data Base Administration (DBA) Capability

The user need for Data Base Administration services is expected to increase sharply as the Agency-wide use of IHSs increases. Also needed is assistance in using DBMS facilities to obtain, retrieve, manipulate and understand information and the specific expertise in particular DBMSs and associated applications software for users to independently apply and operate such DBMSs.

In addition to local DBA functions, a central DBA management function is needed to provide coherency and to set goals and policy in local areas such as:

- o Migration and Conversion of Data Bases and Data
- o Data Standards
- o Synchronization
- o Data Transfer
- o Security

Goal 8.4: Provide an Effective Resource Management Program for User Accountability of Resources

The current resource management program is based on a budgeting approach and meets the Agency's current needs. In the 1985-1989 timeframe, with an order of magnitude increase in on-line users and a more dynamic environment, the current approach is seen as inadequate. To meet the increased resource needs, accountability must be more direct. The decisions concerning IHS expenditure allocations need to be made at lower levels of management so that use is responsive to the dynamics of the required work environment. Additionally, there should be a greatly improved motivation for frugal use of processing and DASD resources. This motivation is needed to alleviate peak processing period loading through deferral of tasks to non-prime time when practical - peak loading being the primary determinant of processing capacity requirements. Users should also be motivated to archive on-line data when it is no longer needed thus alleviating the need for additional DASD resources.

Goal 8.5: Provide Archiving Policy, Implementation Guidance, and an Archive System to which System Developers and Operators can Interface

A method of archiving data bases, files and systems from current status is needed. In the electronic environment, especially with integrated systems, the NARS "record copy" definition is insufficient. Currently, "dumping" for backup purposes is often used as an archiving substitute and this does not provide an adequate historical copy. Retrieval of information from an old copy of an obsolete DBMS and the loading of it into a new (different) DBMS, for instance, would be extremely difficult and time consuming. Guidance as to the criteria to be used in archiving, and an encompassing "archiving system" must be available to system/data base designers so they can incorporate archiving into the design process.

These information management functions will provide the Agency with a more efficient and responsive overall capability. The need for availability of information, its rapid retrieval and use will increase greatly in the future.

9. Security

As increasing quantities of information become available to greater numbers of users at increased data rates, confidence in the integrity of the systems processing this data becomes increasingly important. The following goals for security enhancements apply broadly to the Agency's IHSs.

Goal 9.1: Ensure Compartmentation Controls are an Integral Part of IHS Design, Procurement and Operation

In information systems, the classical methodology is to ensure compartmentaton by employing unique systems for unique purposes. The issue is how to provide IHS interoperability and assure the requisite access limitations. In some cases, interoperability may not be desired for normal operations, but should be available for emergency backup.

Technology offers some prospective solutions. Secure operating systems, encrypted data bases, and kernelized security clusters have the potential for enhancing compartmentation. These technologies all present tough developmental problems to be solved; thus, there is major uncertainty in the timing of their maturity.

Compartmentation will be emphasized in hardware and software applications e.g., front-end processors, link encryption, DES, and ACF-2. Additional requirements for accountability, audit trails and techniques to verify and assess loss of information, either accidently or intentional are goals for IHS's in the 1985-1989 timeframe.

In the final analysis, however, personal accountability, professionalism and internal management control procedures still provide the cornerstone for security of our activities.

Goal 9.2: Provide for the Use of Secure Operating Systems in Agency IHS

Secure operating systems (OS's) have the potential for providing multi-level security features. Utilization of secure OS's in Agency IHSs will require a balanced approach between security enhancements and operational flexibility. As secure operating system technology or techniques develop, provision for incorporation of secure OS's into the Agency's IH environment is a goal. Immediate concerns for the IHS architecture are definition and scope of the security threat and identification of protective measures and incorporation of security enhancements into the design of IHSs.

Goal 9.3: Provide for Incorporation of Encrypted Data Bases

Encryption of file data, stored on electronic media, particularly DASD's, is needed to counter unauthorized access or accidental spillage. Such a capability is particularly needed for field station IHSs. This methodology provides spillage protection by putting the decryption on authorized terminals rather than in the OS. The result is that spillage to an unauthorized terminal yields only unreadable, encrypted data. In support of this, the Agency must:

- o Foster research in development of techniques for utilization of encrypted data bases.
- o Develop testbeds within the Agency to rigorously evaluate the performance of encrypted data bases in relation to elapsed processing time.
- o Establish management plans for storage and use of system and personal keys for encrypted data bases.

Goal 9.4: Ensure TEMPEST Protection for IHS Field Systems and I/O Devices

Improved TEMPEST protection is a very important dimension of improved IHSs security.

25X1

C. Areas Requiring Concentrated Planning and Engineering

It is recognized that the foregoing goals are inadequately definitive in many areas. This lack of definition exist chiefly where feedback from the implementation implications of the generally stated goals is required before the specific goals can be appropriately defined.

Implied by these goals is a substantial dedication of planning and systems engineering effort by Agency line organizations to develop and resolve the implementation implications. This should provide feedback to

the strategic goals and the strategic-level implementation plans, as well as definition of the tactical plans of the individual organizations.

The scale of the required efforts is such that, in many instances, a substantial refinement of the associated strategic planning is to be expected in the second years' plan. Such planning and systems engineering work is ongoing in many of the areas. For others, such as top-down office automation planning where it has not yet started, it needs to be initiated directly if the refinement sought is to be ready for the 1983 plan.

The areas that are currently identified as being of particular concern in this regard are discussed in the following paragraphs.

1. Office Automation Plan

Pursuant to a management decision to automate Agency offices on the recommended schedule as a top-down integrated program, the office automation plan has to be developed. The strategic planning for this process has to take place within directorates as well as on an integrated, Agency-wide basis. Working through the priorities, required organizational accommodations, and related personnel planning will take time and should begin soon.

2. Interoperation of Major Systems

Each of the major systems currently under development (SAFE, NDS, MERCURY, and CAMS) have requirements to interoperate with other systems. The developers, in the absence of an overall architectural definition or prescribed standards, tend to work these requirements independently and on a system-to-system basis. If continued in this manner, the results will be a proliferation of interfaces, protocols, and information exchange formats. Subsequent integration of these major systems into a total homogeneous environment will be costly, perhaps prohibitively so. A solution frequently conjectured is to insert "gateways." However, these are costly and they take a long time to build if developed for a unique interface.

If the goal of a homogeneous environment permitting interoperation of these major system entities is to be achieved, standardized communication networks and the environment will have to be defined to which these systems can interface. The variation in the network architectural alternatives is wide, and the ability of the Agency to tie its systems together will depend strongly on a judicious choice of network architecture and individual systems and centers architectures. To avoid costly retrofits, the determination of the architectural approach should proceed as expeditiously as possible and will require focused attention by the principal providers.

3. User Support Functionalities

An architecture for user support functionalities needs to be defined if the goal of a single, user friendly environment is to be achieved. This architecture would comprise and support a family of operating systems, DBMSs, and utilities, with their capability being a function of the power

of the host machinery. There is also an interrelationship between this architecture and that of the Agency hardware systems. Their mutual compatibility is required in achieving the desired environment.

Developing this architecture will take an integrated effort on the part of providers and users.

4. Message Dissemination and Distribution

The architecture of the Agency's intended dissemination and distribution system needs to be determined to develop a complete strategic plan in this area. This determination is compounded by the fact that the Agency is evolving from a monolithic dissemination and distribution system, using CDS and hand distributed paper, to one integrated, hierarchical system. The latter will incorporate such functionalities as MHF, SAFE dissemination, the MPS and APARS. The allocation of functional responsibilities among these systems needs to be determined, however. In addition, the top-level relationship between the dissemination and distribution functions and the MERCURY-type of message transmission and handling system needs to be determined. A complete strategic plan depends on a top-level allocation of functions among all these entities, defining the goals for each sector.

5. Scientific and Technical Facilities

The projected sharp expansion in scientific and technical requirements presents some significant, interrelated questions with respect to provisions of the services. These questions need to be resolved before a comprehensive strategic plan can be worked out in this area. Among them are:

- o What are the time-phased, capacity requirements by scientific and technical processing categories?
- o How should security objectives and constraints be met?
- o What sort of approaches should be taken in selection of machinery, its mutual interoperation, and its internetting with communications facilities and other types of processing equipments or centers?
- o How should the professional cadre be formed and positioned within the Agency?

6. Availability Goals

User inputs provided a reasonably good perspective, in a strategic sense, of what availability of central services the user needs at his terminal. The allocation of availability goals to the various provider areas which support this is to be determined. The communications and processing availability goals will vary by type of service and character of the mutual interaction. The utilities goals will have to support the highest availability goals that obtain for processing and communications.

Developing the allocations of availability goals is a complex problem involving cost versus availability performance tradeoffs among hardware, software, and architecture. Because of the approximate character of much of the tradeoff relationships, the analysis process leading to the allocation will have a strong judgmental element.

7. IHS Training and CAI

A preliminary survey of IHS future training requirements completed about seven months ago indicated the potential for a very substantial classroom training requirement. This need was predicated on continued reliance on the current approach, which emphasizes classroom training.

The size of the training personnel and facilities investments that would be needed in continuing the Agency's current approach are judged to be impractically large. So are the time requirements on the part of the professional staff which would be trained. The manner in which CAI can be used to alleviate this load and the degree of emphasis for a CAI program remains to be determined.

Working out a strategic plan for IHS training will require a coordinated assessment of training requirements by individual directorates, and then an evaluation of approaches to meeting those requirements. Responsibilities for implementing those training requirements then need to be allocated.

8. Backup Facilities

Because of the high cost, any significant progress in providing large-scale, remote backup of Agency IHSs is judged dependent on inter-program

25X1

D. Items with Incremental Budget Impact

It is clear from the general character of the goals that, taken as a whole, they cannot be accomodated within a continuation budget. They imply a significant increase in those portions of the budget that pertain to Agency IHSs, beyond an inflationary adjustment.

Although cost estimates of the goals are well beyond our current status, it is desirable for Agency management to have some feel for the budgetary implications of these goals. To this end, those goals that the IHSA estimates will produce an incremental increase in a continuation budget are listed in the following paragraphs.

1. Office Automation

The acceleration of office automation implies buying and installing substantially more terminals, software, communications and processing capacity than a continuation budget will accomodate. Terminals, with an appropriate allocation of printers and local net facilities probably average about $10,000 per unit. Everything necessary to support this increase probably multiplies this number by a factor of two to four.

[redacted] 25X1

2. Administrative Systems Development

The investments required for new administrative systems to automate current manual tasks and to enhance the existing systems to interoperate is substantial. Based on costs estimated for a few new systems and some extrapolation, this additional investment is placed in the $50 to $100 million category, through 1989.

3. Enhanced Scientific and Technical Facilities

There are three aspects of this investment: hardware including special I/O devices to provide the capacity and response needed; software packages; and a cadre of skilled professionals. The total cost of this investment is estimated to be [redacted] 25X1

4. Networking of Major Centers

The networking of the cluster centers of the Agency will require a significant design engineering investment and then an investment in hardware, software and communication protocols. NSA's PLATFORM backbone system successfully internets into a homogeneous environment more than half a dozen cluster centers, comprising a variety of marques of computers. Although it is a dated technology relevant to new computer communications implementations, PLATFORM provides valuable experience as well as insight relevant to the level of investment required to achieve such an objective. A cost on the order [redacted] seems probable, assuming that the internal architecture and prototype of clusters can be accommodated to this environment and gateways can be avoided. 25X1

5. Data Base Conversions

With the substantial rate of storage of electronic data, the Agency has now accumulated a significant amount of data in DBMSs that are obsolescent. We are entering an era where new DBMSs should be brought into the Agency's IHS environment and the files on the old DBMSs converted. It is a major expense, but a concomitant one to bringing aboard new DBMSs. It is estimated [redacted] is required for these conversions. This does not include conversions associated with designated projects. 25X1

6. Backup Facilities

For robustness in the face of a wide range of contingencies short of strategic nuclear war, the Agency needs backup in both communications and processing facilities. It appears essential for cost reasons that communications and processing be colocated in a single facility. There would be far greater assurance of the backup functions being there when needed if the center were continuously manned, performing a valid normal operating function of the Agency.

[redacted] 25X1

III. Outline of the First Draft of the Strategic Plan

The following pages present a draft of the Table of Contents of the Strategic Plan for IHSs for the Agency. The term "provider areas" in section VII refers to the nine areas previously defined. For sections IV and VII, the subordinated subjects apply to each provider area.

Designated projects were specifically excluded from scrutiny in the first phase because there was no contribution to be gained from reviewing the definition of already formalized needs. Such projects are an integral part of the total strategic plan for IHSs, however, and are included in the total plan.

It is expected that in subsequent years, it will be possible to be much more definitive with respect to resources and investments, personnel planning and Agency operations as they are relevant to IHSs. In addition, it is anticipated that planning will have defined the need for some prototype developments, which will also be added.

It is projected that the strategic plan will be updated each year. In some instances, major refinements will occur, principally where new technology provides new opportunities. A significant refinement of the first year's plan can be expected in the 1983 plan, as many of the technical and organizational questions are resolved.

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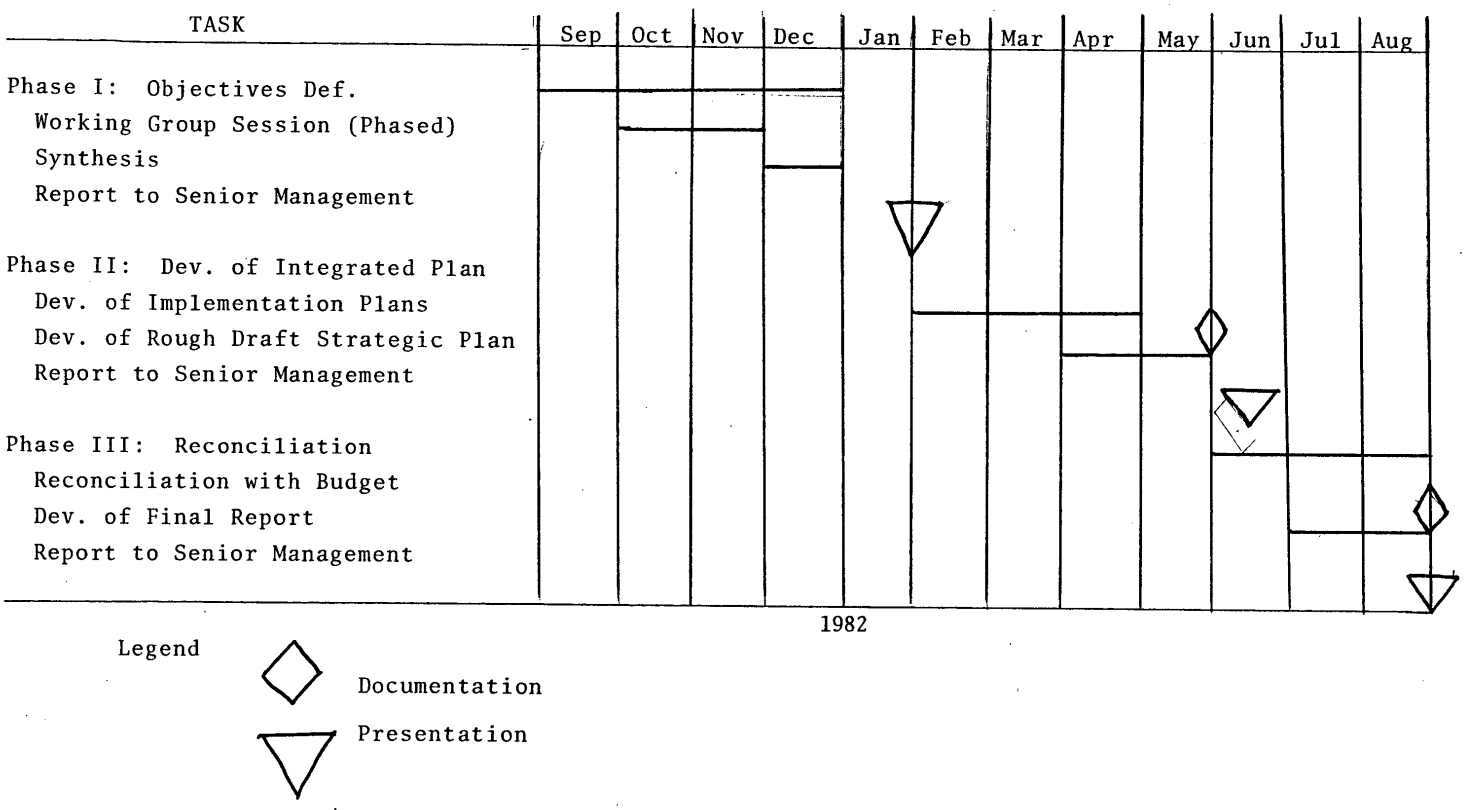
IV. Revised Plan for the Development of the Strategic Plan

Due to constraints in time and provider personnel resources, the working group approach was not considered feasible for the implementation plans in the next phase. As a consequence, the originally planned phases II and III have been combined. The IHSA staff will assume responsibility for the development of the implementation plans. It will coordinate extensively with provider and user organizations in doing this, and will have its staff supplemented by a few, dedicated personnel from ODP and OC for this next phase.

The revised plan is shown in the following figure.

Revision 1

1982 PLAN FOR IHSs STRATEGIC PLAN



Approved For Release 2006/07/10 : CIA-RDP83M00914R000700090025-3

DEFINITIONS

Availability (Intrinsic system - A_o)	MTBF divided by MTBF plus MTTR; a mathematically described aspect describing the performance of a system considering spontaneous failure of components.
Functionality	Anything which has been built to perform a particular function. May include hardware as well as software, but most frequently used in reference to various software applications packages.
Integrated	Systems which are designed as components of a larger whole. Implies tight coupling of data files, processing operations, and communications.
Interoperability	The ability of separately designed and developed systems to operate together. Implies data and execution compatibility.
Robustness	A system characteristic measuring the ability of the system to continue to perform after sustaining component failures, excessive loading and all other sources of increased levels of system stress. Robustness encompasses availability but also includes system "graceful degradation" characteristics and contingency or backup capabilities.