MODERNIZATION OF THE WWMCCS

INFORMATION SYSTEM (WIS)

PREPARED FOR

THE COMMITTEE ON ARMED SERVICES
UNITED STATES HOUSE OF REPRESENTATIVES

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WITH THE ASSISTANCE OF

JOINT PROGRAM MANAGER
WWMCCS INFORMATION SYSTEM

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1.0 INTRODUCTION

This document reports on the status of and describes the approach to the modernization of the WWMCCS Information System (WIS) by the recently established WIS Joint Program Manager. This report has been coordinated with the Services, the Joint Chiefs of Staff, the Office of the Secretary of Defense and the Defense Agencies concerned. Two previous reports (References 1 and 2) were forwarded by the DoD in response to Congressional request.

1.1 Context

The WIS encompasses the information collection, processing and display system that includes WWMCCS ADP and related software systems, procedures and supporting telecommunications. The goal of the WIS is to provide information support to the National Command Authorities for use in the decision making process. The focus of the WIS modernization effort is on the WWMCCS ADP and directly related telecommunications. WWMCCS ADP currently utilizes the Honeywell H6000 series computers procured in the early 1970s, standard applications and system software, and the digital data communications capabilities of the WWMCCS Intercomputer Network (WIN) that interconnects most of the ADP sites.

The current WWMCCS ADP community consists of a number of CINC/Service/Agency sites, each of which has one or more H6000 ADP systems. The WWMCCS ADP community performs a limited number of applications which are "standard" throughout the community. Each site performs functions specifically designed to support the local CINC/Service/Agency. The WWMCCS ADP community today is a loose confederation of interests rather than a structured organization. This makes modernization a difficult task. There has been little centralized direction provided to this community and an overall baseline has not yet been established.

The existing WWMCCS ADP and telecommunications system has been the subject of widespread criticism. The criticism is centered around the perception that the current system does not permit the various military commanders to support the National Command Authorities in a timely, cost effective manner.

The problems associated with WWMCCS ADP today derive from the inadequacies of management, hardware, software and supporting communications. The H6000 computers derive directly from architectures and designs introduced in the early 1960s. Since that time, ADP technology has evolved through several generations offering improved and expanded capabilities. These rapid advances in ADP technology have created a situation in which the current H6000 hardware and software do not represent state-of-the-art capabilities. Additionally, as the system ages, reliability is expected to decrease due to the lack of spare parts and trained personnel to maintain the hardware and system software. More importantly, inadequacies of the current system preclude the development of highly interactive, on-line query/retrieval software capabilities necessary to satisfy command and control requirements. Consequently, a major modernization and enhancement of the WWMCCS ADP is essential, with early emphasis in redesign of the major applications software supporting the command and control user.

On 5 November 1981, the Deputy Secretary of Defense (DEPSECDEF) established the WIS Joint Program Manager (JPM) to be the focal point for coordination and control of all WWMCCS ADP upgrading and modernization activities and directly related telecommunications (Reference 3). This authority includes cognizance over all portions of the WWMCCS ADP system and direct control over the development of the joint portions of the WIS modernization (Reference 4). The JPM receives policy guidance and requirements from the Joint Chief of Staff (JCS) and reports through the JCS to the Secretary of Defense. The Air Force has established a System Program Office in support of the JPM within the Headquarters, Electronic System Division (ESD).

Major General D.L. Evans, United States Air Force, reported for duty as the JPM on 11 January 1982. Since this time, the JPM efforts have concentrated on organizing a staff, defining the baseline WWMCCS ADP configuration, preparing a charter of organizational responsibilities and relationships, and preparation of this Report to Congress. In addition, several initiatives have been started. These are described in Section 1.3 of this report.

The JPM has developed a management and acquisition approach to the implementation of WIS. In order to be more functionally specific, the modernization phases described in the 1981 Report to Congress (Reference 2) have been redefined and renamed as follows: Maintenance Segment, Transition Segment, Joint Mission Segment and the Service and Command Uniques Segment. The modernization activities within each Segment will be largely parallel efforts designed to accelerate the fielding of new capabilities at reduced cost while maintaining evolutionary design flexibility.

To focus WIS modernization priorities, the JPM has established three categories of WWMCCS ADP. Category A is supported by Honeywell systems that form the core or backbone of WWMCCS ADP. Included in this category are Joint WIS and Service/Command Unique WIS applications. These systems principally support command and control. They are most crucial to the WWMCCS community and represent the first priority for modernization under the guidance and control of the JPM. Category B systems are unique to a particular activity and perform a very specific function. Some of these missions are being supported on standard WWMCCS computer hardware and some are currently supported by other hardware. Representative of Category B are systems supporting tactical warning and attack assessment, such as those in the NORAD Cheyenne Mountain Complex, and systems supporting nuclear planning and execution, such as the TRIAD computer system. Category C includes emerging systems such as airborne and mobile or transportable systems which, because of their unique requirements or mission, do not fit the other Categories. (Some transportable/mobile systems may eventually become Category A systems.) The JPM will be cognizant of the development of Category B and C systems. Their development will be the responsibility of the agency they support. The JPM will prescribe the WIS interface standards for these systems as required. The precise delineation of all systems within each category has not yet been accomplished. It is realized that the large investment in Category B systems could impose a heavy burden on the already modest ADP manpower resources of the Services. This problem will be addressed more specifically as the WIS modernization concept matures.

1.2 Progress

In February 1981, the "WWMCCS ADP Concept of Operations and General Requirements for Post-1985" was approved by the JCS and Services (Reference 5). Generic systems requirements and operational performance requirements generated by the major commands are an important part of the Transition Segment of the modernization effort. Requirement collection teams have visited most major sites using the functions, subfunctions and tasks of the Concept of Operations to identify the detailed information characteristics for the Joint Mission Segment. It is anticipated that JCS will complete requirements validation by 3rd quarter CY 1983. Requirements are further described in Section 2.0.

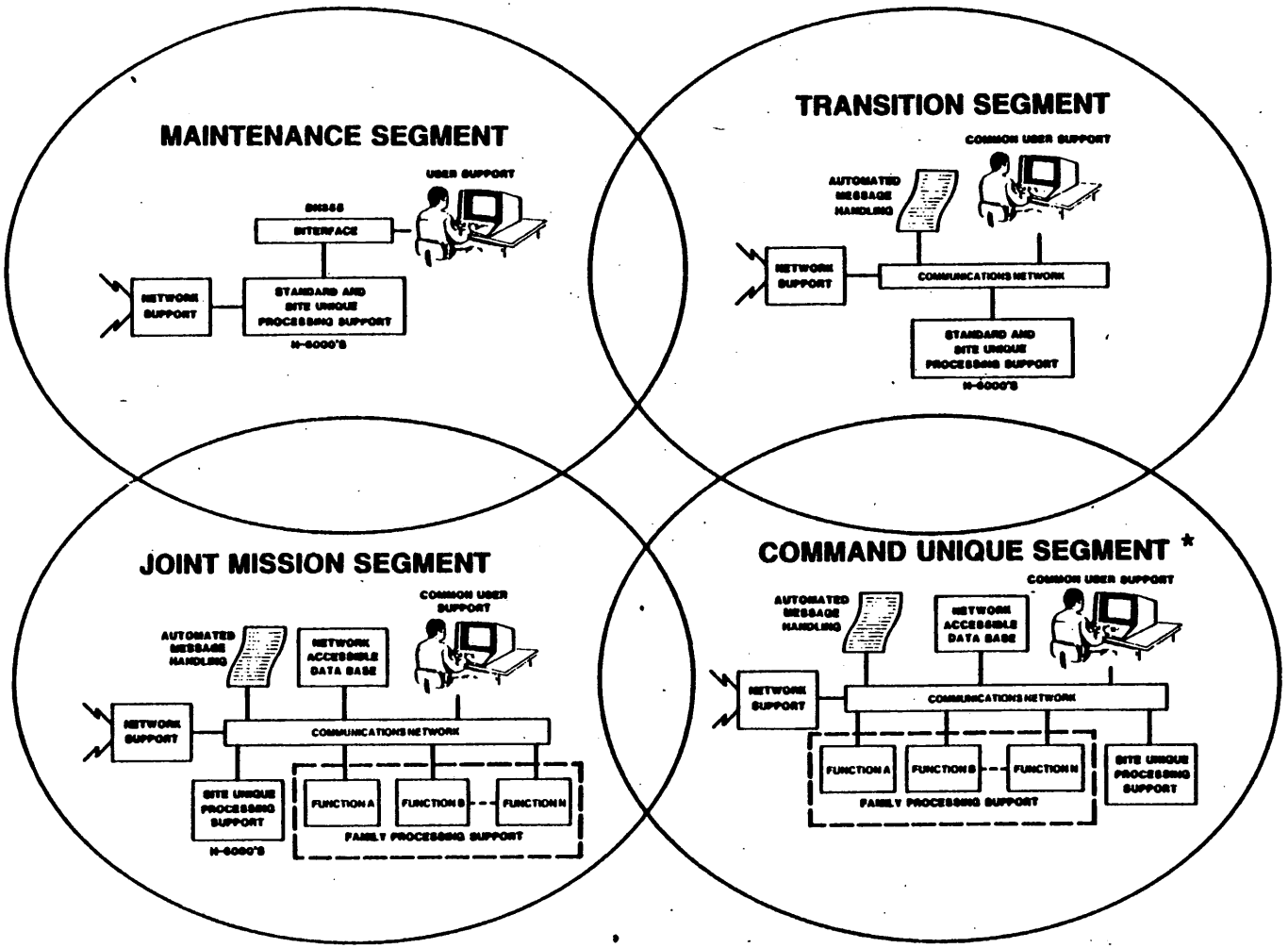
The WIS nodal structure provides for the intra-site distribution of ADP processing over several components interconnected by a communications network. As the Commands and Services complete WIS requirements analysis, and after JCS validation of joint requirements, specific configurations will be tailored to site needs. The distributed components will be dedicated to functional application processing and common user support functions. The benefits of this distributed approach includes the flexibility to perform the following:

- Configure the system to specific site needs
- Develop standard components for common functions
- Integrate non-standard components
- Phase the modernization of specific functions
- Develop security solutions in increments.

The WIS architecture and related technical questions are being reviewed prior to issuance of a Request for Proposal to the commercial vendor community. A recent Commerce Business Daily Notice to obtain industry comments and qualifications for the integration effort is reprinted in Appendix A.

Initial use of Ada as a design language and ultimately as the DoD approved programming language, will be a major step forward. In addition, experiments testing the FORSCOM Security Monitor have provided positive results toward providing more efficient security controls. Refinements of the communications network equipment and interfaces will provide the reliability and responsiveness needed in both day-to-day and crisis situations. WIS technical issues are discussed in detail in Section 3.0.

Within the revised acquisition strategy for WIS, the Maintenance Segment encompasses near-term enhancements as well as operation and configuration control of all current WWMCCS ADP systems and WIS components developed in other segments. The Transition Segment will provide a set of generic operational capabilities that will aid in the transition from WWMCCS ADP to WIS. As implied in the segment names, common applications processing capabilities will be provided in the Joint Mission Segment and processing capabilities unique to a Service or Command will be provided in the Command and Service Uniques Segment.



*Includes Service Uniques

Figure 1.1
WIS Architectural Segments

Major acquisition activities are described in Section 4.0. Figure 1.1 illustrates the implementation of the WIS processing capabilities over the four modernization segments.

Further discussion of WIS JPM management responsibilities and authority is contained in Section 5.0. Life-cycle costs and schedules for implementation are given in Section 6.0.

1.3 Near-Term Initiatives

As one of the first actions, the JPM reviewed and redirected several WWMCCS ADP projects to focus on the early delivery of capabilities in direct support of the operational mission user. The review was conducted with a view to the realities of software and the pace of hardware technology advances. The JPM "software first" policy brought to the front for immediate attention the fundamental data management and software modernization issues of WWMCCS ADP. Within the context of this broad policy direction, the JPM established selection criteria for evaluating candidate activities. Any transition activity sponsored by the JPM must meet the following criteria: provide high pay-off expectation for WWMCCS, pertain to H6000-based WWMCCS standard systems, and be command and control pure. Additionally, the activities should clearly respond to Congressional and GAO concerns (especially the desire to see greater use of off-the-shelf technology) and Defense Science Board recommendations (on use of Ada and machine independent software).

In support of WIS development, the JPM Program addresses opportunities from both emerging technology and the evaluation of "off-the-shelf" products. Although initial work is fiscally constrained, the following list of candidate projects illustrates the kinds of activities that qualify for immediate emphasis:

1. Install an off-the-shelf Automated Message Handling (AMH) system at one or more sites.
2. Implement a distributed data base for both Unit Reporting (UNITREP) and Conventional Planning to improve the Joint Reporting Structure (JRS).
3. Install a local area network to extend H6000 terminal access.
4. Integrate a software control process to reduce costs and achieve portable, machine independent software.
5. Support the RDJTF and/or USAREUR in the application and evaluation of transportable computer systems.
6. Support the installation of computer-to-computer high speed data transfer at the NMCC.

In consultation with sites, Services and the JCS, as appropriate, specific projects will be finalized. These projects will be called Transition Precursors. While the main-stream WWMCCS ADP modernization is targeted toward the mid to late 1980's, the focus of Transition Precursors will be near-term capabilities that can be completed and delivered in the next two years or less. Transition Precursors will provide immediate interim operational capabilities, provide direction-setting hands-on experience to guide WIS modernization decisions, lead logically to additional precursor projects, or be terminated. These Transition Precursors can be thought of as "ADP firepower on target" delivering working prototypes to specific users. They will never be merely a report or study. The emphasis will be on putting off-the-shelf technology in the field. Work requiring innovative scientific and technological advances will be separated and merged with the advanced programs of the Defense Advanced Research Projects Agency and the Services.

2.0 REQUIREMENTS

Definition and documentation of WIS requirements are an important part of the modernization effort since the specific characteristics of the WIS must be defined to satisfy these requirements. Figure 2.1 depicts the relationship of types of requirements to time and level of detail. WIS requirements, as shown, can be considered hierarchical and driven by both shortfalls in the baseline and by evolving missions. The near-term shortfalls are typically translated into formal need statements by components and budgeted for as funds allow. As projected missions change in response to changing threats and weaponry, concepts of operation are changed, giving rise to new generic system requirements and new operational information requirements. These two types of requirements are combined to produce system performance requirements which are used to specify new software and hardware to evolve the system and facilitate transition. Collection, review, and validation of requirements is the responsibility of the OJCS Functional Project Manager (FPM); incorporation of those requirements into the WIS modernization is the responsibility of the JPM.

2.1 Requirement Types

To better structure the processes of requirements collection and analysis, the following organization of requirements into types is used:

Generic system requirements are long term and relate to the environment in which the users expect to operate. They express the attributes of the system such as reliability, responsive (real-time) and rapid processing, expandability, flexibility, survivability and transportability. "The WWMCCS ADP Concept of Operations and General Requirements for Post-1985" (Reference 3) emphasizes such qualities as well as general functional capabilities required to support the broad range of WWMCCS missions. These generic requirements were used to develop system concepts and were the basis for development of the WIS system structure.

Operational information requirements refer to information needed by personnel performing command and control functions as well as characteristics of that information in terms of timeliness and currency. These requirements provide the basis for the design of new applications software and data bases and for the redesign of the reporting systems.

Four areas or families of functions have been defined in the approved WWMCCS Concept of Operations as being required to support the NCA. These four families are as follows:

- Resource and Unit Monitoring (RUM)
- Conventional Planning and Execution (CPE)
- Nuclear Planning and Execution (NPE)
- Tactical Warning/Attack Assessment and Space Defense (TW/AA and SD)

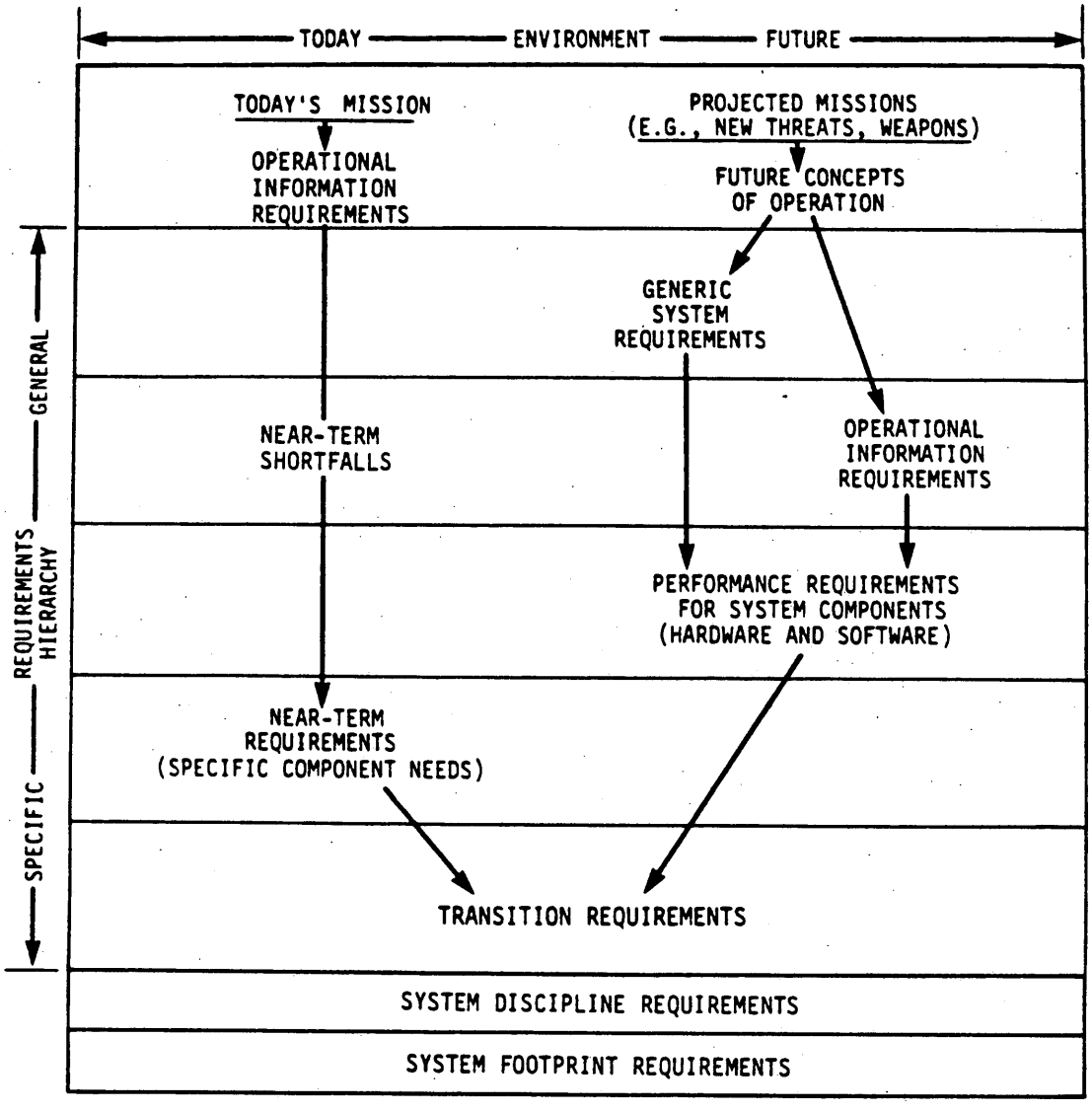


Figure 2.1
Types of Requirements

Performance requirements relate specifically to characteristics of the components of the automated system and are derived from the generic system and operational information requirements. These are the requirements used to specify and acquire the WIS hardware and software components and include such things as transfer rates, memory capacity, and reliability measures (e.g., mean time between failures).

Near-term requirements are immediate and respond to specific deficiencies of today's WWMCCS ADP that must be corrected to provide adequate performance during the interim before the new WIS is installed. They are expressed in terms of specific system deficiencies and refer to both specific sites and system wide needs.

Transition requirements describe the steps which must be taken to minimize disruption during transition to the new system. Specifically, they include what is needed in order to install the new system, move the workload from the old system to the new and, if necessary, maintain parallel operations for a limited time. As a general rule, total parallel operations are not planned due to the limited ADP physical resources. Important considerations such as increased personnel, space, environmental support and training to implement new capabilities while continuing to operate and maintain existing systems must be addressed. The length of time for these parallel operations affects system costs, and will vary from site to site.

System discipline requirements identify those operating procedures and system capabilities required to promote efficiencies in the support and operation of the system. System discipline requirements from a management perspective include agreements and procedures for distributing standard software and maintaining its integrity, use of standard data elements, standard protocols and standard compilers, and purging of data and software which has outlived its usefulness. System discipline requirements which will be satisfied by capabilities within the system itself include allocation of system resources by task priority and selective exclusion of lower priority nodes from the global network in a crisis situation.

System footprint requirements describe the physical and logistic impact of the new system on the sites. Adjustments to numbers, types and training of personnel; air conditioning; power supplies; cabling; and floor space are all aspects of footprint requirements. Advances in technology make it incumbent to reduce the system's footprint through the modernization.

2.2 Requirements Integration

In order to exploit existing documentation and methods developed for surveying users, requirements have been collected and integrated in the following four groupings. These will be organized into the previously defined requirements types which will drive the system specification process.

2.2.1 Maintenance Segment Requirements

These encompass the entire range of WIS. Documentation of the individual sites' near-term requirements includes the following:

- o Individual Commands' Five Year Plans
- o Required Operational Capability (ROC) submissions
- o System Development Notifications (SDNs)
- o Five Year Defense Plan (FYDP)
- o Site visit team results (see Section 2.2.3) -- the teams have collected site specific baseline deficiencies

This segment also includes system-wide enhancements such as improvements to the WWMCCS Intercomputer Network by upgrades to the network front ends and packet switches. It also includes enhancements to specific sites. The satisfaction of near-term hardware requirements will continue under the current WWMCCS standard contracts and new contracts designed to be compatible with WIS. Examples of near-term requirements are contained in Table 2.1.

2.2.2 Transition Segment Requirements

Requirements for this segment describe the functional capabilities necessary to provide the commands the ability to continue uninterrupted access to their baseline WWMCCS ADP while allowing them to begin to access the new capabilities as they become available in the WIS. Descriptions of requirements for physical facilities, such as cabling for communications networks, power and air conditioning, are being developed. A Multicommand Required Operational Capability (MROC) (Reference 6) has been prepared by CINCEUR and CINCPAC. It addresses the requirement for an automated message handling system which includes a major portion of the user interface to the WIS. Some of these capabilities will be implemented during this segment to accomodate user access to the next two segments. Table 2.2 contains examples of Transition segment requirements.

2.2.3 Joint Mission Segment Requirements

The "WWMCCS ADP Concept of Operations and General Requirements for Post-1985" provides many of the WIS generic system requirements and defines supported command WWMCCS missions and tasks by functional family. These missions and tasks have served as the basis for a major effort to collect operational information requirements for this segment. Since January 1981, most major commands have been visited to collect WIS requirements.

The requirements collection teams, led by each of the Services and consisting of OJCS and Service personnel supported by DCA and the WIS JPM, are responsible for conducting the site visits. Each Service is responsible for collecting requirements at its subordinate commands and the unified commands that it supports. In preparation for these visits, strawman information flows were developed for the RUM and CPE functional families.

Table 2.1
Examples of Maintenance Segment Requirements

"Store, format, and display environments data using the WWMCCS standard computer, to improve timeliness and better support tactical and deployment planning."

SOURCE: USREDCOM C^2 Master Plan, January 1981

"HIS 6060 peripherals upgrade: replace aged and infirm mechanical equipment, e.g., printers, card readers, tape drives."

SOURCE: USREDCOM C^2 Master Plan, January 1981

"Uninterruptable power and backup air conditioning at Quarry Heights to improve hardware reliability and protect from power failures."

SOURCE: USSOUTHCOM C^2 Master Plan, June 1980

"Increased hardening of ADP resources to raise the computer support to the same level of hardness as protection of the C^2 staff in the Operations Support Center."

SOURCE: USAFE C^2 Master Plan, June 1978

"Terminal graphics suitable for unit tracking, combat status display, data presentation, computer aided route planning and statistical analysis to allow watch officers to access and assimilate more data."

SOURCE: CINCLANT C^2 Master Plan, April 1981

"Recent power failures, fluctuations and the potential for brown-outs at Reston and the Pentagon have reopened the requirement to improve and stabilize electric power supplies at both locations."

SOURCE: CCTC POM Input, 2 July 1980

Table 2.2
Examples of Transition Segment Requirements

- Two Categories of Transition Requirements
  - Statements of Functionality -- Detailed statements of the functions to be performed by the system
  - Performance Requirements -- Statements concerning required system performance parameters such as reliability, speed, availability, security and physical dimensions
- Statements of Functionality Example*

  Processing in Response to a Data Base Query. AMHS users must be able to query system data base(s) at any time using a single or logical/arithmetic combination of the message summary element values. Processing of a query must have the following results:

  (1) The normal (default) result of a retrieval, unless retrieval and display of whole message is directed by the user, will be the formulation of another kind of ordered queue of message summaries: a demand summary queue.

  (2) The contents and ordering of this queue must be determined from the order of the user specified retrieval parameters/system default ordering and prestored access authorizations.

  (3) A demand summary queue will differ from an account summary queue in that it will be formed and reordered only in response to individual requests for a data base retrieval or reordering of the queue.

  (4) The display of this queue must be similar to that for an account summary queue; i.e., an itemized assemblage of message summaries.
- Operational Aspects Example**

  (2) Message Processing Speed; "The times required by the AMH to in-process messages received from external systems, up to the point that corresponding message summaries are ready to display, must not exceed (providing no higher precedence interrupts the processing):

Precedence	Maximum Time (sec.)
ECP	10
FLASH	15
IMMEDIATE	30
PRIORITY	60
ROUTINE	120

*"Automated Message Handling Required Operational Capability," 26 May 1981, CINCPAC and CINCEUR, Part II, Section I, "Characteristics," Paragraph 8.e, Page 15.

**Ibid., Part II, Section I, Paragraph 9, "System Performance Characteristics," Item c.(2)., Page 23.

Operational users were then asked to confirm or identify the specific information needed to perform that function, as well as the sources and users of that information. The operational users were also asked to estimate characteristics of the data such as accuracy and currency. After review and validation, these requirements will form the basis for definition of new applications software and should aid the revision of the Joint Reporting Structure.

In addition to information requirements, the site visit teams collected information on generic system requirements, performance requirements and anticipated transition needs for this phase of the modernization. Table 2.3 contains examples of these operational information requirements for the National Military Command Center (NMCC). More detailed information requirements for the NMCC, as well as performance metrics, are reported in the classified document,"Concept for the Use of ADP in Support of the NMCS" (Reference 7). An integrated (i.e., theater) perspective of the requirements will be developed for the unified and specified commands once all of the site visits have been completed by the Services. A classified report, " European C3 Architecture" (Reference 8), which currently exists for the European Command, will be confirmed and updated.

Review of requirements will continue to be the responsibility of the JCS. Specifically, the national level operational information requirements collected by the Services will be validated by the JCS and then forwarded to the WIS JPM.

2.2.4 Service and Command Uniques Segment Requirements

Collection of Service and Command unique requirements for this segment is the responsibility of the Services. The site visits, described in Section 2.2.3, are also providing many of these Service and Command unique requirements. The WIS JPM will provide guidance and interface direction to those systems which supply information to the WIS.

Table 2.3
Examples of Joint Mission Segment Requirements for the National Military Command Center (NMCC)

- Operational Requirements Examples
  - Assess force readiness information.
  - Monitor the status and readiness of reserve units.
  - Perform aircraft following in near real-time.
  - Estimate gross requirements rapidly for a proposed OPLAN.

- Information Requirements Examples
  - Current information on the name and type of unit; its location; the organization to which it is assigned; its characteristics, performance, and capabilities; and current and projected status.
  - Information for the coordination of deployment routing overflight routes and landing rights.
  - Location and status of specific equipment items.
  - Use of actual instead of notional forces for crisis planning.

  Functions must be performed within 15 minutes to 8 hours depending on the severity of the crisis. Specific performance requirements classified SECRET.*

- System Requirements Example
  - Multi-level security and file privacy for sensitive data.
  - Multiple routing options among WWMCCS nodes.
  - Responsive interfaces to non-WWMCCS systems.
  - Improved time-distance calculation capability for air, sea and land movements.

SOURCE: Data collected on site visits to the NMCC and OJCS, June-July 1981.

* OJCS,J3. Concept for the Use of ADP in Support of the NMCS. (J3I 3000.10B) September 1981.

3.0 SYSTEM CONCEPTS

This section of the report describes the WIS system structure which will ultimately provide a time-sensitive, viable solution to the critical mission of supporting the information requirements of the National Command Authorities (NCA), JCS and subordinate elements. This system concept is described in terms of its objective, concept of operation from the user's perspective, and system structure, both at an individual node and from a world-wide perspective.

3.1 System Objectives

The primary objective of the WIS system structure is to meet the JCS-validated functional requirements. The WIS must (1) provide a user-friendly interface for WIS interactions, (2) ensure that all WWMCCS sites have ready access to data processing capacity to support their needs, (3) provide high availability communications among the WWMCCS commands to support that access, and (4) provide improved processing capability with a high degree of modularity, flexibility and sustainability in battle conditions. The projected characteristics of the WIS which are necessary to accomplish these primary objectives are presented in Table 3.1.

Additional modernization objectives include minimizing ADP life-cycle costs and the costs of software conversion. Modernization planning and implementation will also take into consideration such user concerns as: not disrupting the continuity of day-to-day operations or the ability to provide support to other levels of conflict; the limited number of personnel available to operate old and new systems in parallel during transition; and the operational problems (e.g., manpower, training, maintenance) created by installing a multiplicity of types of ADP at a site. Essential near-term improvements must not be deferred while the longer term modernization is planned and implemented.

3.2 Operational Concept

WIS support will be provided to users according to their "functional family" roles and responsibilities. The support will be both intranodal and internodal, since information will flow both laterally and vertically within and among Services, Commands and Agencies. Interconnection among sites will be through the Defense Data Network (DDN). The WIS structure at each site will consist of user workstations and, in most cases, hosts interconnected by a local area network. A user at a workstation will be able to access all WIS functions, whether local or remote, provided that the user and the workstation meet specified security and privacy criteria. Specific attributes of WIS user support are presented in Figure 3.1.

From a global perspective, the WIS will serve as a single, interactive, interrelated system such that a user at any Command or Agency will be able to communicate and interact with any other Command or Agency in accordance with approved procedures and security criteria. Specifically, as a long-range goal, the user will be able to access all WIS functions with a single system log-on. The system will maintain a "user profile" to aid and monitor the

Table 3.1
Projected WIS Characteristics

1. ACCESS

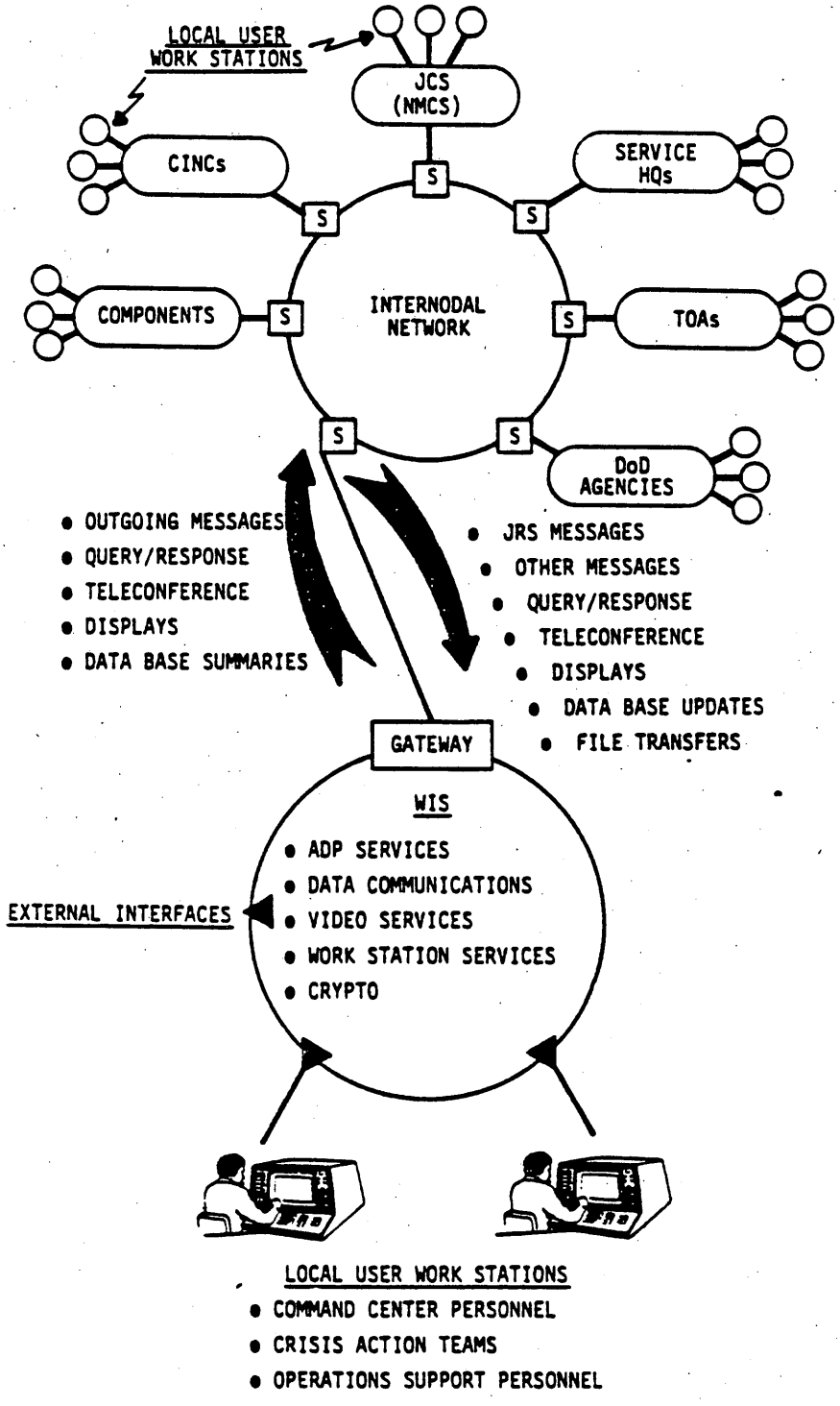
   - MAJOR SITES WILL HAVE ORGANIC WIS SUPPORT; SMALLER SITES WILL HAVE THE CAPABILITIES TO ALLOW ON-LINE INTERACTIVE ACCESS TO PROCESSING FACILITIES AT ANOTHER SITE.
   - THE USER WILL HAVE THE ABILITY TO ACCESS MOST, IF NOT ALL, WIS RELATED CAPABILITIES FROM A SINGLE WORK STATION WITH A SINGLE COMMAND LANGUAGE RATHER THAN USING DIFFERENT TYPES OF TERMINALS AND LANGUAGES FOR VARIOUS FUNCTIONS.
   - THE SYSTEM WILL ACCOMMODATE THE CONCURRENT STORAGE AND PROCESSING OF INFORMATION OF VARYING SECURITY CLASSIFICATION LEVELS, ALLOWING USERS WITH PROPER IDENTIFICATION AND SECURITY CLEARANCE TO ACCESS THE INFORMATION WHILE DENYING ACCESS TO UNAUTHORIZED USERS.
   - THE SYSTEM WILL PROVIDE SUFFICIENT SUPPORT SO THAT OPERATIONAL PERSONNEL CAN ACCESS AND EXPLOIT THE SYSTEM'S CAPABILITES WITH MINIMUM ON SITE TRAINING AND WITHOUT THE AID OF DATA PROCESSING PERSONNEL.

2. AVAILABILITY

   - ALL WIS SITES WILL BE CONNECTED BY A RELIABLE, SECURE, HIGH-SPEED, INTERACTIVE NETWORKING CAPABILITY.
   - OPERATIONAL USERS WILL BE ABLE TO SUCCESSFULLY USE THE SYSTEM IN BOTH DAY-TO-DAY AND CRISIS SITUATIONS.

3. MODULARITY AND FLEXIBILITY

   - THE BASIC ARCHITECTURE WILL BE ABLE TO ACCOMMODATE A WIDE RANGE OF SITES THAT VARY GREATLY IN SIZE, TYPE OF PROCESSING SUPPORT NEEDED AND TECHNICAL SKILLS AVAILABLE AT THE SITE.
   - THE SYSTEM WILL BE ABLE TO ACCOMMODATE AND COMMUNICATE WITH HARDWARE AND SYSTEM SOFTWARE FROM DIFFERENT VENDORS.
   - THE SYSTEM FLEXIBILITY WILL BE SUCH THAT THE INITIAL PHASING INTO THE WIS, AS WELL AS FUTURE GROWTH OR CONTRACTION DUE TO CHANGES IN THE SITE'S MISSION OR NEW SYSTEM DEMANDS, CAN BE ACHIEVED WITH MINIMUM DISRUPTION TO ONGOING OPERATIONS; SIMILARLY, NEW STATE-OF-THE-ART TECHNOLOGIES WILL BE ACCOMMODATED.



USER CAPABILITIES

- USER AND WORK STATION SUPPORT TO PROVIDE A FRIENDLY, SINGLE INTERFACE BETWEEN THE ON-LINE TERMINAL USER AND THE REMAINDER OF THE WIS
- A SINGLE SYSTEM LOG-ON BY THE USER TO ACCESS ALL WIS CAPABILITIES IS A LONG RANGE GOAL.
- AUTOMATIC USER ACCOUNT AND PROFILE MAINTENANCE
- EASY TO USE ALPHANUMERIC AND GRAPHIC INPUT AND OUTPUT DEVICES, WITH AN ENGLISH-LIKE QUERY LANGUAGE, TO SUPPORT THE USER-MACHINE INTERFACE
- INFORMATION HANDLING CAPABILITIES INCLUDING EDITING, TEXT MANIPULATION AND PRIVATE FILE MAINTENANCE.
- DATA ENTRY, WITH VALIDATION CHECKS, TO UPDATE FILES AND REPORTS
- PROCESSING OF INCOMING AND OUTGOING NARRATIVE MESSAGES
- QUERY/RESPONSE ACCESS TO LOCAL HOST DATA PROCESSORS AND DATA BASES
- QUERY/RESPONSE ACCESS TO REMOTE HOST DATA PROCESSORS AND DATA BASES VIA THE WIN OR ITS REPLACEMENT
- INTERACTIVE PROCESSING ACROSS ALL FUNCTIONAL AREAS TO SUPPORT RAPID CORRELATION AND DISPLAY OF INFORMATION FROM MULTIPLE SOURCES, WHETHER LOCAL OR REMOTE, WITHOUT USER PROMPTING
- FILE AND DATA BASE SEGMENT TRANSFERS WITHIN AND AMONG WIS SITES
- SECURE INTRA- AND INTERCOMMAND MULTI-TERMINAL TEXT TELECONFERENCING TO SUPPORT ALL FUNCTIONAL TASKS PLUS GRAPHICS CONFERENCING FOR SELECTED FUNCTIONAL AREAS (E.G., SITUATION ASSESSMENT, PLANNING)
- PRODUCTION OF CLASSIFIED COLOR VUGRAPHS AND HARDCOPY OUTPUTS TO ASSIST IN BRIEFING DECISION MAKERS AND THEIR STAFFS
- AUTOMATED CHECKLISTS, PROCEDURES, INSTRUCTIONS AND DECISION AIDS TO ASSIST USER PERSONNEL, WITH TWO LEVELS OF PROMPTING -- ONE FOR THE NOVICE AND ONE FOR THE EXPERIENCED USER

Figure 3-1
User Support Overview

user's system accesses. The user will be able to use any workstation for which he has authorization in interacting with WIS. When the user is not interacting with the system, messages and other transmittals received by the system will be retained and the user informed of their availability when he logs on.

Human-factored interfaces to the system will aid the user in performing such tasks as automated message handling, accessing and updating both local and remote files, and preparing reports or briefings. The more routine aspects of these tasks -- such as originator-level editing, message and report formatting, data verification and status accounting -- will be incorporated within the hardware and software capabilities, thus minimizing the user's job. To assist the user in performing operational duties, a private file capability will be provided to permit storage and manipulation of both structured and unstructured information in ways that are convenient and meaningful.

In support of automated message handling, the WIS will automatically receive, store, distribute and display messages in accordance with user defined criteria (e.g., subject, source). The user will also be able to create messages or retrieve any message(s) in storage by the same criteria. The retrieval will be for review, reference or for incorporation in the preparation of another message. Forms and checklists will be available for the preparation, coordination and release of messages. Parallel or consecutive coordination will be provided to the user. The coordination sequence will depend upon standard procedures and situation-dependent time constraints. Upon release, the approved message will be automatically transmitted to recipients via the local Telecommunications Center or direct to a Defense Data Network (DDN) facility.

With respect to file updates, certain sites will be responsible for the collection, aggregation and summarization of information on resources under their control and pertinent information (e.g., plans, activities) about their area of concern. Source information will be sent by originators (e.g., operating forces) to other headquarters as required. The source information received will be automatically edited, error checked, correlated, inserted into the local data base, summarized and forwarded to other sites to update their data bases. The on-line update process will be performed according to user specified criteria (e.g., immediate, elapsed time since last update). The update process will also give positive error indications to the information originator and users for timely correction of the report and data base.

Users, whether local or remote, will be able to access WIS processes and data base information through such capabilities as query/response and data base segment/file transfer. Automated techniques (e.g., direct cross-referencing, integrated data bases, interaction among RUM and CPE processes) will be provided to support queries and aid the user in correlating, synthesizing and evaluating related information. For example, man and machine working together will be able to (1) update the RUM data base using force status information received from commander's operational reports and situation reports, (2) correlate force information with that from

such external-WIS sources as intelligence systems to produce a situation composite, and (3) compare readiness of forces (a RUM function) committed to a high-interest plan (a CPE function) to determine feasibility of the plan.

Time-critical situations require a high degree of communication and coordination among WIS users (e.g., crisis planning). Through the use of teleconferencing capabilities, including graphics and facsimile exchange, geographically dispersed users will be able to rapidly obtain a common perception of the situation, develop alternative courses of action, coordinate force/resource requirements and movement schedules, resolve shortfalls, and automatically update appropriate files to reflect their collective analysis. This process will be aided by interactive processing with information transferred directly among computers at the teleconferees' sites.

The WIS user will be able to generate on-line reports and briefings for the decision makers and their staffs. Report and briefing generation will usually require accessing local and remote files, coordination/conferencing with other internal and external organizations and staff, and generating output. The WIS will aid the user in performing these activities by providing such capabilities as interactive query/response, teleconferencing and briefing generation aids (e.g., forms, graphic vugraph output). The specific structure and capabilities of the WIS which will support the user are discussed below.

3.3 System Structure

This section discusses the system structure as confirmed through analyses and discussions with the community.

3.3.1 Overview

The WIS will be located at, or accessible from, each of the current operational sites in order to provide local processing support. A high-speed, interactive, global network will provide host-to-host and terminal-to-remote-host information exchange among all WIS sites. A network operations center will monitor the global network and, from a system-wide perspective, the WIS resources of the individual sites. The level of local WIS support will range from a full complement of hosts, workstations and associated software supporting all command and control functions to an individual workstation connected to a remote processing capability. Those sites which require more than an individual workstation will have multiple sets of functionally-distinct and secure components which are physically separate from each other. The components will use a local area communications network to communicate securely and interactively, in effect, acting as a large, single system. A primary purpose of this separation is to provide the flexibility necessary to meet the specific functional needs of the individual sites (e.g., not all sites are members of all functional families). It also allows selective modernization (e.g., additions, replacements) to be accomplished without disrupting other system components.

3.3.2 Nodal System Structure

Figure 3.2 presents a diagram of a simplified conceptual WIS nodal structure once the transition from the H6000 is complete. It uses a local area communications network to interconnect the functional components of the WIS configuration which includes:

1. Host processor configurations

   Standard applications support for each joint functional application

   - RUM

   - CPE

   Service and command-unique applications

2. User and workstation support (terminals)

3. Automated message handling capability

4. Network accessible data base

5. Software development and training

6. Nodal network communications.

The characteristics of these components are summarized below with emphasis on functional attributes.

3.3.2.1 Host Processor Configurations

Each host processor configuration will support its specific function through processing and storage of:

1. Applications software

2. Application data files

3. Transaction processing software and algorithms

4. Data base management system

5. Software that interfaces with the other WIS components.

Although each host processor configuration could conceivably provide processing backup for other functions, the component will normally be sized and will use applications software specifically oriented for its primary operational mission. A given site could have multiple host configurations

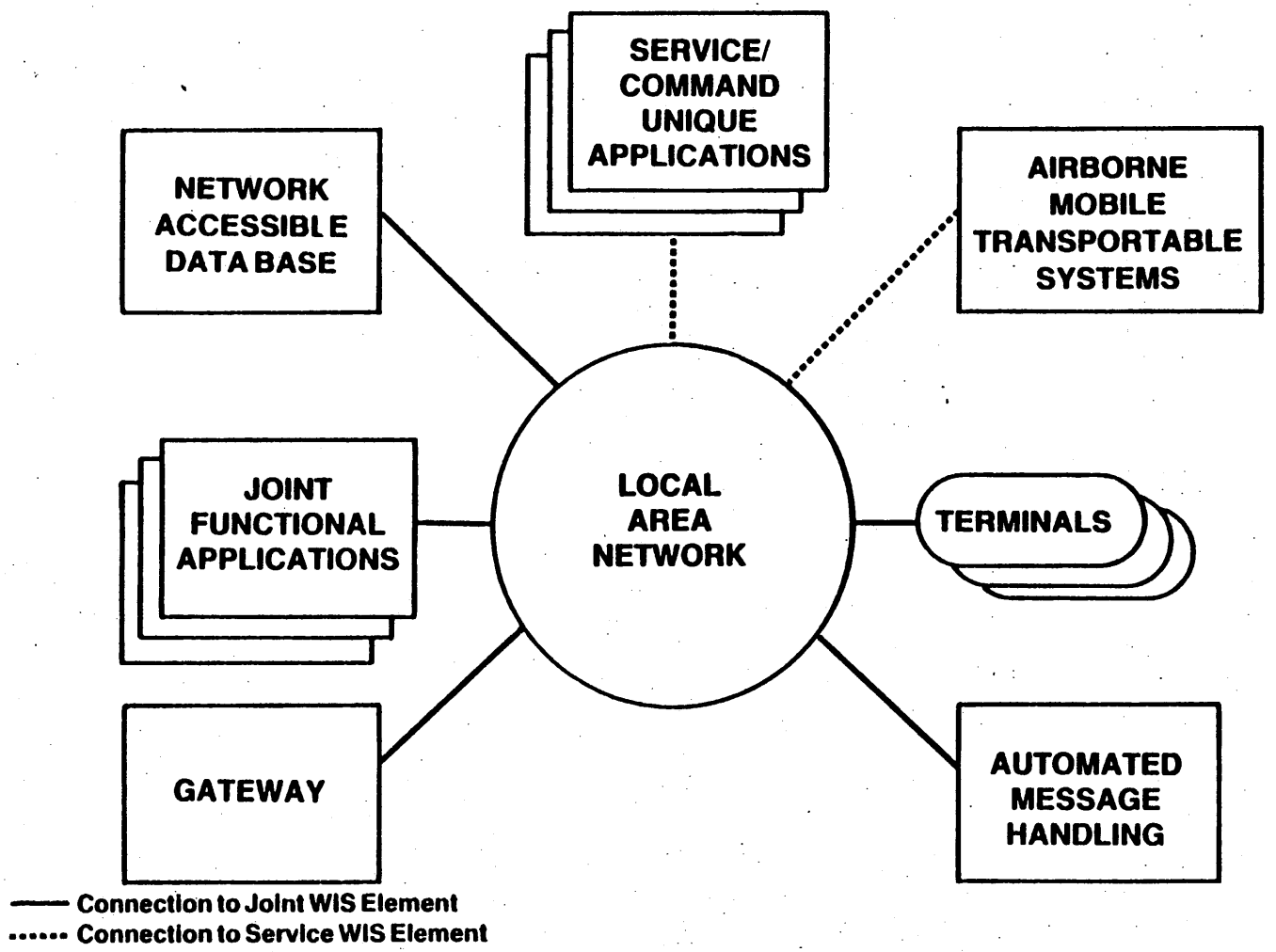


Figure 3.2
Nodal System Structure

to support RUM, CPE, and Service and command-unique functions. At smaller sites, the same component may be used for both RUM and CPE processing. Each function may not require a separate and unique processor. User interface systems will support a common user.

3.3.2.2 User and Work Station Support

The Common User Capability (CUC) component will provide a single-point user interface with virtually all of the WIS user support functions. These functions include easy to use data input capabilities (which will not be limited to typing), information and message display, user profile and account maintenance, user-specific storage, teleconferencing and virtual terminal protocol support so that the user can access all other WIS components from a local terminal.

The CUC will include intelligent terminals, CUC directory processor configuration(s) to keep track of the users and, optionally, cluster controls so that terminals can be clustered by function, security classification level, or both.

3.3.2.3 Automated Message Handling

At any given WIS site, the Automated Message Handling (AMH) component will interface electronically with the local Telecommunications Center for the actual receipt and transmission of textual messages among sites. Some sites will have a direct interface between AMH and the DDN. Upon receipt, the AMH will distribute messages directly to the users through the CUC for presentation. In addition, the AMH will provide:

1. Profiling by key word/phrase with full text search
2. Logging and accounting
3. Summary generation
4. Preparation and coordination
5. Transmission to the local Telecommunications Center/DDN
6. Storage and retrieval of messages.

3.3.2.4 Network Accessible Data Base

The Network Accessible Data Base (NADB) will be a step toward globally distributed data base management. The NADB will include a host processor configuration and data files of global interest that can be accessed by local and remote WIS users. Remote users will have access through the global network (e.g., DDN). The NADB file structure and content will be highly standardized as will the WIS data management system. Worldwide data directories will have to be maintained so that authorized WIS users at any node will be able to access information stored remotely.

The NADB contents will intially support the new family applications. For example, force status information and weather data are both candidate NADB files. The NADB, however, is not intended as a general data base machine that will satisfy the needs of all the local WIS components, since each component will have its own data management capbility and each site will store locally the data relevant to its own operations.

3.3.2.5 Software Development and Training

The WWMCCS ADP Concept of Operations states that system development will not be resident on an on-line operational command and control ADP system. Therefore, software development, training, and testing will be conducted separately to reduce operational disruptions. Not all sites may be able to justify their own on-site development component. However, since it is feasible to provide access to a processor at a remote site for software development, those sites without their own software development component may be able to use one at another site.

Several new software development components to support Service and command-unique needs will be located at selected existing facilities. These facilities could include those currently equipped with development processors plus other in-theater locations. The integrated support facility at DCA (CCTC-Reston) may be expanded to accommodate some training requirements.

Training for the WIS will be provided through the U.S. Air Force as the Single Service Training Manager (SSTM) for WWMCCS ADP. The Air Training Command at Keesler Air Force Base will be adequately equipped to execute its WIS training responsibilities.

3.3.2.6 Nodal Communications

The site's local area network will provide connectivity among all WIS resources at any given site. This network consists of these major elements:

- Circuitry to connect the WIS components at a given site
- Network Interface Units (NIUs) to attach the WIS components to the circuit
- Network Monitoring.

The network will be designed to accommodate each site's workload. This could include system interaction, message handling, report/briefing preparation and data verification/storage, among other capabilities. The circuitry will allow simultaneous communications among WIS components. In addition, it may have provisions for accommodating other kinds of signals such as secure voice, video and facsimile. The circuits will be secure and redundant to provide for continued operation in case of failure.

The NIUs will interface WIS components to the local area network and handle all network protocols and multiplexing functions. One of the NIUs will function as a gateway, interfacing the local area network to the internodal network that interconnects all the WIS sites. A nodal monitor will maintain constant surveillance and record the status of the local communications network and the components attached to it. In addition, it will perform traffic analysis and logging functions. For some sites, however, alternate communication links may have to be planned, particularly for the mobile or transportable facilities.

To ensure acquisition of a system which is fully capatible with the WIS nodal system structure concept, DoD data communication standards will apply to the maximum extent.

3.3.3 Internodal System Structure

The high speed, interactive, packet-switched network for exchange of data traffic among WIS sites will be the Defense Data Network (DDN). System-wide monitoring and control of that network, and its interaction with the nodal networks at each site, will be provided to allow viable system management. Below, the various aspects of the internodal system structure are discussed.

3.3.3.1 Allocation of Central Processing Units Among WWMCCS Nodes

At each site, modernization will be made to those configurations which are connected to the DDN and perform joint WIS functions. Table 3.2 lists those 27 organizations and their 87 central processors considered to be included in the standard WWMCCS. These sites all have one or more host H6000 processors. There are over 300 sub-commands, operations centers, Numbered Air Forces, and joint task forces which are supported by one or more terminals in locations worldwide.

Thirteen of the major Commands/Services/Agencies which receive support from a terminal connected to a remote job entry system, a remote network processor or are directly remoted from a host processor are shown adjacent to the organization which support them.

The proposed projected WIS processing support to be provided to those sites that participate in the RUM and CPE functional families is described below. Each site would participate at one of four levels as illustrated in Figure 3.3.

- Level 1. Transition Segment capabilities plus family and site-unique processing capabilities on site.
- Level 2. Transition Segment capabilities plus limited on-site family processing plus network access to remote processing capabilities.
- Level 3. Transition Segment capabilities on site plus network access to remote processing capabilities.
- Level 4. Individual terminal(s) connected to a remote processing capability.

TABLE 3.2

TODAY'S WWMCCS H6000 ADP PROCESSOR INVENTORY

COMMAND LEVEL	SITE	LOCATION	CONVENTIONAL OPERATIONS SUPPORT PROCESSORS	*SUPPORT SYSTEMS PROCESSORS	ORGANIZATIONS SUPPORTED BY TERMINAL ACCESS
JCS	NMCC	Pentagon	4		DIA, DNA, USMC
	ANMCC	Ft. Ritchie, MD	2	2	NEACP
Service HQ	Army (AOC)	Pentagon	2	1	NGB
	Navy (NCC)	Washington Navy Yard	4		MSC, COMDTCG
	AF(AFDSC)	Pentagon	1		AFLC
Unified	USEUCOM	Vaihingen, GE	2	1	
	PACOM	Camp Smith, HI	0	1	
	LANTCOM	Norfolk, VA	4	2	CCGD3, ICEDEFOR****
	USREDCOM/JDA/RDJTF	MacDill AFB, FL	4		AAC, AFRES SOUTHCOM
Specified	SAC	Offutt AFB, NE	6**	1	
	ADCOM/NORAD	Colorado Springs, CO		14	
	MAC	Scott AFB, IL	7		
Sub-Unified	USFK	Taegu, Korea	1		US FORCES JAPAN
Component Commands	PACFLT (PACWRAC)	Makalapa, HI	3***		WESTCOM,FMFPAC,CCGD12
	USAREUR	Heidelberg, GE	1		
	FORSCOM	Ft. Gillem, GA	2		
	NAVEUR	London, England	2		
	TAC	Langley AFB, VA	3		
	PACAF	Hickam AFB, HI	1		
	USAFE	Ramstein AB, GE	1	1	
Transportation	MTMC	Falls Church, VA	3		MSC
Support and Development	Army War College	Carlisle BKS, PA	1		
	Air University	Gunter AFS, AL	2		
	DCA (CCTC)	Reston, VA	4		
	ATC	Keesler AFB, MS	2		
	Land-based Test Site	Pax River, MD	1		
	DNA	Albuquerque, NM	1		
TOTALS	27 Sites		64	23	

* Includes Tactical Warning, Space Defense, Nuclear Planning and Execution, Intelligence and NATO Support.

** 1 CPU switchable between NPE CPU and MAJCOM machines..

*** Parallel processing at the PACWRAC using one PACOM and two PACFLT processors.

**** and FMFLANT, LANTFLT..

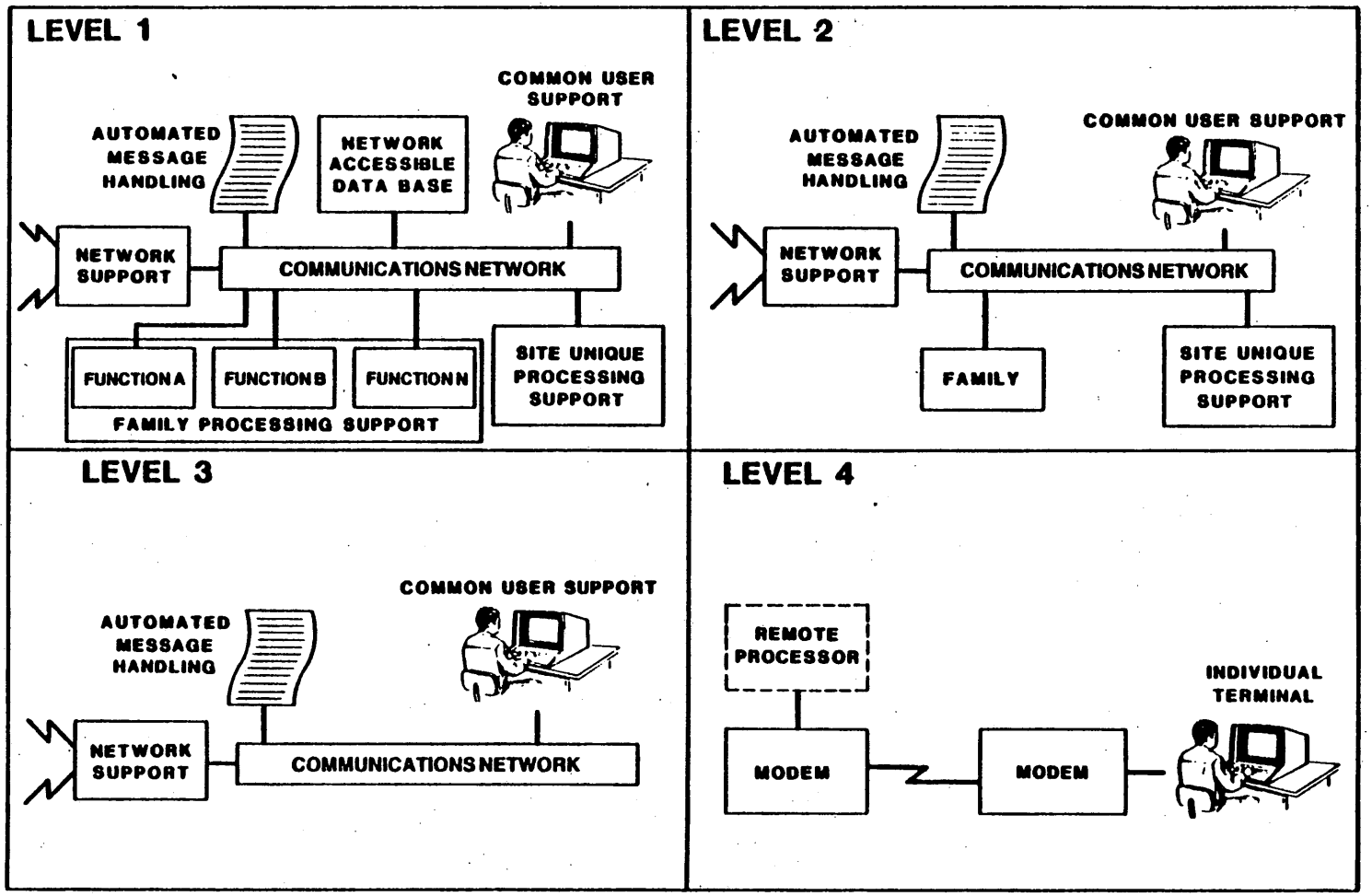


Figure 3.3
Host Data Processor Support Categories

A preliminary analysis indicates that the number of WWMCCS sites projected to be Level 1, or host data processor sites, is 26 for RUM and CPE support. Several of today's sites are not categorized as Level 1 sites: CINCPAC SIOP and ADCOM NORAD have limited involvement in RUM or CPE processing. The Navy has decided to dedicate the Navy land-based test site to Service-unique work; and USAREUR desires a Level 1 transportable facility. Two new sites were assumed to be Level 1 sites: (1) the JDA may be classified as a separate site even though today they share a facility with REDCOM; and (2) the Network Operation Center (NOC) which will be a separately defined node on the DDN and will be responsible for worldwide system monitoring and control.

Nine sites are projected to have Level 2 support; that is, limited on-site host data processor support plus access to remote host data processors. These sites include the one transportable facility -- RDJTF -- as well as the five sites that currently have remote job entry processors -- AAC, USFJ, USSOUTHCOM, MSC and DLA. Another Level 2 site is the fixed RDJTF site whose primary role is software development. Additionally, two sites - AFLC and AFMPC have identified requirements for on-site processor support.

Three sites are projected to have Level 3 support; that is, processing support will be through network access to remote processors in Hawaii. They are WESTCOM, FMFPAC and CINCPAC -- all with primary access to the shared PACWRAC facility at PACFLT. Finally, some sites are projected to have Level 4 access; that is, support will be provided by individual terminals connected to remote host data processors similar to the remote terminal support provided today to DIA, AFGWC, NGB, HQMC and AFRES. Future requirements, of course, may dictate upgrades to any of these sites or additions of other sites.

3.3.3.2 Training and Development Sites

At present, four central processing units at DCA (CCTC-Reston) support software development for the WWMCCS. In addition, the following sites have computer configurations for software development and training:

- NMCC, Pentagon, Washington, D.C.
- Navy, Naval Air Station, Patuxent River, Maryland
- MAC, Scott Air Force Base, Illinois
- SAC, Peterson Air Force Base, Colorado Springs, Colorado
- SAC, Offutt Air Force Base, Nebraska
- Navy, Washington Navy Yard, D.C.
- AU, Air Force Data Systems Design Center
- ATC, Keesler Technical Training Center.

Other sites currently develop software on an operational computer.

"The WWMCCS ADP Concept of Operations and General Requirements for Post-1985" states that system development capabilities will not be resident on the on-line, operational command and control system. Training, software development, and testing should be conducted on another system for security considerations and to reduce operational disruptions. Not all sites may be able to justify their own on-site development processors based on the amount of software development currently being done. Since remote software development (that is, providing access to a processor at a remote site for

software development) is feasible, then those sites not able to justify their own software development processors may use a software development configuration at another site for software compilation, preliminary testing and validation.

Preliminary analysis indicates several new software development facilities will have to be created to support Service and command-unique needs. It has been assumed that these software development "configurations" will be located at selected existing facilities (most likely those currently equipped with development processors plus a few more in-theater locations). However, there is a possibility that new facilities may have to be created, particularly in the European theater where survivability is a major added concern. The actual location of software development facilities will be determined by the Services, the Unified and Specified Commands and the WIS JPM.

The probability of a significant training effort exists with regard to the use of the Ada, the new DoD-sponsored programming language, in standardization of WIS software. Where feasible, training support will be provided by the appropriate vendor under the WWMCCS ADP contract and supplemented by other contract and/or in-house training, as required. Maximum use will be made of computer-assisted training. Individual training resources (leadtime and manpower required for training management, courseware development, and delivery of instruction, as well as training equipment) will be specifically addressed in transition planning, both at system and site levels. The required degree of standardization will be determined by the Single Service Training Manager (SSTM) in coordination with the JPM and users.

3.3.3.3 Internodal Network Design Issues

There are two internodal network design issues. The first relates to what type and degree of system-wide monitoring and control are needed to allow viable system management. Table 3.3 summarizes the system-wide monitoring and control for the WIS. Much of this control would be exercised through the Network Operation Center (NOC). Although a single NOC was assumed for costing, this could be implemented as three or more regional sites. System-wide functions include (1) monitoring of all internodal networking resources (lines, switches, front ends, etc.) as well as each site's nodal communications network; (2) control of networking resources and alternate/backup facility assignments for processing and data storage; and (3) control and maintenance of some system functions including network directory, network-accessible data base operation, software "down-loading" (i.e., automatic updating from a central location) for NOC-controlled processors, preventive maintenance scheduling, and control of gateways to other systems. Some sites must function as back-up for other sites. This may vary on an operational basis from day to day. Actual back-up assignments are classified and not discussed in this report.

Concern for the degree of control relates to the second issue -- the operational viability of the network in wartime and in overseas locations where communications are poor. Under these circumstances, alternate communication links are required (particularly to transportable facilities, alternate processing facilities and data storage facilities) to assure operational continuity. This adds levels of complexity to the monitoring and control function, and may increase costs significantly. Survivability is discussed further in Section 3.4.

Table 3.3
System-Wide Control Assumed For WIS

- Network Operation Center (NOC)
  - Monitor network and its activities
    - -- On-line presentation
    - -- Query of each site's local area network status
    - -- Statistics reports
    - -- Anomaly analysis
  - On-line control of network and the resources allocated to it
  - Control some system activities (alternative/backup assignments, scheduled down time, network directory)
  - Coordinate other network activities
  - Control gateways to other networks
- Other System-Wide Controls
  - Data Base Management System, file structures and data elements for the Network Accessible Data Base
  - Centrally developed standard software--"down loaded"
  - Sites' software development at regional facilities
  - Application (or family) specific controls; e.g.,
    - -- Joint Deployment Agency control over updates to its files from remote sites
    - -- National Military Command Center control over reporting frequency, and need for added elements

3.3.3.4 Impact of Interfacing With Allied Commands

The interoperability of WIS is a Joint Mission Element Needs Statement (JMENS) requirement (Reference 9). It follows that the WIS should be capable of interoperating with NATO systems, for example, the Allied Command Europe/Automated Command and Control Information System (ACE/ACCIS). Interfaces with the other allied systems should also be anticipated. The NATO interface could be a gateway between the planned ACE/ACCIS intercomputer network -- the NATO Integrated Communication System (NICS-II) -- and the DDN. The characteristics of these interfaces must still be determined. Although three ACE sites currently use the WWMCCS ADP standard H6000 hardware and system software, there is no on-line connection with the WWMCCS ADP systems. Future interfaces between WWMCCS and allied systems must take these factors into consideration:

1. Some standard DoD protocols have already been accepted for WIS (Section 3.4). On the other hand, the member nations of NATO affected by ACE/ACCIS favor the International Standards Organization protocols. Thus, some protocol translation will be necessary. This will be considered as the Defense Data Network, an element of the Defense Communications System, is developed.

2. Data transfers, including some potentially large files, may be necessary in cases where U.S. resources are "chopped" to NATO or other multi-national commands.

3. Security-related problems must be solved. Low-level modes of exchange (e.g., exchange of formal message traffic) minimize security constraints but restrict functionality. Higher-level modes of exchange (e.g., cross-system on-line queries and responses) provide more functionality but create severe security problems. Therefore, an on-line interactive gateway capability should not be assumed unless a requirement for it is established. Procedures heavily influence security requirements and must be considered in any solution.

Continued work and close coordination with ACE and other allied commands are needed to better define interoperability requirements and reasonable solutions to them. The ACE is currently defining their ACE/ACCIS and NICS II systems and the survivability of these systems. As this work continues, the gateway requirements can be defined. At that time, the gateway protocol translation problem can be addressed.

3.4 System Structure Attributes

The WIS must support the NCA, JCS and Unified/Specified Commands with current force status, tactical and deployment planning information, and the capability for directing subordinate military forces. The WWMCCS modernization strategy encompasses steps which address each of these broad requirements, and is designed to provide compatible communications networks necessary for real-time access to information in support of these requirements.

In order to overcome the current overall WIN shortcomings and complete the evolution to the WIS, redesign and modernization of the WWMCCS ADP and WIN hardware and software has become an important thrust of this modernization. The effort to develop enhanced system structural attributes, among other things, includes:

a. continued emphasis on the design and modernization of the WIS system structure to allow near-term upgrades, as well as long-term hardware and applications software modernization

b. design of a system structure that can take full advantage of state-of-the-art technological advances to further the growth and evolution of the WIS to meet and defeat the changing world-wide threat challenges

c. improved structural attributes of the WIS (reliability, maintainability, flexibility, etc.), toward optimum system performance in normal functions and, more significantly, during time-sensitive and crisis assessment operations.

3.4.1 Standardization

One of the objectives of the WIS modernization is to achieve greater flexibility in providing ADP capabilities for the wide range of WWMCCS functions. This flexibility includes the freedom to select system hardware to meet a command's unique processing needs and the development of command unique software. However, proliferation of different hardware from various vendors can increase training, operation manning, and maintenance costs as well as lead to duplicative software efforts. The issue is what degree of standardization is desirable and necessary to preserve the system and control costs, and yet allowing customized solutions for site-unique requirements.

3.4.1.1 Hardware Standardization

The WIS modernization effort may well result in the utilization of different makes of computer equipment. Central processing units installed today will continue to be utilized through some of the modernization segments. Competitive procurement could result in computer equipment for the Transition Segment that is different from the hardware selected for the Joint Mission and the Service/Command Unique Segments since Transition Segment support heavily emphasizes networking, user support and terminals.

Given the possibility of heterogeneous equipment, there are three major concerns relating to standardization in WIS: software development, intercomputer communications and maintenance. These concerns are discussed below.

3.4.1.2 Software Development Standards

The use of high order languages generally is recognized as a mechanism for software standardization. Ada will be one of the DoD standard languages available for WIS software development. Ada will be used as an application program design language. Applications program implementation will

focus on transportability; the use of Ada for implementation of applications program design will depend on the maturity of the Ada concept at the time of implementation. Standard software development methodologies will be applied as appropriate. Strong DoD control of the Ada standard by formal validation of compilers and the development of standard Ada program support environments provides an important potential benefit; that is, early use of the Ada concept in WIS may preclude a need for an extensive effort on any future WIS modernization.

3.4.1.3 Intercomputer Communications Standards

Communications among the various computer equipments is essential to make the distributed processing concept work. Any number of computers from different vendors can communicate with each other through the use of predetermined "protocols", sets of rules governing formats and relative timing of information flowing between the processors. It is imperative that WIS modernization be built upon standard, predetermined protocols and that all systems that become part of the WIS or interconnect to WIS comply with these protocols.

There are many different protocols specified for different kinds of communications. In those cases where DoD standards have been set, the WIS will conform to the DoD standards. For example, the Transmission Control Protocol is a DoD standard for host-to-host communications and will be the host-to-host protocol for WIS (Reference 10). In those cases where DoD standards have not been set, (such as terminal to host), the protocols will be specified later. Utilizing DoD standard protocols will maximize interoperability between WIS components and between WIS and non-WIS systems. There is also the opportunity to benefit from previous designs and implementations of the standard protocols.

3.4.1.4 Maintenance Standards

A standardized approach to maintenance of both hardware and software will improve the operational utility of WIS at each of the sites. As discussed in section 3.4.3.6, it is important that routine and emergency maintenance be monitored by a single organization, to assure that standards of performance are being met.

3.4.1.5 Data Definition Standards

Data definition standards are required to supplement the standard hardware, software and intercomputer communications. Standard data definitions are necessary to facilitate interaction among WIS families, between WIS families and Service standard applications, and between WIS families and external information systems such as DoD Intelligence Information System (DODIIS) and the ACE/ACCIS. WIS data definition standards impact the information base for the Network Accessible Data Base System.

WIS data definition standards will be derived from the revised JRS and other reporting systems. A JRS modernization effort directed by OJCS is focused on the validation of data requirements for joint information management. It assumes that near-term modernization can best be accomplished by streamlined procedures and the exploitation of advanced technological capabilities. Currently, emphasis is on improving the quality and currency of data through the establishment of more effective reporting procedures, compatibility of message text, and interoperability with Allied systems. This will provide a basis for long term modernization. Other non-WWMCCS data definition efforts such as JINTACCS and the NATO ACEREP will be consulted to effect maximum standardization, to enhance data interchange, and to allow for system interoperability.

The Network-Accessible Data Base (NADB) component will implement many of the data file standards. It will contain data files that can be accessed by local and remote WIS users, with remote users having access through the global network . The NADB file structure and content will be highly standardized as will the WIS data management systems; worldwide data directories will have to be maintained so that authorized WIS users at any node will be able to access information stored remotely.

3.4.2 Security

Existing ADP security controls have placed a limit on the use of present capabilities and the future expansion of WWMCCS ADP. In accordance with DoD security requirements (Reference 11) and WWMCCS needs, controlled mode or multi-level security is mandatory for WIS. Work on the FORSCOM Security Monitor will lead to an initial capability for Secret users to access selected Secret, Confidential and Unclassified data stored within a Top Secret, system-high processor. Although this is a significant step, it does not meet all WIS security needs, since the WIS security system must be designed to support a combination of multi-level, controlled and system-high security modes operating in many different environments.

Alternative approaches for meeting existing security requirements are being examined and a security approach for WIS is being developed based on specific, near-term and low risk technologies used in conjunction with hardware separation and legitimate data and environment classification. In these approaches, traditional security controls (e.g., physical, personnel) will be used in concert with enhanced automated controls (e.g., trusted network interface units). This approach will initially provide WIS with an adequate, functionally-secure system.

The core of the WIS security approach is a multi-level secure local area communications network with trusted interfaces to all other WIS components. The system will be able to evolve to a multi-level secure mode, where some components will be multi-level secure, and other system components will function on an access restricted basis. Because security objectives for WIS represent an area of risk, the objectives will be evaluated as the program progresses to ensure that they remain realistic.

The WIS will prohibit the flow of classified information in any manner which could result in the compromise of that information. The WIS security controls will authenticate each user accessing the system. The authentication will verify the identity of the user and establish his authorized capabilties for using the resources of the system. Remote system accesses will provide the local functional configuration with the authenticated identity of the originator. Each system user will be permitted access to only those capabilities which are required to perform his duties.

The WIS will also provide a capability for audit control and diagnosis of the operation of security-related hardware and software components without causing excessive reduction in system functionality. Diagnostics will be performed to verify the integrity of the security mechanism during system startup or prior to system restart.

The DoD Computer Security Evaluation Center will support technically the definition and implementation evaluation of the WIS security controls. The JCS must approve the system for multi-level or controlled mode security operations. This approval will be based on assurances that the security controls are adequate. The security approach being developed for the WIS, utilizing hardware and firmware separation techniques and software security controls, will provide that assurance. In addition, it will permit the individual WIS components to transition to full multi-level security once such technology is developed. The Director, Joint Staff, as the Designated Approving Authority (DAA), will make the WIS accreditation decision. DAA approval is required prior to operational use.

3.4.3 Generic Characteristics

3.4.3.1 Survivability

Survivability refers to the ability of a command to continue to exist and function during and after nuclear or conventional conflict, hostile countermeasures or natural disaster. Data processing survivability is related directly to the survivability of the WWMCCS facilities, communications, and sources of information. There are on-going DoD efforts to improve command center survivability through the use of hardened, transportable or mobile facilities. Other on-going efforts are concentrating on communications survivability.

WIS modernization provides an opportunity to improve the survivability of ADP support to WWMCCS facilities. WIS will provide capabilities to help ensure availability of ADP resources compatible with surviving communication systems in a hostile environment. These capabilities include distributed and/or redundant processing with remote access; graceful degradation of processing; rapid restart and recovery; distributed, redundant and consistent data files that are remotely accessible; systems for use in transportable facilities; and fail-soft local and internodal networking. Although no definite plan for communications survivability has been finalized, it remains a high JPM priority and will be the focus of further analysis during the upcoming months.

3.4.3.2 Accessibility

Major sites will have organic WIS support; smaller sites will have the capabilities to allow on-line interactive access to processing facilities at another site. The user will have the ability to access most, if not all, WIS related capabilities from a single workstation rather than using different types of terminals for various functions. The system will accommodate the storage and processing of information of varying security classification levels, allowing users with proper identification and security clearance to access the information while denying access to unauthorized users. The system will be human-factor engineered so that operational personnel who are not data processing oriented can access and exploit the system's capabilities with minimum on-site training.

3.4.3.3 Availability

All WIS sites will be configured with redundant processors for critical functions, plus automatic restart and backup capability to provide high on-site processing availability. In addition, the site will be interconnected by a reliable, secure, high-speed, interactive networking capability. Operational users will be able to use the system in both day-to-day and crisis situations with high confidence.

3.4.3.4 Flexibility

The basic system structure will be able to accommodate a dynamic range of sites that vary greatly in size, types of processing support needed and technical skills available. The system will be able to accommodate and communicate with hardware and system software from different vendors. The system flexibility must be such that the initial phasing into the WIS, as well as future growth or contraction due to changes in the site's mission or new system demands, can be achieved with minimum disruption to ongoing operations; similarly, new state-of-the-art technologies will be accommodated on a function-by-function basis without disruption to the entire system.

3.4.3.5 Reliability

Near-term upgrades will be made to the WIN and to selected host system sites during the Maintenance Segment to correct current performance shortfalls. Installation of Network Front End (NFE) devices (if selected) and WIN packet-switches (Interface Message Processors - IMP) upgrades may offload many host site network interface responsibilities and provide improved reliability and speed. The local communications network and the common user capability will provide for better system availability and reliability in the Transition Segment. In addition, new state-of-the-art hardware and the redesign of much of the joint applications software in the Joint Mission Segment will also result in a significant improvement in reliability over the current WWMCCS ADP.

3.4.3.6 Maintainability

Software Maintenance. Software development and maintenance for the following components will be centralized for all of WIS and their software changes/upgrades will be automatically distributed to all WIS sites:

- o Local Area Network including its NIUs and network monitor
- o Network gateway
- o NADB component
- o AMH component
- o Common-User Capability software
- o System software for family host processor configurations.

WIS standard applications software will also be centrally developed and maintained. It is desirable that site implementation of new standard applications software (RUM and CPE) releases be automatically distributed. This should reduce each site's need to allocate part of their software personnel to maintain standard software.

Hardware Maintenance. In order to obtain the best support for each functional configuration, hardware from different vendors may be present at any given WIS site. For example, the Transition Segment hardware to support the local area network stations may be from a different vendor than the separately-procured Joint Mission and Service and Command Uniques Segment host data processors. It is, however, important that routine and emergency maintenance be monitored by a single organization to ensure continuous system operations and high reliability. At in-theater commands, the maintenance organization will train military personnel in all aspects of maintenance because of the possible rapid shift to wartime environment. An important issue will be to ensure that hardware and software maintenance can be accomplished with fewer personnel than the present system. If cost permits, this maintenance support should be organic to the site being supported. This is especially important in areas outside the CONUS.

3.4.3.7 Sustainability

The system should be able to continue to exist and function satisfactorily after, or in spite of, failure of any of its parts due to combat, hostile countermeasures, sabotage or natural disaster. This includes such performance characteristics as connectivity, denial, dispersion, mobility, diversion, and redundancy. It may also include the ability to continue to function through alternate existing means or regeneration of a system to perform the required function.

3.4.3.8 Interoperability

As discussed in Paragraph 3.3.3.4, the interoperability of the WIS will provide services to, and accept services from, other systems (e.g., Intelligence, NATO ACE/CCIS). This encompasses software, standard host-to-host communications protocols and items of communications-electronics equipment.

3.4.3.9 Testability

With the selection of equipments from different vendors to satisfy the site unique requirements, the need for equipment testability becomes critical to system maintainability. Testability for both the software and hardware will be aggressively pursued as the program progresses. Diagnostic programs for WIS will be supported by Independent Verification and Validation (IV&V) to the level necessary to ensure quality of testability to support the maintainability and availability requirements of the program.

3.4.3.10 Supportability

In accordance with DoDD 5000.1, supportability will be an important design requirement. Integrated Logistics Support (ILS) elements (e.g., maintenance planning, logistics management, supply support, manpower, personnel and training) will be considered throughout all phases of the system acquisition process. The system will be provided with a logistic support capability that is operationally responsive to site needs. Maintenance support for future mobile sites will be a key consideration. Required system life-cycle support beyond site capability will be coordinated with the Air Force Logistics Command (AFLC), the designated Single Service Logistics Support Manager (SSLSM).

4.0 WIS ACQUISITION STRATEGY

4.1 Introduction

The WIS has been designated as a major system acquisition following the guidelines of OMB Circular A-109. The Joint Mission Element Need Statement (JMENS) (Reference 9) for the WIS identifies the JPM as the focal point for the coordination and control of all WWMCCS ADP upgrading and modernization activities. Progress on WIS will therefore be monitored through top-level DoD reviews. These reviews will examine the WIS architecture refinement, acquisition strategy, development schedules, and costs. To meet the special circumstances of the complex and evolving command and control environment and to incorporate technological innovations as rapidly as possible, several management initiatives have been formulated. These initiatives have been outlined in a 30 April 1981 memorandum by the Deputy Secretary of Defense "Improving the Acquisition Process" (Reference 12). The initiatives deal with improved management, preplanned product improvement, multi-year program management, and encouragement of capital investment.

The remainder of this section describes the acquisition strategy to be followed in the modernization of the WWMCCS Information System, which will provide expanded support for current WWMCCS ADP applications and growth for new user functions and applications. The intent is to provide a range of capabilities appropriate for the needs of the diverse WWMCCS sites. To accomplish this, site tailoring has been made a central part of the acquisition approach.

In order to accommodate the different capabilities included in WIS, a development approach is needed that clearly delineates product responsibilities while providing for integration of products into combinations that match site needs. The state of the art has grown in a modular and specialized way, and WIS needs linkage to vendors able to implement highly specialized products. Timely provision of ADP upgrades is important; a number of sites currently have active plans for their own upgrades, and WIS needs to factor in those activities. For these reasons, the program has been divided into a number of largely parallel segments. The segment is a convenient division of activities associated with the WIS program based on the nature of the activity, the management responsibility for the work, and the source of funding. Segments are subdivided into blocks, which are tied to specific time periods, capabilities, and contracts. Within blocks, tasks can be tied to individual jobs and line costs. The task level is not specified in this document. The activities defined here represent JPM SPO development activities. Service activities in support of Command and Service needs are yet to be defined.

4.2 Program Segments

The modernization is divided into four segments:

MAINTENANCE

TRANSITION

JOINT MISSION

SERVICE AND COMMAND UNIQUES.

4.2.1 Maintenance

The objective of the Maintenance Segment is to stabilize WIS maintenance and configuration control. Responsibilities include maintenance of current WWMCCS ADP, a WIS transition phase when both current systems and new WIS systems are supported, and finally, support for new equipments provided under the WIS modernization. The WIS Maintenance Segment has already begun with the installation of the currently deployed WWMCCS Standard System Software Release (W7.2.0).

4.2.2 Transition

The objectives of the Transition Segment are to provide the foundation for the evolution of WIS, and a bridge from the existing WWMCCS ADP to WIS. Additionally, the Transition Segment introduces a modular architecture to WWMCCS ADP that will allow future modernization to be accomplished in an orderly fashion. Goals also include supporting evolution consistent with site differences and extensive use of capabilities existing currently within the technology.

Products of the Transition Segment are intended to be configurable to meet these goals. Automated message handling and user support software, with a local area communications network and inter-site connectivity, are to be introduced early, and user participation and feedback will provide guidance for identification of system enhancements. Software development tools, an Ada training capability, a development and engineering facility, and distributed processing support (including data base management) are vital components.

4.2.3 Joint Mission

The objective of the Joint Mission Segment is to upgrade WWMCCS multi-command applications. In order to do this, substantial resources will be expended on provision of new host hardware and associated system software. This Segment focuses on software modernization. The two applications families currently proposed are Resource and Unit Monitoring and Conventional Planning and Execution. It is expected that other standard applications will be identified for development as well. In order to ensure transportable software design, the development approach in this Segment will focus first on applications design, using Ada as a program design language. When the applications design is sufficiently firm, the Joint Mission hardware base and system software will be selected and acquired.

4.2.4 Service and Command Uniques

The objective of this segment is to provide resources for improvements to Service and Command Unique applications. The selection of hosts and development of the applications and support software will be Service and Command responsibilities, but the WIS JPM will prescribe interfaces to other segments and arrange for use of the WIS software development and conversion facilities. This segment may provide new processing hardware and

system software, although it may be possible to use the Joint Mission hardware and system software. Given the current investment in Service and Command Unique software, this will be the most complex segment of the program in terms of development effort.

4.3 Program Blocks

The activities of the Transition Segment set the stage for the applications modernization provided by WIS. Blocks have been defined to provide visibility into activities of the Transition Segment, and to allow specialized Government resources to be applied to management of the development process in a more precise way. Blocks themselves provide a basis from which a new block, with further improvements, can be started.

4.3.1 Maintenance Segment

This single block extends throughout the life of the WIS. Its objective is to provide for effective WIS maintenance and control. This maintenance responsibility includes maintenance and near-term upgrades to the current system, a transition phase when both current systems and new WIS systems are supported, and finally, support for new equipments provided under the WIS upgrade.

4.3.2 Transition Segment

Block 1: Foundation

This block provides needed early capabilities, and establishes the framework for user involvement and feedback. Two sites will receive near-term WIS capabilities. These will include an "off-the-shelf" message handling system to satisfy critical near-term requirements and gain valuable user feedback. Local area network interface units will be developed to support access from terminals to the message handling system and to current Honeywell computers.

Among the activities of this block are those beginning the WIS Development and Engineering Facility. This facility will be used by the Government and vendors to evaluate in-process work, to support item and system testing, and for proof of concept development for new or high-risk WIS components. Facility planning will be carried out to levels of detail allowing installation of equipment comparable to that for the selected two sites as well as reconfiguration capabilities and provison for facility expansion.

Block 2: Enhancement

Block 2 is a growth block from Block 1 for a larger set of WWMCCS sites. AMH evolution to new capabilities are provided in response to user feedback, and more stringent performance requirements are supported. The local area network supports additional traffic types, including video distribution, and local host-to-host traffic. Network design focuses on secure operation in a controlled-mode environment, allowing evolution to

multi-level secure operation. A new product of the block is a software development environment, used for Transition Segment software development and automated configuration control.

User services must be provided in a way that sets the stage for the full power of WIS, consistent with interactive capabilities of a network-based system. Some services may be distributed to intelligent terminals (for example, word processing), and some otherwise distributed on the network (for example, support for greaseboards and briefing preparation). New interfaces are added to the network to support requirements such as large wall screen displays and video. Capabilities provided in this block will be tailored to site needs.

Block 3: Distributed Processing Environment

Focus in this block is on providing the distributed processing environment within which applications will operate, and defining its capabilities and interfaces. The distributed data base management system(s) for WIS and network based software services are provided in this block. At the completion of this block the process of generalizing user support is complete.

4.3.3 Joint Mission Segment

Block 1: Applications

Applications design in Ada and applications development focusing on transportability takes place in this block. At an appropriate point in the design stage, the contractor assists the Government in selecting the target hardware, and a final decision is made on the implementation language.

Block 2: Hardware and System Software

This block consists of the replacement of the H6000 hardware and system software base of the current WWMCCS. New hardware, with supporting system software required to support the Joint Mission applications design are selected in this block. The activities required to integrate hosts, peripherals, and system software of potentially diverse vendors (selected to match applications needs) into the WIS fall within this block. WIS standards are developed for interfaces and system-level test requirements defined. Issues relating to use and extension of the software development facility (given resolution of issues related to HOL selection and hardware) are also attended to in this block.

4.3.4 Service and Command Uniques

Block 1: Applications

Identification, design, and development of applications are a Service responsibility. However, JPM-SPO assistance will be provided to support interfaces to the WIS and in use of the WIS software development facility if requested. Data base interfaces required to provide information to Joint Mission applications will be worked jointly by the Services and the WIS JPM SPO.

Block 2: Hardware and System Software

This block is a Service (or Command) responsibility. Insofar as the hardware of the Transition or Joint Mission Segments are selected, the JPM-SPO will provide an acquisition vehicle for their implementation. Responsibilities are generally allocated to the Services and are similar to those of Block 2 of the Joint Mission Segment. Additional concerns to be addressed in this block are associated with extension of capabilities (e.g., data automation) to the unit level, and support of Service-standard data processing.

4.4 Acquisition Approach

The acquisition approach involves participation of four WIS contractors in the various segments and blocks. The scope of the WIS program and the major integration effort make this acquisition approach more like a weapon-system procurement rather than a classic ADP procurement. This acquisition approach has the advantages of: providing for development of software prior to committing to hardware selections, thus allowing the most current technology at the time of installation; permitting, if necessary, the termination of a contract with minimum disruption to the program and at minimum cost to the government; allowing the government to control system development; allowing for selection of subcontractors based on government criteria and approval, providing for independent software validation and verification; preventing the government from being dependent on a single vendor. The contracting approach permits concurrent efforts to be undertaken in manageable units; approval to proceed to the next block occurs only when the preceding block has progressed satisfactorily. The responsibilities of each of the contractors is briefly described below.

The Integration Contractor is responsible for system integration and for specific products such as the local area network, applications software, data base management software, distributed processing support, and the development and engineering facility. In conjunction with responsibilities for applications software, the integration contractor (with government guidance) selects, uses, and eventually turns over to the Government software development and conversion tools. This contractor shall also conduct a test and evaluation (T&E) program, using Government-provided criteria, to demonstrate acceptable system performance and operational suitability. Testing shall be performed incrementally. Functional demonstrations and performance verification shall begin early in the program and continue through the development program as equipment and software becomes available. Software and component testing shall be used to demonstrate that components are ready to install in the development and engineering facility.

The Common User Capability Contractor is responsible for the message handling system, as well as for WIS workstations and user support software. The message handling system and user services will initially evolve from GFE software, but user support will be redefined and extended in the context of the needs of the full WIS system. The Common User Capability Contractor provides processor and peripheral hardware and terminals required to support message handling and general user services required in the Transition Segment.

The Joint Mission Contractor provides the selected hardware base for the joint applications and the system software required to integrate it. Hardware required for the Transition Segment is not included under the scope of this contract.

The Configuration Management Contractor supports the JPM SPO by providing hardware and software configuration control during the program. This contractor will be responsible for independent WIS verification and validation; he also provides and uses automated tools as appropriate.

Contractor participation in program segments is shown below:

	INTEGRATION	COMMON USER CAPABILITY	JOINT HARDWARE	CONFIGURATION MANAGEMENT
MAINTENANCE	X			X
TRANSITION	X	X		X
JOINT MISSION	X		X	X
COMMAND UNIQUE	X	X (option)	X (option)	

5.0 MANAGEMENT

5.1 Establishment of the JPM

In November 1981, the Chief of Staff Air Force (CSAF) was directed to appoint a Joint Program Manager (JPM) for the WIS Modernization (Reference 4). Major General D.L. Evans reported for duty as the WIS JPM in January 1982. The WIS JPM has been tasked to provide centralized management of all modernization planning and implementation activities, including day-to-day direction, fiscal review, and life-cycle management. The WIS JPM Charter will define the specific responsibilities and organization relationships for the WIS.

5.2 JPM Authority and Responsibilities for WIS Modernization

The WIS JPM receives policy guidance and the requirements base for WIS modernization activities from the JCS. Within the OJCS, the Director, Joint Staff provides policy guidance to the JPM.

The WIS JPM has cognizance over all portions of the WWMCCS ADP system in addition to direct control over the development of the joint portions of the WIS modernization including all directly related interfaces to telecommunications. The WIS JPM is the central focal point for coordination and control of all WWMCCS ADP upgrading and modernization activities, except for minor routine upgrades and enhancements of the current system which will continue to be processed in normal channels.

JPM responsibility with respect to the three categories of WWMCCS ADP is as described in Section 1. Several Category B systems, systems unique to a particular service or command, in the Tactical Warning/Attack Assessment and Space Defense (TWAA and SD) and Nuclear Planning and Execution (NPE) areas are currently undergoing major upgrades in response to priority needs for improved capabilities. These modernization activities are summarized in Appendix B.

5.3 JPM Organizational Relationships

The JPM receives policy guidance and requirements through the JCS and reports through the JCS to the Secretary of Defense. In support of the JPM, the Air Force has established a WIS System Program Office (SPO) within the Air Force Electronic Systems Division (ESD). The SPO will be responsible for the acquisition of the WIS and will also provide support to the JPM in the areas of planning, architecture, and system engineering. Elements of the Command and Control Technical Center (CCTC) will be responsive to the WIS JPM to ensure efficient use of resources and a more effective control of WIS modernization and the transition to it. The relationship between the JPM and the Functional Project Manager (FPM) is one of close coordination and collaboration where the FPM collects requirements and the JPM incorporates those requirements into the WIS modernization program.

6.0 SCHEDULE AND COSTS

The WIS schedule for each segment is shown in Table 6.1. This schedule reflects an early start on both the Joint Mission and the Command and Service Unique Segments of WIS. In addition, the Maintenance Segment spans the WIS modernization, providing support both for the current system and the evolving WIS. Within each segment, the schedule for each segment block is shown.

Cost estimates for the WIS include costs to develop and operate the WIS hardware and software, WIS JPM support costs, and costs to operate and maintain current WWMCCS ADP systems until the new WIS equipment is available (References 13, 14). Preliminary cost estimates for the WIS have been developed using two independent costing models: COCOMO and Price-S (References 15, 16). The costs were allocated to the WIS segments according to the segment boundary definitions described in Section 4.0. Cost estimates shown for the Maintenance Segment include projections based on near-term enhancements planned centrally and those planned by individual WWMCCS sites. They also include maintenance costs for the total WIS modernization. Transition Segment costs are based on detailed planning and analyses conducted over the past fifteen months. Costs for the Joint Mission and the Command and Service Unique Segments are the result of long-range planning for WIS and discussions with the individual Services concerning their emerging plans to modernize Service and command-unique processing support. In some instances, Services/Agencies requirements for the Command Unique Segment were not sufficiently well defined nor validated at the time of WIS cost estimate development. As definition and validation efforts progress, WIS cost estimates will require commensurate adjustments to more properly reflect Services/Agencies cost requirements. These costs will be further refined at the DSARC II milestone prior to the Full-Scale Development Phase.

It should be noted that WIS costs are presented in this Section in two ways: constant dollars and fully-inflated dollars. The constant dollar presentation permits comparison with previous WIS cost estimates. In addition, it is essential that fully-inflated costs be reported since it is these costs that must be programmed into the various budgets.

Acquisition cost estimates for the WIS, including both RDT&E and procurement expenditures, are shown in Tables 6.2 and 6.3. These costs are shown in constant FY 82 dollars to be consistent with previous reports.

Budget planning for the WIS has also included the examination of life-cycle costs for the WIS. Furthermore, these life-cycle costs have been allocated between the Joint WIS component of the WIS program which will be funded from a single program element, and the costs for the Service or Command-Unique WIS components which will be funded in each of the Service's budgets.

Calculation of life-cycle costs for the WIS includes Military Personnel (MILPERS) costs and total expenses for the operation and maintenance (O&M) of the WIS. The preliminary life-cycle cost estimate for both the current and modernized systems through the end of the modernization of WIS (FY 83-95) is 5.3 billion dollars. These costs include adjustments for planned inflation in future years. Table 6.4 shows the portion of WIS costs attributable to each cost category by year. The figures do not include funds for military

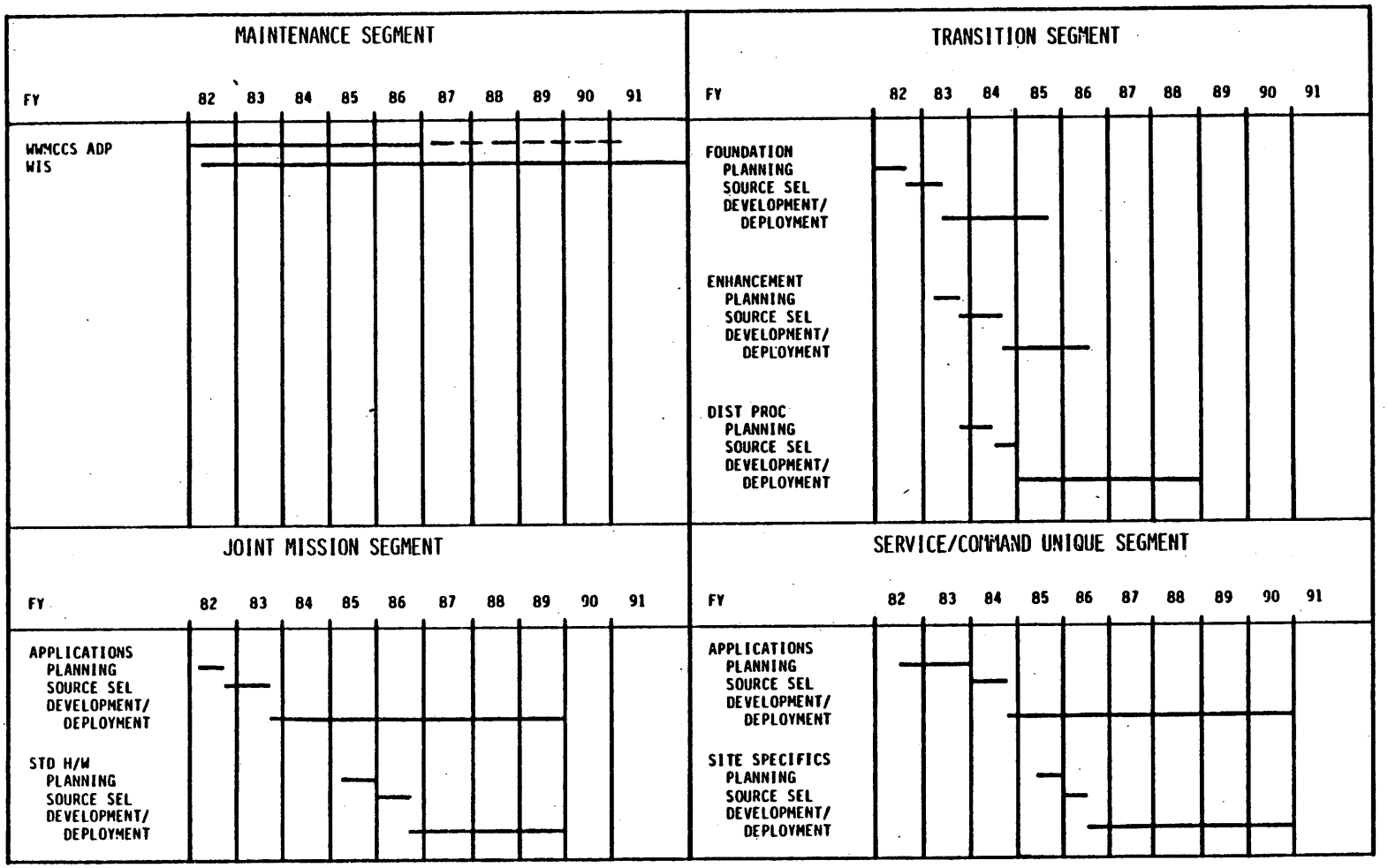


Table 6.1
WIS Modernization Schedule

Table 6.2 - Preliminary WIS Acquisition Cost Estimates By Segment and Year*
(Constant FY82 $ in Millions)

	FISCAL YEAR													
	83	84	85	86	87	88	89	90	91	92	93	94	95	TOTAL
MAINTENANCE SEGMENT	31.	10.	-	-	-	-	-	-	-	-	-	-	-	41.
TRANSITION SEGMENT	14.	14.	20.	79.	54.	32.	-	-	-	-	-	-	-	213.
JOINT MISSION SEGMENT	26.	93.	91.	84.	34.	54.	34.	6.	-	-	-	-	-	422.
COMMAND/SERVICE UNIQUE SEGMENT	1.	20.	136.	136.	134.	46.	58.	40.	11.	-	-	-	-	582.
TOTAL WIS ACQUISITION COSTS	72.	137.	247.	299.	222.	132.	92.	46.	11.	-	-	-	-	1,258.

* Acquisition Costs Include Both RDT&E and Procurement.

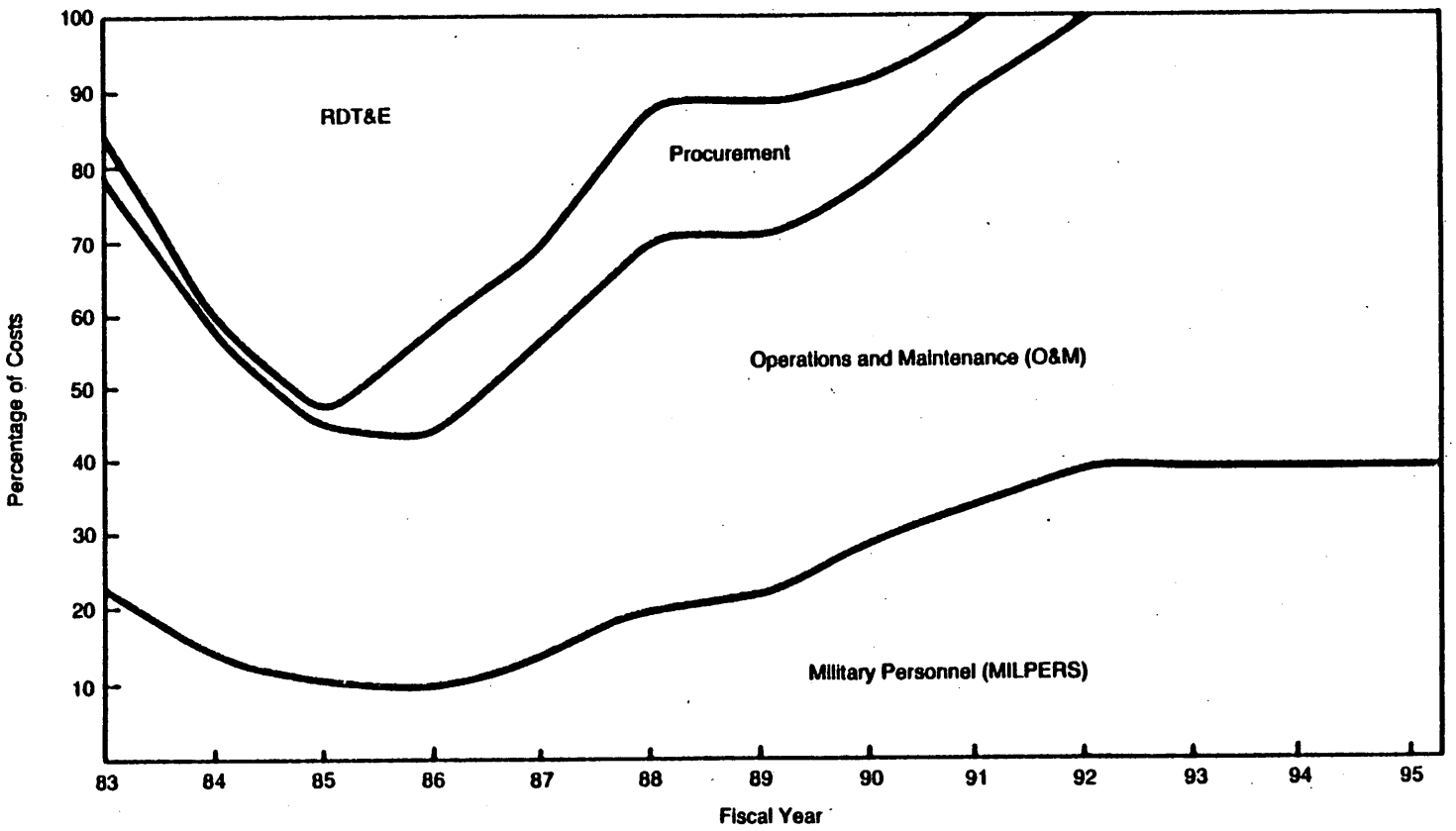
Table 6.3 - Preliminary WIS Cost Estimate For RDT&E and Procurement
(Constant FY82 $ in Millions for FY83 through FY95)

	MAINTENANCE SEGMENT	TRANSITION SEGMENT	JOINT MISSION SEGMENT	CMD & SERVICE UNIQUES SEGMENT	TOTALS
RDT&E	18.	38.	318.	531.	905.
PROCUREMENT	23.	175.	104.	51.	353.
TOTALS	41.	213.	422.	582.	1,258.*

*Equivalent to $1,618.M in then-year dollars.

Table 6.4

Percentage of Estimated WIS and
WWMCCS ADP Costs by Category



construction because specific needs have not been determined. Estimated costs for site preparation associated with the fielding of new WIS equipments have been included in the operations and maintenance costs shown. As the WIS JPM identifies architectural designs, MILCON needs will be identified to the Services/Agencies. The WIS JPM budget will include the funds necessary for the planning and acquisition of WIS standard software including associated engineering, development, and implementation activities. It is anticipated that the maintenance of standard WIS system and application software will be performed by DCA. The JPM will assist in the support of the WIS budget throughout each Military Department PPBS process and before Congressional committees.

In some instances, the current Five-Year Defense Plan (FYDP) does not reflect sufficient budgeting of funds in many areas to support the WIS modernization. The WIS cost estimates are being provided to the Services so that they can program the necessary funds in future budget submissions. The WIS cost estimate also places all software development and conversion costs under the category of RDT&E. Individual Services and Commands may ultimately decide to program software costs under operations and maintenance (O&M) rather than RDT&E. In addition, it should be noted that assumptions inherent in the cost models produced estimates for military personnel costs (MILPERS) that are not constrained by current military personnel allocations. Some of the estimated MILPERS costs may need to be converted into civilian personnel or contract services and included in O&M budgets.

A comparison of estimated costs for WIS modernization against estimated costs to continue the current WWMCCS ADP with no modernization can be seen in Figure 6.1. Part a of the figure shows graphically the estimated WIS costs by year. In part b of the figure, a conservative estimate of costs to continue the current WWMCCS was derived. Assumptions used to produce these costs were that O&M cost growth would be equal to the average yearly growth between 1976 and 1982, that is 7.4%. Cost growth in other categories -- RDT&E, Procurement, MILPERS -- was assumed to be only a result of inflation. Several key points can be quickly seen in the figure. First, O&M expenditures are the dominant costs. The cost figures show expenditures to operate and maintain the WIS, even excluding military personnel costs, are significantly greater than the purchase cost of the hardware and software. Second, modernization allows for significant reductions in O&M expenditures through the introduction of more reliable and more-easily maintained system components. Moreover, these significant cost reductions are achievable even though processing power and system capabilities are to be increased over current WWMCCS ADP.

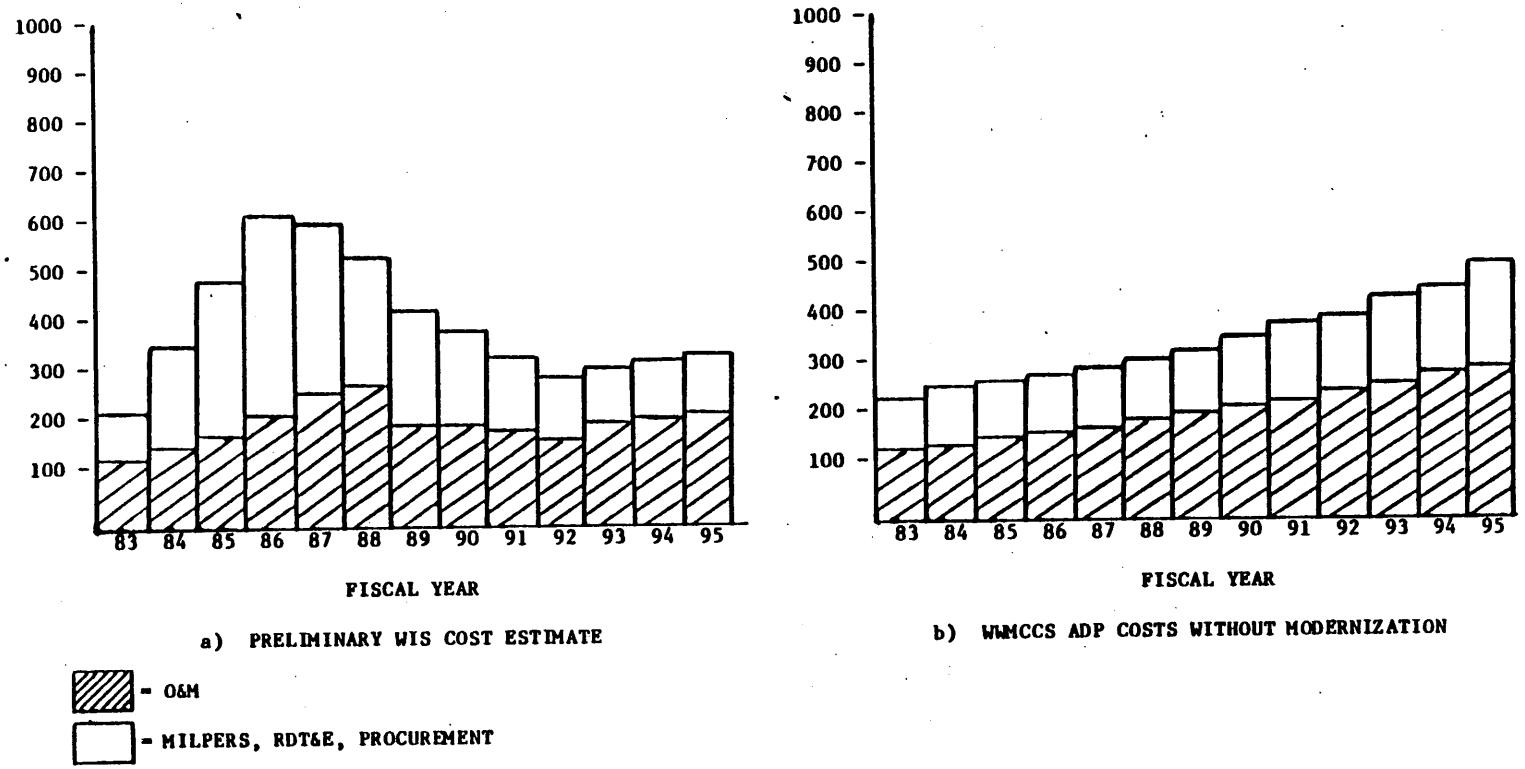


Figure 6.1 - Comparison of Estimated Costs for WIS Against Costs To Continue Current WWMCCS ADP

(Then Year $ in Millions)

The WWMCCS ADP O&M costs represent a large expenditure for a command and control system. Adding the estimated WIS modernization acquisition costs makes this effort one of the largest ADP programs to be undertaken. The need to control O&M and military operating personnel costs has influenced the development of the WIS operational concepts and system structure, as well as the selected acquisition approach. In addition, near-term initiatives will also be focused on reducing the O&M costs for the current WWMCCS ADP. The current and projected Five-Year Defense Plan (FYDP) O&M costs for the current WWMCCS ADP, including all program elements (or portions of program elements), associated with WWMCCS ADP are shown below:

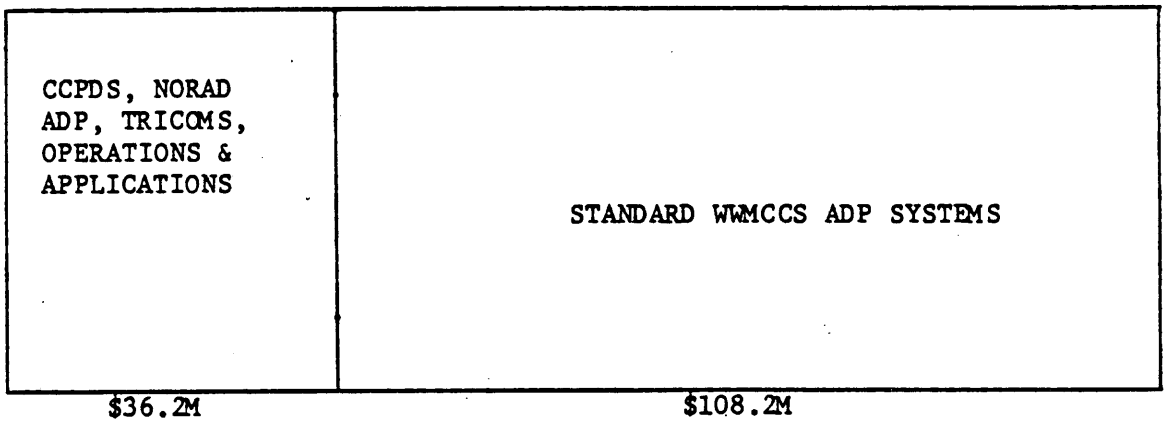
	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88
Standard WWMCCS ADP	108.2	109.3	134.9	140.5	182.8	188.9	188.1
Other WWMCCS ADP	36.2	45.3	52.4	58.8	68.7	76.4	76.0
WWMCCS ADP TOTALS	144.4	154.6	187.3	199.3	251.5	257.3	264.1

The "Other WWMCCS ADP" category includes such systems as the Command Center Processing and Display System (CCPDS), the TRIAD Computer System (TRICOMS), and NORAD ADP. These fall into the Tactical Warning/Attack Assessment and Space Defense (TW/AA and SD) and SIOP war planning areas. While the total WWMCCS ADP figure is of concern to the WIS JPM, the standard WWMCCS ADP costs are those most associated with WIS modernization. Standard WWMCCS ADP costs contain some enhancements to the current systems but they do not include WIS modernization funds.

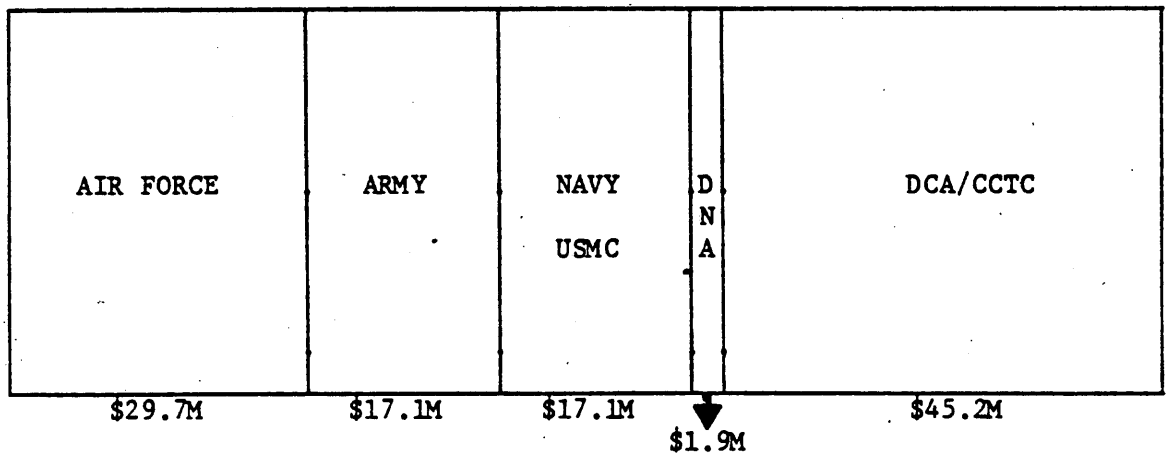
The WWMCCS ADP O&M costs for FY 82 are subdivided in Figure 6.2. In each of the Services and DoD agencies shown, the O&M funds include civilian pay, training, supplies, minor equipment purchases, TDY, hardware lease, site preparation, hardware maintenance, and contract services for systems and application software. In the Services, this last category is relatively small. However, almost half of the DCA cost of $45.2 includes two contract services areas: maintaining WWMCCS-specific portions of the operating and non-functional software, and contract support for the joint applications software. Excluding those contract services and associated civilian pay, the remaining total for O&M equals $74.6 million in FY 82 or an average of about $3 million per WWMCCS site. It is also important to note that included in the hardware maintenance and lease costs are all of the terminals, peripheral equipment, the Honeywell Level 6 processors, and the interface message processors, in addition to the host H6000 processors.

To ensure detailed and accurate tracking of program elements and activities and their associated costs, the Software Acquisition Process (SWAP) model, a program management and budget system developed jointly by DoD and NASA for large information system acquisitions will be used for the WIS Modernization. In addition, detailed costs will be provided at the formal DSARC review.

WWMCCS ADP - $144.4M



STANDARD WWMCCS ADP SYSTEMS - $108.2M



DCA/CCTC WWMCCS - $45.2M

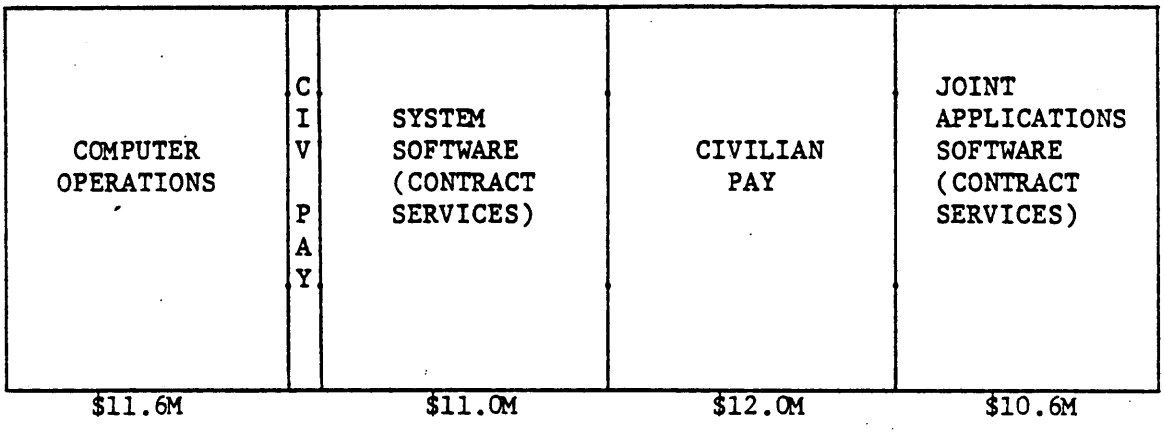


Figure 6.2
WWMCCS ADP O&M Costs For FY 82

It is realized that some sites may have critical capacity shortfalls with the current H6000 systems within the time period preceding the fielding of WIS capabilities. This may necessitate the procurement of some new hardware systems that are upward compatible to the H6000 hardware. This compatible equipment would impact neither the current operations, nor the long-term WIS. A budget estimate of the procurement cost for this compatible hardware option is $21.0 million in constant FY 82 dollars. This cost estimate is based on the belief that no RDT&E effort or software (applications or system) modifications should be required. The estimates assume a new contract but do not imply a single solution. The procurement funds for this option, if pursued, should be programmed for the Services' budgets, as this would be envisioned to be a part of the Maintenance Segment of the WIS.

7.0 SUMMARY OF RESPONSES TO CONGRESSIONAL CONCERNS

Several important issues confronting the WIS JPM coincide with concerns expressed during recent Congressional hearings. The primary thrust of the planned WIS modernization addresses those concerns. The most significant of these issues are discussed in the following paragraphs. References are provided to indicate where detailed information can be found within the body of this report. Figure 7.1 summarizes these issues.

An important issue is the solution to the problems associated with current WWMCCS ADP equipment shortfalls. Upgrades will be made on the merits of each case, supported by justified operational requirements and comparative cost analysis. Enhanced applications software packages must be considered as part of each procurement. Further discussion of this topic can be found in Section 1.3, Near-Term Initiatives.

A second major concern, detailed information requirements, is nearing resolution. Baseline information requirements necessary for defining Type A specifications required in initial procurement steps should be documented by the end of CY82. WIS information requirements will continue to be refined as the threat changes. Section 2.0 provides more-detailed information on this subject.

Operational and functional requirements, specified in various JCS documents, provide a solid foundation upon which the system structure will be developed. The process for defining Type A specifications (see previous paragraph), combined with requirements published by JCS, will produce a system structure and design to support detailed information requirements. For more-specific information, refer to Section 2.0 REQUIREMENTS, and Section 3.0 SYSTEM STRUCTURE.

Life-cycle management for the WIS is the responsibility of the JPM as is central coordination and control of the modernization effort. OMB Circular A-109, "Major Systems Acquisition," DoD Directive 5000.1 and DoD Instruction 5000.2 will be used to govern the life-cycle management practices. In accordance with the above references, the prescribed acquisition process steps may require modification to meet the specific needs of the WIS . Additional information is provided in Sections 4.0 ACQUISITION and 5.0 MANAGEMENT.

The designation of the WIS JPM as the DoD focal point for the WIS modernization effort provides management control for planning and implementation activities, fiscal reviews and life-cycle management. This structure will allow the development of both joint and site-unique systems, in addition to the connecting interfaces at various levels of command. Also, responsive to the WIS JPM is the System Program Office (SPO), responsible for acquisition planning, system structure and engineering. A Functional Project Management Office (FPMO), within C3S/OJCS, supports the RUM and CPE functions for the various commands and operating agencies. This subject is discussed in Section 5.0 MANAGEMENT.

CONCERNS	COMMENTS	REFERENCE
HARDWARE	Replace those systems having immediate shortfalls with modern upward compatible computers where a comparative cost analysis justifies such action.	SECTION 4.0
INFORMATION REQUIREMENTS	Complete the detailed information requirements to support command and control decision-making.	SECTION 2.0
SYSTEM STRUCTURE	Develop an architecture and system design that can satisfy detailed information requirements.	SECTIONS 2.0, 3.0
LIFE-CYCLE MANAGEMENT	Employ life-cycle management practices, including life-cycle costing, as presented in DoD Directive 7920.1 Life-Cycle Management of Automated Information Systems.	SECTIONS 5.0, 6.0
PROGRAM MANAGEMENT	Follow other sound management practices such as establishing measurable system performance and effectiveness goals and objectives, including periodic evaluation, providing cost-effective growth potential, and clearly delineating responsibilities and coupling them with needed authority and control of resources.	SECTION 5.0
SYSTEM RELIABILITY	Employ proven state-of-the-art technology in the WIS design to ensure the development of reliable systems.	SECTION 3.0
STANDARDIZATION	Specify standard network protocols, terminology, data elements, data formats, and data retrieval techniques for horizontal (between commands) and vertical (command to national military command centers) communications.	SECTIONS 2.0, 3.0
COMMAND/ SITE-UNIQUE	Decentralize decision-making to allow individual WWMCCS sites to develop their own systems to meet command needs in compliance with the above standards.	SECTIONS 3.0, 4.0
NETWORK RESOURCE CONTROL	Centralize management and control of resources for the communications network and equipment interconnecting WWMCCS sites to ensure that local command needs do not pre-empt network operations.	SECTIONS 3.0, 5.0

Figure 7.1
Responses to Congressional Concerns
(Summary)

State-of-the-art computer technology has made significant improvements in systems development in recent years. Proven technology for a local area communications network is currently being used in commercial applications. Current network designs can be modified to provide a reliable command and control system to support WIS requirements, employing proven network technology. This is discussed further in Section 3.0 SYSTEM STRUCTURE.

The WIS JPM and other members of the WWMCCS community are committed to the standardization of system elements. Standardization is an on-going process, promulgated within the Joint Reporting Structure (JRS) and WWMCCS Intercomputer Network (WIN). In addition to the publication of a WWMCCS Data Base User's Manual, ADP Dictionary and Standard Application Data Element Dictionary, emphasis is being placed on the use of DoD standard host-to-host transmission control protocols. Standardization is a continuing process within the overall WIS modernization plan, dedicated to a totally compatible, interoperable system. Refer to Sections 2.0 and 3.0 for more-detailed information on requirements and system structure standardization, respectively.

As discussed in Section 3.0, the preliminary system structure for the WIS has been defined. Within this structure, standardization of hardware elements and software remain key elements to a totally viable system. Based on the primary requirements to support the information needs of the NCA, the JCS and the specified and unified commands, communications and data standards will ensure that sufficient timely information is available. The WWMCCS Information System will continue to support the development of command/site-unique systems, ensuring concurrent compliance to WIS standards. This modernization plan also permits command/site unique procurement needs to be accommodated within a framework that precludes system anarchy.

A review of WIN network operations reveals some basic procedural areas for improvement. The network should be controlled by a single manager during both day-to-day and crisis operations to effect continuity of control. An effective means for limiting and prioritizing network access during crisis/exercise conditions must also be implemented. In addition, overall procedures must be identified for the maintenance and control of the network as a whole. Central control should be established to apply discipline to the network, a fundamental requirement for successful network operation. Adherence to sound procedures and strict network discipline will improve the operational capabilities of WIN.

REFERENCES

1. The Assistant Secretary of Defense (Communications, Command, Control and Intelligence) with the assistance of the WWMCCS System Engineer, Defense Communications Agency. Planning for Modernization of the WWMCCS Information System (WIS). 19 January 1980.

2. The Assistant Secretary of Defense (Communications, Command, Control and Intelligence) with the assistance of the WWMCCS System Engineer, Defense Communications Agency. Modernization of the WWMCCS Information System (WIS). 19 January 1981.

3. Deputy Secretary of Defense. "Memorandum on Establishment of a Joint Program Manager for the WWMCCS Information System". 5 Nov 1981.

4. Deputy Secretary of Defense. "Memorandum on WWMCCS Information System Joint Program Management Office." 9 February 1982.

5. WWMCCS ADP Concept of Operations and General Requirements for Post-1985. SM-101-81. February 1981.

6. USCINCEUR/CINCPAC. Required Operational Capability for Automated Message Handling. (MROC 9-81). 26 May 1981.

7. OJCS (J-3). Concept for the Use of ADP in Support of the NMCS. J31 3000.10B. September 1981 (Secret).

8. IBM, US European C^3 Study Group, HQ EUCOM. European C3 Architecture: Requirements for C3 Support. J3-576-2151. 8 May 1976.

9. Deputy Secretary of Defense. "Memorandum on the Joint Mission Element Need Statement (JMENS) for WWMCCS Information System (WIS) Modernization." 18 December 1981.

10. Gerald P. Dinneen, Principal Deputy, Office of the Undersecretary of Defense, Research and Engineering. "Memorandum on Host-to-Host Protocols for Data Communications Networks." 1978.

11. DoD Directive 5200.28. Security Requirements for Automatic Data Processing (ADP) System. 18 December 1972, as amended.

12. Deputy Secretary of Defense. "Memorandum on Improving the Acquisition Process." 30 April 1981.

13. WIS System Program Office. "Preliminary System Description and Cost Estimate." 30 July 1982.

14. JPM WIS. "Supplement to the Preliminary WIS Cost Estimate".

15. Boehm, B., "Software Engineering Economics" Prentice Hall Inc., 1981.

16. RCA Price Systems, Price-S (Software), RCA Inc., Cherry Hill, NJ.

APPENDIX A

WIS COMMERCE BUSINESS DAILY ANNOUNCEMENT

The following announcement appeared in the 9 June 1982 edition of the Commerce Business Daily (CBD). The announcement represents the first step in the process of selecting the Integration Contractor for the WIS.

INTEGRATION EFFORT OF THE WIS MODERNIZATION

The WWMCCS Information System (WIS) Program Office, Electronic Systems Division is planning a procurement for the Integration Effort of the WIS Modernization. The WWMCCS Information System is now under the purview of the Joint Program Manager (JPM) which was established by the Deputy Secretary of Defense in January 1982 to oversee the modernization of the WWMCCS ADP. The JPM will provide guidance and direction to DCA and the Services regarding WIS related activities and will direct the transition from the WWMCCS Standard ADP System to the WWMCCS Information System.

This program will require the potential contractor to perform the system integration role for the incremental modernization of the current WWMCCS ADP at various Department of Defense (DoD) facilities. As part of this role, the contractor will:

a. Act as system integrator for WIS;

b. Design, develop, and install a local data communications capability at the WWMCCS sites;

c. Convert some of the existing WWMCCS applications software for use in the new system;

d. Design and develop new applications software;

e. Assist the Government in the selection of the hardware and system software to be used in WIS (a hardware exclusion clause will be enforced);

f. Select a Commercial Data Base Management System for use in WIS and plan for its evolution into a distributed data base management system;

g. Develop engineering criteria for a WIS Development and Engineering Facility and assist in the operation of that facility;

h. Use Ada as the design language;

i. Upon completion of installation of the system at the WWMCCS sites, perform Development Test and Evaluation (DT&E) on an end-to-end basis certifying that the system is ready for Operational Test and Evaluation (OT&E);

j. Develop the Integrated Logistics Support planning for the WIS;

k. Act as the Security Engineer for this classified system;

l. Coordinate these activities with Government contractors providing othr aspects of the WIS.

These tasks will be carried out in an incremental fashion.

Firms responding to this announcement must meet the following requirements:

a. Have or be able to obtain a facility clearance commensurate with the overall security classification of TOP SECRET;

b. Be a United States contractor;

c. Have the capability to perform the tasks with a sufficient number of qualified personnel. The potential contractor or his subcontractors also should have specific experience in the following areas:

(1) Automatic Data Processing Systems Integration;

(2) Local data communications capabilities;

(3) Preparation of Formal Development Test and Evaluation Plans and Procedures for automatic data processing systems and conducting of those tests;

(4) Design of applications software and use of formal development techniques;

(5) Distributed processing;

(6) Data Base Management;

(7) Integrated Logistics Support Management.

d. Demonstrate capability to provide operational and maintenance support on a worldwide basis.

Responses from interested firms should be sent to Hq ESD/PKS, Attn: Mr. M. J. Konior, Hanscom AFB, MA 01731 no later than 30 days from the date of publication. After review of responses, a solicitation may be issued to those prospective sources who, in the sole judgment of the purchasing activity, are fully qualified to successfully fulfill the requirement. This synopsis is for information and planning purposes only, and does not constitute an RFP or IFB and should not be construed as a commitment by the Government. Firms responding should indicate if they are qualified as socially or economically disadvantaged. Submission of information should not exceed 60 pages.

Information submitted should be pertinent and specific, in the technical area under consideration, on each of the following qualifications: (1) Experience: An outline of previous projects, specific work previously performed or being performed and any in-house research and development effort, (2) Personnel: Name, professional qualifications and specific experience of scientists, engineers and technical personnel who may be assigned as principal investigator, and/or project officer, (3) Facilities: Availability and description of special facilities required to perform in the technical area under consideration. A statement regarding industrial security clearance. Any other specific and pertinent information as pertains to this particular area or procurement that would enhance our consideration and evaluation of the information submitted.

Organizations having information on file with this procurement office may have reference to such information. There is no need to duplicate such data. However, supplemental specific information regarding the above question must be submitted. Acknowledgement of receipt of response will not be made.

APPENDIX B

MODERNIZATION OF NUCLEAR PLANNING AND TACTICAL WARNING SYSTEMS

As described in Section 1, the WIS Modernization program is focused on the Resource Unit Monitoring (RUM) and Conventional Planning and Execution (CPE) families. Management of WWMCCS ADP systems in the Strategic Nuclear War Planning and Tactical Warning/Attack Assessment and Space Defense (TW/AA and SD) areas has been previously assigned to the Air Force, as the Executive Agent for the JCS. A brief summary of system upgrades of Nuclear Planning systems and modernization activities for Tactical Warning Systems is presented below.

Within the Tactical Warning and Attack Assesment and Space Defense (TW/AA and SD) area, modernization is underway on the NORAD Missile Warning and Space Surveillance Systems within the NORAD Cheyenne Mountain Complex (NCMC) and the Command Center Processing and Display System (CCPDS) which receives and displays TW/AA and SD information. These two systems are the primary command and control computer systems that provide and display missile warning information used for strategic (nuclear) decision making. Projected increases in the threat, in sensor outputs to be processed by the systems, and in the computer processing workloads have necessitated the priority replacement of these systems in the FY 85-88 period.

The Command Center Processing and Display System (CCPDS) employs computers at NORAD, SAC, the NMCC and the ANMCC to receive, process, and display ballistic missile warning and attack assessment information. CCPDS consists of dedicated computers, software, display control elements, consoles and associated systems support hardware at the four command centers. SAC, as the Executive Manager for the centralized management of the CCPDS, in conjunction with the Army, DCA, and the OJCS, have planned for a competitive replacement of the CCPDS computer systems by FY 87. In the interim, near-term improvements are also programmed to support additional data traffic from new/upgraded sensor systems to avoid processor saturation until the replacement CCPDS is completed.

Within the NORAD Cheyenne Mountain Complex (NCMC), two major programs have been initiated to replace the Communications Segment (CSS) and the NORAD Computer System (NCS). The CSS serves as the "front-end" communications processor for the NCMC. Due to the complexity of the existing CSS, the system is to be replaced in several phases. The first phase, to be completed in FY 86, will provide a new interface for ballistic missile TW/AA and SD circuits. Follow-on phases will support the space defense, atmospheric surveillance, and common user communications requirements of the NCMC. The NCS is the primary missile warning processor in the NCMC. An FY 87 IOC is planned for the NCS replacement program. In addition, the SPADOC Computation Center Computer will be replaced as part of the SPADOC Phase IV program. An IOC of FY 85 has been established for Block A of the SPADOC IV acquisition.

Improvements are also underway on the Triad Computer System (TRICOMS) and an ADP capability is being installed on the E-4 National Emergency Airborne Command Post (NEACP) aircraft. TRICOMS is the primary computer system supporting the development and production of

the national war plan. The NEACP automation program will provide a highly survivable facility from which to perform situation assessment, nuclear operations monitoring and termination, plus force reduction and reconstitution in the event of the loss of ground-based facilities.

The TRICOMS upgrade is primarily a result of the decision by the NCA to develop more flexible and responsive nuclear capability planning. This decision has necessitated improved war planning and options analysis including increased use of contingency planning and nuclear weapons employment planning. In addition, several new weapons systems are under development which will enlarge the processing support required by TRICOMS. Plans for the TRICOMS upgrade include the lease of additional hardware and system software, and contractor services to provide war planning, modeling, computer networking, and an enhanced file management capability.

An austere ADP capability for the four NEACP aircraft is planned to be implemented during FY 83/84. This capability will provide the NEACP with limited automated support for Nuclear Operations Monitoring and Residual Capability Assessment. Additional operational user improvements have been recommended to accommodate planned changes to the General War System and improvements in satellite sensors and communications systems, such as Jam Resistant Secure Communications.

The funding profiles for these programs are provided in Table B.1. Only programmed funds for procurement of improved capabilities are shown.

Table B.1 - Modernization For Nuclear Planning and Tactical Warning Systems
(Then Year $ in Millions)

	FISCAL YEAR					
	83	84	85	86	87	88
TRICOMS	3.4	1.7	1.7	22.2	17.9	19.1
NCMC	24.6	58.4	61.0	24.6	24.6	11.1
CCPDS	-	12.4	32.9	9.9	6.7	6.0
NEACP	7.2	8.1	2.3	-	-	-

APPENDIX C

GLOSSARY

AAC	Alaskan Air Command
ACE	Allied Command in Europe
ACE/ACCIS	Allied Command Europe/Automated Command and Control Information System
ACEREP	Allied Command Europe Reporting System
ADCOM	Aerospace Defense Command
ADP	Automated Data Processing
AFGWC	Air Force Global Weather Central
AFLC	Air Force Logistics Command
AFOC	Air Force Operations Center
AFMPC	Air Force Military Personnel Center
AFRES	Air Force Reserves
AMH	Automated Message Handling
AMHS	Automated Message Handling System
ANMCC	Alternate National Military Command Center
AOC	Army Operations Center
ATC	Air Training Command
AU	Air University
AUTODIN	Automatic Digital Network
AWC	Army Way College
C^2	Command and Control
C^3	Command, Control and Communications
C^3S	Command, Control, Communications Systems
CAS	Crisis Action System
CCIS	Command and Control Information System
CCPDS	Command Center Processing and Display System
CCTC	Command and Control Technical Center
CFC	Combined Forces Command
CINC	Commander-in-Chief,
CINCEUR	Commander-in-Chief, Europe
CINCLANT	Commander-in-Chief, Atlantic
CINCPAC	Commander-in-Chief, Pacific
CIS	Command Information System
CONUS	Continental United States
CPE	Conventional Planning and Execution
CSAF	Chief of Staff, Air Force
CUC	Common User Capability

DAA	Designated Approving Authority
DBMS	Data Base Management System
DCA	Defense Communications Agency
DDN	Defense Data Network
DEPSECDEF	Deputy Secretary of Defense
DIA	Defense Intelligence Agency
DLA	Defense Logistics Agency
DNA	Defense Nuclear Agency
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDIIS	Department of Defense Intelligence Information System
DSARC	Defense Systems Acquisition Review Council
ECP	Emergency Command Precedence
ESD	Electronic Systems Division
EW	Electronic Warfare
FMFLANT	Fleet Marine Force, Atlantic
FMFPAC	Fleet Marine Force, Pacific
FORSCOM	Forces Command (U.S. Army)
FPM	Functional Project Manager
FPMO	Functional Project Management Office
FYDP	Five Year Defense Plan
GAO	General Accounting Office
GFE	Government Furnished Equipment
HOL	High Order Language
HQMC	Headquarters, Marine Corps
IASA	Integrated AUTODIN System Architecture
IDHS	Intelligence Data Handling System
IP	Internet Protocol
ISO	International Standards Organization
JCS	Joint Chiefs of Staff
JDA	Joint Deployment Agency
JINTACCS	Joint Interoperability of Tactical Command and Control Systems
JMENS	Joint Mission Element Needs Statement
JRS	Joint Reporting Structure
JSTPS	Joint Strategic Target Planning Staff
LAN	Local Area Network
LANTCOM	Atlantic Command
LANTFLT	Atlantic Fleet
MAC	Military Airlift Command
MILPERS	Military Personnel
MROC	Multiple Required Operational Capability
MSC	Military Sealift Command
MTMC	Military Traffic Management Command
MTTF	Mean Time to Failure
MTTR	Mean Time to Repair

NADB	Network Accessible Data Base
NASA	National Aeronautic and Space Administration
NATO	North Atlantic Treaty Organization
NATOACEREP	NATO Allied Command Europe Reporting System
NAVEUR	Naval Forces, Europe
NCA	National Command Authorities
NCC	Naval Command Center
NCMC	NORAD Cheyenne Mountain Complex
NCS	NORAD Computer System
NEACP	National Emergency Airborne Command Post
NFE	Network Front End
NGB	National Guard Bureau
NICS	North Atlantic Treaty Organization Integrated Communications System
NIU	Network Interface Unit
NMCC	National Military Command Center
NMCS	National Military Command System
NOC	Network Operations Center
NORAD	North American Air Defense Command
NPE	Nuclear Planning and Execution
NSA	National Security Agency
O&M	Operation and Maintenance
OJCS	Organization of the Joint Chiefs of Staff
OMB	Office of Management and Budget
OPLAN	Operations Plan
PACAF	Pacific Air Forces
PACFLT	Pacific Fleet
PACOM	Pacific Command
PACWRAC	PACOM WWMCCS Regional ADP Center
POM	Program Object Memorandum
PPBS	Planning, Programming and Budgeting System
PSI	Planning and System Integration
RDJTF	Rapid Deployment Joint Task Force
RDT&E	Research, Development, Test and Evaluation
RFP	Request for Proposal
RJE	Remote Job Entry
ROC	Required Operational Capability
RUM	Resource and Unit Monitoring
SAC	Strategic Air Command
SDN	System Design Notification
SECDEF	Secretary of Defense
SDT	Software Development and Training
SIOP	Single Integrated Operational Plan
SPADOC	Space Defense Operations Center
SPO	System Program Office
SSTM	Single Service Training Manager
SWAP	Software Acquisition Process

TAC	Tactical Air Command
TCP	Transmission Control Protocol
TOA	Transportation Operations Agency
TRICOMS	TRIAD Computer System
TW/AA and SD	Tactical Warning/Attack Assessment and Space Defense
UNITREP	Unit Status and Identity Report
UPS	Uninterruptable Power Source
U.S.	United States
USAFE	United States Air Forces, Europe
USAREUR	United States Army, Europe
USEUCOM	United States European Command
USFJ	United States Forces, Japan
USFK	United States Forces, Korea
USMC	United States Marine Corps
USREDCOM	United States Readiness Command
USSOUTHCOM	United States Southern Command
V&V	Verification and Validation
WESTCOM	Western Command
WIN	Worldwide Military Command and Control System Intercomputer Network
WIS	Worldwide Military Command and Control System Information System
WSE	Worldwide Military Command and Control System System Engineer
WWMCCS	Worldwide Military Command and Control System

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WWMCCS Information System (WIS)
Automated Data Processing (ADP)
Command and Control (C^2)
Defense Data Network (DDN)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This document reports on the status of and describes the approach to the modernization of the WWMCCS Information System (WIS) by the recently-established WIS Joint Program Manager. The report was prepared for the Committee on Armed Services, United States House of Representatives.

The WIS encompasses the information collection, processing, and display system that includes WWMCCS ADP and related software systems, procedures and supporting telecommunications. The current WWMCCS ADP is rapidly approaching

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obsolesence. Modernization of the hardware and much of the WWMCCS software will be required to meet operational needs. This report addresses the requirements, system structure, acquisition approach, program management, and cost and schedule for the WIS modernization.