Center for Advanced Computation

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
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CAC Document No. 143

Research in Network Data Management and Resource Sharing

MANAGEMENT PLAN

January 2, 1975

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MANAGEMENT PLAN

Prepared for the
Joint Technical Support Activity
of the
Defense Communication Agency
Washington, D. C.

under contract
DCA100-75-C-0021

Center for Advanced Computation
University of Illinois at Urbana-Champaign
Urbana, Illinois 61801

January 2, 1975

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1. Introduction

This report describes the management plan of the Center for Advanced Computation of the University of Illinois at Urbana-Champaign to implement contract DCA100-75-C-0021 and to effect the timely delivery of the reports specified in the contract statement of work.

This report is organized in five sections:

Deliverables,

Project Organization,

Management Reports,

Technical Management Plan, and

Government Support Requirements.

2. Deliverables

Twelve deliverables are specified in the statement of work. These deliverables will be submitted to JTSA on or before the dates indicated in Table 1.

Due Date	Deliverable
2 Jan '75	Management Plan
1 Apr '75	Survey Report
1 Apr '75	WWMCCS Systems Summary
1 Apr '75	State-of-the-Art Report
1 Apr '75	Annotated Bibliography
1 May '75	Application Summary
1 May '75	Technology Summary
1 May '75	Scenario Report
1 May '75	Preliminary Research Study Report
1 May '75	Oral Briefing on the Research Plan
2 June '75	Research Plan Document
29 July '75	Networking Utility Functional Description

Table 1

List of Deliverables

3. Project Organization

The project is organized into two technical teams and a clerical support activity. Each group reports to the principal investigator.

The two technical teams are staffed by a total of six professional researchers and three graduate research assistants. A fourth graduate research assistant will be added in January 1975. The team leaders are both senior researchers: Professor Belford and Mr. Petronelli.

Professor Belford's team is responsible for research oriented deliverables. These include the

1. Annotated Bibliography,
2. State-of-the-Art Report,
3. Preliminary Research Study Report, and
4. Technology Summary.

Mr. Petronelli's team is responsible for development and field oriented deliverables. These include the

1. WWMCCS Systems Summary,
2. Survey Report,
3. Scenario Report, and
4. Application Summary.

Professor Alsberg, the principal investigator, is directly responsible for the remaining deliverables. These include the

1. Management Plan,
2. Oral Briefing on the Research Plan,
3. Research Plan Document,
4. Networking Utility Functional Description, and
5. Management Reports.

The research group will be organized into three teams to prepare the Networking Utility Functional Description. These teams will be responsible for

1. networking security functions,
2. networking control functions, and
3. networking accounting functions.

The clerical support activity consists of two clerk-typist III's.

Detailed scheduling and task interdependencies are presented in Section 5, Technical Management Plan.

4. Management Reports

4.1 Monthly status reports

Monthly status reports will be transmitted to JTSA 10 days after the completion of each month's work. The monthly status report will be broken into 3 major sections

1. a description of the previous month's activities,
2. a description of the schedule situation, and
3. a description of deliverable refinements and modifications.

4.1.1 Previous month's activities

This section of the monthly status report will include

1. a narrative description of the work performed in the previous month,
2. a list of items delivered to JTSA in the previous month,
3. a list of problems encountered during the previous month which shall include a description of each problem and recommended solutions to each problem, and
4. a summary of manpower expended in the previous month.

4.1.2 Schedule

The schedule section shall include a description of the status of the current schedule, a statement of its current validity and an identification of potential schedule problems. If the current schedule is invalid or if there is technical or political advantage to be gained by modifying the schedule, then a section shall be included which proposes schedule modifications. For each proposed schedule modification, a reason for the modification, the specifics of the modification, and an assessment to the impact of the modification on resource consumption, schedule, and deliverables will be presented.

4.1.3 Deliverable refinements and modifications

As the work progresses it is expected that the scope and depth of each deliverable will be defined in more detail than the original descriptions contained in the contract statement of work. This section of the monthly status report will act as a formal vehicle for conveying refined descriptions of deliverables to JTSA.

As the networking problem becomes better defined, it may be desirable to modify the scope or depth of a deliverable. When the need for modifications become apparent, this section of the monthly status report will contain CAC recommendations for modifications to deliverables. For each proposed modification, the reason for the modification, the specifics of the modification, and an assessment of the impact of the modification on resource consumption, schedule, and other deliverables will be presented.

4.2 Progress reviews

Progress reviews will be scheduled as appropriate. Each progress review will be an oral briefing of JTSA personnel by the contractor. A written outline of the briefing and necessary support documents will be provided by CAC. Progress reviews will provide an opportunity to discuss topics such as

1. project management including resource consumption and schedule,
2. technical topics including new problem areas exposed and potential solutions discovered, and
3. tutorial descriptions of distributed data management and resource sharing problems and presentations of the insights gained relative to these problems.

5. Technical Management Plan

5.1 Task organization

A separate major task has been created for each contract deliverable. These major tasks are each broken into subtasks of short duration.

It is the purpose of this preliminary contract to prepare a multiyear research plan that has high probability to develop that part of the networking technology base that is most urgently needed by the WWMCCS community. It is not the function of this preliminary contract to actually perform the research. Unfortunately, the nature of the topic is such that even preliminary studies to expose problem areas and gauge problem difficulty can rapidly expand beyond the resources assigned. In order to reduce the jeopardy of task growth, arbitrary subtask deliverable dates are assigned and are firm. This forces activities to proceed at a fixed rate and trades off against depth and scope which must be varied to fit the allotted time.

Subtask duration is normally one week. This provides frequent check points and permits task and overall project progress to be metered at a fine level of detail.

5.2 Task dependencies

It is the nature of the tasks of this contract that interdependencies do not force strict sequencing of tasks. For example, all of the preliminary research studies cannot be scheduled until the literature search and research site visits are complete. However, some preliminary research studies can begin after portions of the literature are searched and before all research sites are interviewed. As a result, tasks tend to be phased according to their dependencies but can and do overlap.

Figure 1 graphically displays task dependency for the development of the research plan. The preparation of the Networking Utility Functional Specification is a relatively independent task which follows the development of the research plan.

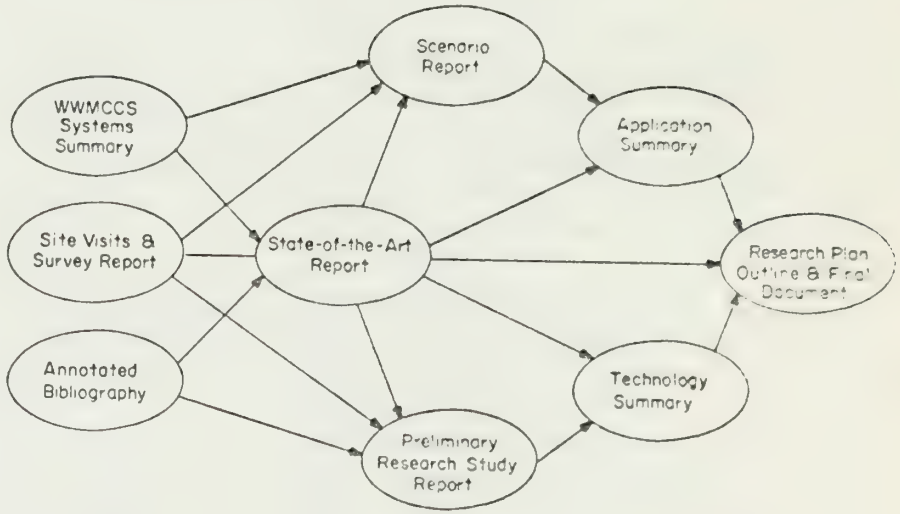

Figure 1
Task Dependencies

5.3 Schedules

5.3.1 Internal schedules

In order to measure and adjust progress, all tasks are broken into subtasks with milestones set at approximately one week intervals. These milestones are relatively firm. However, as the networking problem becomes better defined, it is anticipated that some modifications will be required. In some areas, subtasks are generically defined and will not

become specific until a better problem understanding emerges. For example, the State-of-the-Art Report has several subtasks of one week duration which require the analysis and documentation of a single topic area. However, the precise topic is not yet assigned.

For internal management purposes, these tasks and subtasks have been separately charted and are available to all project personnel.

5.3.2 Monthly schedules

In order to assist JTSA in the evaluation of project progress, the internal project milestones have been aggregated to a set of monthly milestones. Figure 2 shows major task duration, and Table 2 lists the monthly milestone aggregation.

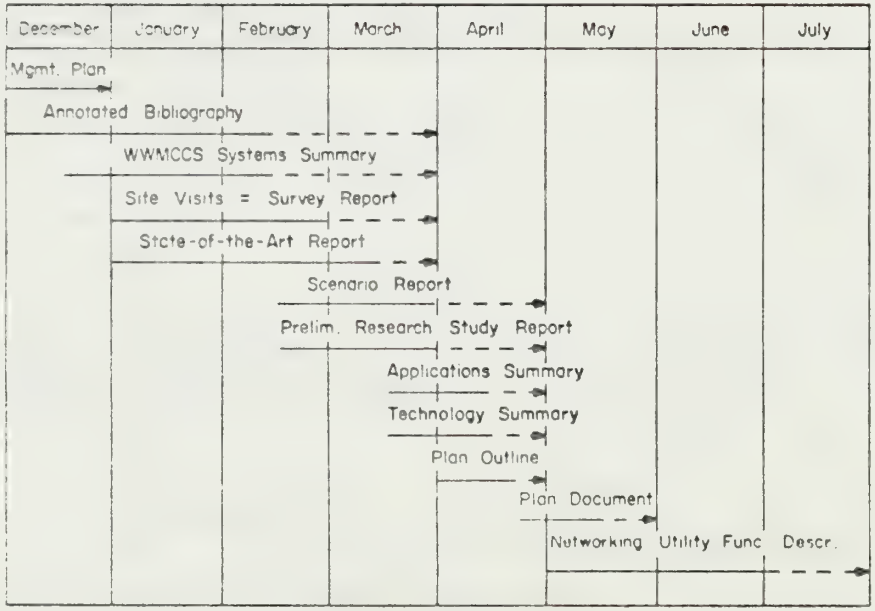

Figure 2
Task Phasing and Duration
(dotted lines indicate report editing, printing, and shipping times)

Date	Milestones
2 January 1975	Management Plan delivered 116 bibliographic annotations PWIN, NCL and NAP reviewed
1 February 1975	306 total bibliographic annotations PWIN FTP, NCP, WLS reviewed GCOS TPS, NPS, TSS reviewed [illegible] interview report UCI, ICI, UCLA, IBM San Jose, SRI, Xerox PARC interview reports drafts of 3 topics in the State-of-the-Art Report
1 March 1975	draft Annotated Bibliography draft WWMCCS Systems Summary NMCSSC, AUS*, CINCPAC*, NSA/DOM* interview reports U. Maryland, U. Michigan, U. Waterloo interview reports drafts or outlines of all topics in the State-of-the-Art Report 2 scenario reports 1 preliminary research study report
1 April 1975	Annotated Bibliography delivered WWMCCS Systems Summary delivered Survey Report delivered State-of-the-Art Report delivered 6 total scenario reports 4 total preliminary research study reports draft outline of Application Summary draft outline of Technology Summary
1 May 1975	Scenario Report delivered Preliminary Research Study Report delivered Application Summary delivered Technology Summary delivered Draft Outline of Research Plan delivered
1 June 1975	Research Plan delivered
1 July 1975	draft outline Networking Utility
29 July 1975	Networking Utility Functional Description delivered

*WWMCCS site suggestions--other potential candidates include [illegible]

Table 2

Monthly Milestones

6. Government Support Requirements

Access to the ARPA Network, WWMCCS users, and relevant technical documentation is required.

6.1 ARPA network access

Adequate access to the ARPA network is required. A number of networking experiments will be performed using the ARPA network. This access is being provided by maintaining the ARPA network IMP located at the Center for Advanced Computation.

6.2 WWMCCS user access

In order to ascertain user needs and to appropriately focus and direct research activities, the research team will require access to a limited number of WWMCCS sites and users. In order to provide as comprehensive a picture as possible, a diverse set of sites should be chosen for interviews. At the same time, it is desirable to interfere minimally with on-going operations at WWMCCS sites. Discussions are currently in progress with the COR to determine the smallest set of sites which can still illustrate the range of WWMCCS networking activities and needs.

6.3 Documentation

The delivery of a WWMCCS Systems Survey, Annotated Bibliography, and State-of-the-Art Report will require that WWMCCS and GCOS documents be provided. In addition, government supplied documents such as those available at the National Technical Information Service and the Government Printing Office will be required.

6.3.1 WWMCCS documentation

Based on our understanding of WWMCCS and PWIN development, the following documents are required. They have been grouped into functional

categories, and when available, government document numbers have been supplied. Where appropriate, the current release should be substituted for any requested item which has been superseded.

(Starred items have been received as of December 26, 1974.)

6.3.1.1 Network design and performance

WP-9845, Projected Response Characteristics of the WWMCCS Intercomputer Network, 8 May 1972.

*MTR-6181, Prototype WWMCCS Intercomputer Network (PWIN) Development Plan, 1 May 1972.

*MTR-5140, Design Overview of the Prototype WWMCCS Intercomputer Network (PWIN), 14 Dec 1972.

*WP-9979, Overview of the Procedures Required for Management, Operation, and Use of the Prototype WWMCCS Intercomputer Network, 13 July 1973.

*MTR-5200, Operational Demonstration Programs for the Prototype WWMCCS Intercomputer Network (PWIN), 30 April 1974.

MTR-5146, Concepts for the Performance of PWIN Operational Experiments, 4 Dec 1972.

WP-9985, Analysis of Applications for Prototype WWMCCS Intercomputer Network (PWIN) Operational Experiments, 1 Aug 1973.

Network Software Tests - Datanet 30 Configuration, 29 June 1973.

*MTR-5201, PWIN Test and Experiment Program: Test Report on HIS 6000 Network Software (PWIN Release WW3.1P1.1), April 1974.

MTR-5210, PWIN System Integration Test Procedures, July 1974.

PWIN Communications Software Programming Specification (DCA Code N341) Undated.

RM-3765-PR, On Distributed Communications, Vol. 9, August 1964, P. Baran, et al.

RM-3767-PR, On Distributed Communications, Vol. 11, August 1964, P. Baran, et al.

*WP-9911, Concepts for PWIN Performance Experiments, 29 Jan 1973.

6.3.1.2 Data management

*R 4177[illegible]008-1-1, Overview of Data Base Directory Design (Draft).

*R 4177[illegible]007-1-1, PWIN Distributed Data Base Network Directory Services Design Specification (Draft).

6.3.1.3 Network control program

*MP-9838, Design Specifications for PWIN Non-functional Network Control Software, 30 June 1972.

*R 17742-1-1, Functional Specification, Programming Specification and User's Manual for Generic Socket Number Software, 23 April 1974.

*MTR-5166, PWIN Test and Experiment Program, Part I: HIS 6000 Network Software Tests.

*MTR-5[illegible]6, PWIN test and Experiment Program, Part II: HIS 6000 Network Software Tests.

*R 417741-5-3, Program Specifications for the Improved PWIN NCP.

PWIN Network Control Program Design Specification (document number unknown).

6.3.1.4 Network accounting

R 417731-1-2, Functional Specifications for the Standard Network Accounting (SNA) Routine, 19 Dec 1972.

Network Accounting Program Design Specification (document number unknown).

*R 4177[illegible]11-2-1, Network Accounting Program Programming Specification (Draft).

6.3.1.5 Network control, protocol designs and implementation

6.3.1.5.1 Telnet protocol

R 417711-2-1, Logger Programming Specifications, 1 Sept 1973.

Telnet Design Specification (document number unknown).

*R 4177[illegible]21-1-1, Program Specifications for the Telnet Program.

6.3.1.5.2 FTP protocol

File Transport Protocol Design Specification (document number unknown).

6.3.1.5.3 Network control language

*R 4177813-14, Prototype WWMCCS Intercomputer Network, Network Control Language, File Transfer Protocol and Workload Sharing Programming Specifications.

*R 4177811-1-1, Prototype WWMCCS Intercomputer Network, Network Control Language, Data Transfer Protocol, and Work Load Sharing Functional Specification (Draft).

6.3.1.5.4 Work load sharing protocol

Work Load Sharing Protocol Design Specifications (document number unknown).

6.3.1.5.5 Site security

S200.28, DOD Directive on Site Security.

6.3.1.5.6 Communications subnet

*BBN #2852, IMPs for the ARPA Computer Network.

6.3.1.5.7 WWMCCS related Honeywell documentation

*DB98, Worldwide Data Management System Administrator's Guide.

*DB97 Rev. 1, Worldwide Data Management System User's Guide.

Worldwide Data Management System Design Specification (document number unknown).

6.3.2 GCOS documentation

For system evaluation purposes of the GCOS hosts on the PWIN the following documentation is required.

(Starred items have been received as of December 26, 1974.)

6.3.2.1 Hardware reference

*DA48, Series 6000 System, Series 6000 Summary Description.

*BS03, Datanet 355 Processor, Datanet 355 Systems Manual.

6.3.2.2 Operating system

BR43, Basic Operating System, General Comprehensive Operating Supervisor (GCOS).

BJ19, Control Card Formats, Control Cards Reference Manual.

BR17, Table Definitions, System Tables.

6.3.2.3 System initialization

DA06, GCOS Startup, System Startup and Operation.

BJ70, Communications System, GRTS/355 Startup Procedures Reference Manual.

DA11, Storage Subsystem Startup, ICS180 Disk Storage Subsystem Startup Procedures.

6.3.2.4 Data management

DB54, File System, File Management Supervisor.

BR69, Integrated Data Store (I-D-S), Integrated Data Store.

DA31, File Processing, Indexed Sequential Processor.

DA80, Multi-Access I-D-S, Multi-Access I-D-S Implementation Guide.

BN85, File Input/Output, File and Record Control.

DB57, I-D-S Data Query System, I-D-S Data Query System Installation.

DB56, I-D-S Data Query System, I-D-S Data Query System User's Guide.

6.3.2.5 Program maintenance

BJ71, Object Program, Source and Object Library Editor.

BJ18, System Editing, System Library Editor.

6.3.2.6. Language processors

BN86, Macro Assembly Language, Macro Assembler Program.

BJ08, COBOL Language, COBOL Compiler.

BJ09, COBOL Usage, COBOL User's Guide.

BS11, ALGOL Language, ALGOL.

BS06, JOVIAL Language, JOVIAL.

BJ67, FORTRAN Language, FORTRAN.

BB98, DATANET 355, DATANET 355 Macro-Assembler Program.

6.3.2.7 Service and utility routines

BN90, Loader, General Loader.

BQ66, Utility Programs, Utility.

BP30, Conversion, Bulk Media Conversion.

BS07, System Accounting, Summary Edit Program.

DB00, Software Debugging, Debug and Trace Routines.

6.3.2.8 Time-sharing systems

BS01, Operating System, Time-sharing System General Information.

BR99, System Programming, Time-Sharing Terminal/Batch Interface Facility.

BR39, System Programming, Time-Sharing System Programmers' Reference Manual.

BR36, BASIC Language, Time-Sharing BASIC.

BJ67, FORTRAN Language.

BR40, Text Editing, Time-Sharing Text Editor.

6.3.2.9 Remote terminal system

DA79, DATANET 30/305/355 Processors, Remote Terminal System (GRTS).

6.3.2.10 Network processing

DB68, DATANET 355 Processor, NPS/355 Reference Manual.

6.3.2.11 Transaction processing

DA82, User's Procedures, Transaction Processing System User's Guide.

6.3.2.12 DATANET 700

*AM05, DATANET 700, RNP System Startup and Operation.

*AM12, DATANET 700, Data Communications.

6.3.3 Government documentation centers

Documents available from NTIS, GPO, and other government documentation centers are required. At present, 57 NTIS documents have been requested. Additional documents will be requested from NTIS and other government sources as needed.

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

This report describes the management plan of the Center for Advanced Computation of the University of Illinois at Urbana-Champaign to implement contract DCA100-75-C-0021 and to effect the timely delivery of the reports specified in the contract statement of work.

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