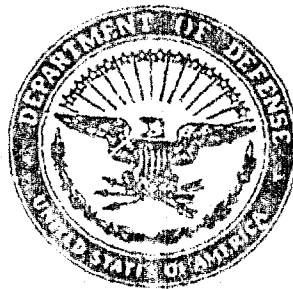


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Ada 9X Project Report



Ada 9X Project Plan

January 1989

Office of the Under Secretary of Defense for Acquisition

Washington, D. C. 20301

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EXECUTIVE SUMMARY

The American National Standards Institute (ANSI) and the Department of Defense procedures require that action be taken periodically to reaffirm, revise or withdraw the Ada language standard, ANSI/MIL-STD-1815A. The Ada Joint Program Office (AJPO) has determined that a revision is necessary. On 25 October 1988, the Director of the AJPO, Ms. Virginia Castor, announced the initiation of the revision process, referred to as the Ada 9X Project. The Ada 9X Project Office was established at the Air Force Armament Laboratory, Eglin Air Force Base, Florida. The Ada 9X Project Manager is Christine M. Anderson.

The overall goal of the Ada 9X Project is to revise ANSI/MIL-STD-1815A to reflect current essential requirements with minimum negative impact and maximum positive impact to the Ada community. The Ada 9X process is a revision and not a redesign of the language and should be viewed as a natural part of the language maturation process.

The Ada 9X Project objectives are:

- Revise ANSI/MIL-STD-1815A

- Obtain Approval by the American National Standards Institute

- Obtain Adoption by the Department of Defense

- Obtain Adoption by the International Standards Organization

- Obtain Adoption by the National Institute for Standards and Technology (formerly the National Bureau of Standards)

- Update the Ada Compiler Validation Capability/Ada Compiler Evaluation Capability Test Suites

- Recommend Transition Policy

- Develop an Education/Training Program

- Develop a Language Long-Term Maintenance Plan

These objectives will be accomplished in three interrelated phases: revision, standardization and transition beginning October 1988 and ending in April 1993. These phases include activities associated with revision request collection, language revision, standardization, transition policy, education/training, compiler validation and long-term language maintenance.

The Ada 9X Project will be conducted in an open manner facilitating two way communication with the Ada community. The Ada 9X Project Office will also work closely with the standards organizations to insure Ada 9X continues to enjoy its multi-standard status.

PREFACE

This report constitutes the Ada 9X Project Plan which outlines the approach for the revision of ANSI/MIL-STD-1815A, the Ada programming language. This report was prepared by Christine M. Anderson, the Ada 9X Project Manager, at the Air Force Armament Laboratory, Eglin Air Force Base, Florida between October and December 1988 under the sponsorship of the Ada Joint Program Office.

ACKNOWLEDGEMENT

Special thanks to: Virginia Castor for her confidence in my ability to "get the job done"; Colonel Peter Marchiando, Commander, Air Force Armament Laboratory, for his support and for providing the kind of environment that makes projects like this possible; and Barbara Fleming at the Ada Joint Program Office for her insight and comment.

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SECTION I
INTRODUCTION

1. Objective of the Ada 9X Project Plan

The purpose of the Ada 9X Project Plan is to provide a detailed and organized approach to the ANSI/MIL-STD-1815A revision process. The Ada 9X Project Plan will be updated on an annual basis throughout the duration of the effort.

This document is organized as follows:

- Section I: INTRODUCTION

Section I presents (1) objectives of the Ada 9X Project Plan; (2) the scope of the Ada 9X Project through delineation of the Ada 9X Project objectives; and (3) background information which led to the initiation of the Ada 9X Project.

- Section II: APPROACH

Section II provides an overview of the approach to the ANSI/MIL-STD-1815A revision process by discussing the activities associated with achieving each of the specific objectives described in Section I.

- Section III: MANAGEMENT CONCEPT

Section III provides the management structure for the Ada 9X Project and identifies specific tasks for various groups and organizations in support of the Project.

- Section IV: DELIVERABLES

Section IV presents a description of the deliverables resulting from the Ada 9X Project.

- Section V: WORK BREAKDOWN STRUCTURE

Section V presents a work breakdown structure which delineates all of the activities to be accomplished.

- Section VI: SCHEDULE

Section VI presents the Ada 9X Project master schedule.

- Section VII: REFERENCES

Section VII provides a list of references which are referred to directly or indirectly in this document.

- Appendix A

Appendix A contains the AJPO Ada 9X Project Announcement and the Revision Request Form.

2. Scope

The overall goal of the Ada 9X Project is to revise ANSI/MIL-STD-1815A to reflect current essential requirements with minimum negative impact and maximum positive impact to the Ada community. The Ada 9X Project, sponsored by the Ada Joint Program Office, will be managed by the Ada 9X Project Office at the Air Force Armament Laboratory (AFATL), Eglin Air Force Base, Florida.

In order to accomplish the goal of the Ada 9X Project, nine specific objectives have been identified.

a. Revise ANSI/MIL-STD-1815A

ANSI/MIL-STD-1815A will be revised based on current essential requirements. The requirements will be developed from an in-depth analysis of revision requests from the Ada community with a strategic balance between change and stability. The requirements will be mapped into a revised language description. The utility of this description will be demonstrated via language implementations.

b. Obtain Approval by the American National Standards Institute (ANSI)

The revised language will be submitted to ANSI for approval in accordance with the ANSI canvass procedures.

c. Obtain Adoption by the Department of Defense (DOD)

In keeping with the DOD policy to adopt (vice develop) standards as applicable, the revised ANSI standard will be submitted to the DOD for adoption.

d. Obtain Adoption by the International Standards Organization (ISO)

It is essential that Ada retain its national and international standards standing. International coordination throughout the Ada 9X Project will play a major role in insuring that this dual status is maintained. The Ada 9X Project Office will work closely with the ISO Working Group on Ada (WG-9) in seeking ISO adoption of the revised ANSI standard.

e. Obtain Adoption by the National Institute for Standards and Technology (NIST)

Ada is currently a Federal Information Processing Standard, FIPS PUB 119. In order to retain this standing, the revised ANSI standard will be submitted to NIST (formerly the National Bureau of

Standards) for adoption.

- f. Update the Ada Compiler Validation Capability (ACVC)/ Ada Compiler Evaluation Capability (ACEC) Test Suites

The ACVC/ACEC test suites will be revised to reflect changes in the standard.

- g. Recommend Transition Policy/Procedures

Transition policy and procedures for using the revised standard will be developed and recommended to the appropriate organizations for approval and implementation.

- h. Develop an Education/Training Program

An education/training program will be developed to facilitate the transition to the revised standard. The program will focus on the "delta" between the previous and new versions of the language, and any nuances associated with the change.

- i. Develop Language Long-Term Maintenance Plan

The revised standard must be maintained. This maintenance involves many considerations including occasional language interpretation, request collection for a future revision, and ACVC test suite updating, etc. A Long-Term Maintenance Plan will be developed which addresses these and other pertinent issues related to the continued normal language maturation process.

3. Background

In the 1970s, recognizing the need to better manage its software, the DOD sponsored the development of a single high order language. A very public and competitive effort resulted in the design of the Ada programming language, so named for Augusta Ada Byron, Countess of Lovelace (1815-1851), a mathematician who worked with Charles Babbage on his difference and analytic engine. In particular, Ada suggested how Babbage's machines might be programmed much like the Jacquard loom, and for this work she is considered the world's first programmer. The Ada language became a DOD standard on 10 December 1980, MIL-STD-1815 (1815 is the year of Ada's birth). At the request of the computer industry, the Ada Joint Program Office initiated an effort for national and international standardization. The first revision to the military standard occurred as part of the American National Standards Institute (ANSI) standardization process. MIL-STD-1815A superseded MIL-STD-1815 on 22 January 1983. The same version was approved 17 February 1983 by ANSI as ANSI/MIL-STD-1815A-1983, and November 1985 by the National Bureau of Standards (now the National Institute for Standards and Technology) as FIPS PUB 119. The same version was also approved as an international standard in March 1987 by the International Standards Organization (ISO) as ISO/8652-1987.

Both ANSI and DOD procedures require that action be taken periodically by the DOD to reaffirm, revise or withdraw this standard. To meet the required schedules, the Ada Joint Program Office (AJPO) requested its

advisory group, the Ada Board, to prepare a recommendation on the most appropriate standardization process to use in developing the revised Ada standard. The Ada Board completed their report in August 1988. It was accepted by the Under Secretary of Defense for Acquisition in September 1988.

The Ada Board recommended that the DOD initiate a revision of ANSI/MIL-STD 1815A (referred to as Ada 9X) using the ANSI canvass method with broad input and review by the Ada community (reference 1).

On 25 October 1988, the Director of the AJPO, Virginia Castor, publicly announced the initiation of the ANSI/MIL-STD-1815A revision process and named Christine M. Anderson from the Air Force Armament Laboratory as the Manager of the Ada 9X Project.

The Ada 9X Project spans many issues including: the language revision, the standardization process, transition policy, education and training, and long-term language maintenance.

II. APPROACH

The Ada 9X Project is a major undertaking with many critical tasks that must be accomplished in a timely manner. It is essential that the Project be conducted in a very public manner, soliciting input and support from the entire Ada community, both nationally and internationally. The Ada community will have an opportunity to review all Ada 9X activities described below.

In order to accomplish the objectives listed in Section I, three major phases of the Project must occur: revision, standardization, and transition. While these activities will be discussed in a serial manner, there is much overlap and feedback between phases. The Ada 9X process is more "spiral" than "waterfall" in nature.

1. Revision Phase

The Revision Phase includes the following activities:

- Collect Revision Requests
- Study Complex Issues
- Develop Requirements/Justification Document(s)
- Develop Mapping Document
- Develop Revision/Rationale Documents
- Perform Implementation/Demonstration

a. Collect Revision Requests

Revision request collection was initiated on 25 October 1988 at the TRI-Ada '88 Conference. The AJPO announcement and revision request form are included in Appendix A. There will be a major effort to distribute these documents widely to insure that the Ada community has the opportunity to participate. Each request will be assigned an accession number, acknowledged to the sender, and filed in a database for further processing. The collection will continue until 24 October 1989. The status of each request will be tracked throughout the Ada 9X Project duration, and will be made available on an electronic bulletin board for public review.

b. Study Complex Issues

Over the past several years, 197 Ada Language Commentaries have been approved by the AJPO (reference 2). A small number of issues have been raised, thus far, that require focused study for proper resolution. In order to facilitate the revision process, these issues will be studied while the collection process is still in progress.

c. Develop Requirements/ Justification Document(s)

The revision requests collected will be studied by a small Requirements Team. The team will develop the requirements for the Ada 9X revision and provide justifications supporting these requirements. Non-support of revision requests will also be justified. In order to insure that the Ada community has ample opportunity to discuss requirements issues, at least one requirements workshop will be organized. The product of this task is a Requirements/ Justification Document(s). This document will be updated as necessary during the course of the Project.

d. Develop Mapping Document

The requirements will be mapped into recommended solutions by a small group called the Mapping Team. In some cases several solutions may be presented for use by the Revision Team. In other cases, a single solution may be obvious. There will be at least one public review during this activity. The product of this effort is a Mapping Document. This document will be updated as necessary during the course of the Project.

e. Develop Revision/Rationale Documents

The requirements and solutions recommended by the Requirements and Mapping Teams will serve as the basis for the revision to ANSI/MIL-STD-1815A. It is expected that there will be much interaction between the teams during this activity. The Revision Team will be responsible for developing the revised Language Reference Manual (LRM) and Rationale Document (references 3, 4). Several public reviews will be held during this phase.

f. Perform Implementation/ Demonstration

In order to demonstrate the acceptability of the revision, a credible demonstration will be performed. Up to three Implementation Teams will modify existing compilers to reflect the Ada 9X revisions. While the compilers themselves may remain under the developers' ownership, and thus certain proprietary rights observed, the Implementation Teams will be required to report on the approach used to make the changes, the difficulties, and the results. The Ada 9X Project Office will furnish benchmark programs to be executed, both before and after the changes. The product of this task is an Implementation Report. Several public meetings will be held during this phase.

2. Standardization Phase

The standardization phase includes the following activities:

Develop a Standardization Plan

Conduct ANSI Canvass

Pursue DOD, ISO and NIST Adoption

a. Develop a Standardization Plan

The overall objective of the Ada 9X Project is to revise and reaffirm Ada as a DOD, ANSI, ISO, and FIPS standard. Coordination of these processes is critical to the successful outcome of the Project. To this end, a detailed plan will be developed describing the steps that must be taken to satisfy each standards organization's requirements.

b. Conduct ANSI Canvass

The precise steps required by ANSI for conducting a canvass will be followed. One of the most crucial steps is the development of a balanced ANSI canvass list that represents the major interest groups in the Ada community. To that end, the Ada 9X Project Office will openly seek qualified candidates (individuals and organizations). Additionally, public reviews will also be staged so that individuals not on the canvass list will also have an opportunity to review and comment on the revised language (references 5, 6).

c. Pursue DOD, ISO, and NIST Adoption

In order to insure that Ada continues to enjoy its multi-standard status, DOD, ISO, and NIST adoption will be pursued based on the approach defined in the Standardization Plan.

3. Transition Phase

The transition phase includes the following activities:

Recommend Transition Policy

Update ACVC/ACEC Test Suites

Develop an Education/Training Plan and Program

Recommend Long-Term Maintenance Procedures

a. Recommend Transition Policy

The Government Advisory Group established by the Ada 9X Project Office will develop the recommended transition policy and procedures for using the revised standard. This document will address various issues including system upgrades, new system development, and compiler validation.

b. Update ACVC/ACEC Test Suites

In order to insure that compilers include the revised language features, the ACVC/ACEC test suites will be modified. The tests recommended by the Implementation Teams will serve as the basis for this modification. The ACVC/ACEC Team(s) will be responsible for developing the new ACVC/ACEC test suites and the corresponding updated Implementer's Guide (reference 7).

c. Develop an Education/Training Plan and Program

In order to facilitate understanding and thus use of the revised language features, an education/training program will be developed. The scope of this program will be described in a detailed plan. Products of this effort include the plan, courseware, and a pilot seminar.

d. Recommend Long-Term Maintenance Procedures

A plan will be developed and coordinated with the appropriate organizations for the long-term maintenance of the language. Various issues must be addressed such as language interpretation, ACVC/ACEC updates, and request collection for future revisions.

III. MANAGEMENT CONCEPT

Each of the groups in the Ada 9X Project Management structure is identified in the following discussion.

1. Ada Joint Program Office (AJPO)

The AJPO sponsors the Ada 9X Project. All Ada 9X Project activities will be coordinated with and approved by the AJPO prior to execution by the Ada 9X Project Manager.

2. Ada 9X Project Office

The Air Force Armament Laboratory (AFATL) has assumed responsibility for the Ada 9X Project. The Ada 9X Project Manager is an AFATL representative who is authorized to work directly with the AJPO in the execution of the Ada 9X Project. The Ada 9X Project Manager is responsible for providing technical direction to all Ada 9X Project participants and for planning and implementing the Ada 9X Project activities.

3. Government Advisory Group

The Government Advisory Group is composed of representatives from various government organizations spanning a wide range of user interests. The Government Advisory Group is responsible for insuring technical issues/concerns of their respective organizations are reported; providing policy/procedures advice regarding the Ada 9X process; reporting Ada 9X status to their respective organizations; and developing an Ada 9X Transition Plan. The Government Advisory Group will also have an opportunity to review and comment on all Ada 9X Project Documents.

4. Distinguished Reviewers

Distinguished Reviewers consist of Ada experts representing various groups in the Ada community (e.g., realtime embedded users, implementers, language experts, information systems users, etc.). The Distinguished Reviewers will review and comment on key activities of the Ada 9X Project (e.g., requirements development, revision). They will be competitively selected.

5. Requirements Team

The requirements team will develop the requirements and supporting justification based on the approved 197 Ada commentaries and the Ada 9X Project revision requests. The Requirements Team, consisting of a small group of Ada experts selected via a competitive process, will develop the Requirements/Justification Document(s). The requirements phase will include several public meetings/reviews.

6. Mapping Team

The Mapping Team consists of a small group of Ada experts selected via a competitive process. The Mapping Team will map the requirements into

language specific issues with several recommended solutions, and record this information in the Mapping Document. The mapping phase will include several public meetings/reviews.

7. Revision Team

The Revision Team will make the actual changes to the ANSI-MIL-STD-1815A, based on the Requirements and Mapping Documents. Results from the implementation demonstration must also be reflected. A revised Language Reference Manual (LRM) and supporting Rationale document will be developed. The revision phase will include several public meetings/reviews. The Revision Team will be competitively selected.

8. Implementation Teams

There will be several Implementation Teams that will modify existing validated Ada compilers to reflect the Ada 9X changes. Government furnished benchmarks will be provided to compare "before and after 9X revisions" performance. At least one embedded target cross-compiler and one host-to-host compiler will be used for this task.

The compilers must be "production quality", i.e., capable of producing results suitable for operational systems. The Implementation Teams will document their approaches to handling the changes, and the performance results. They will also recommend and develop new tests for incorporation in the ACVC/ACEC test suites. The Implementation Teams will be selected via a competitive process.

9. Ada Compiler Validation Capability (ACVC)/ Ada Compiler Evaluation Capability (ACEC) Team(s)

After the standard is approved, the ACVC/ACEC Team(s) will update the ACVC/ACEC test suites based in part on recommendations by the Implementation Teams. This team will also update the Implementer's Guide. This team will be selected via a competitive process.

10. American National Standards Institute (ANSI)

ANSI is the coordinating and approval clearinghouse of America's federated national voluntary standards system. In cooperation with its membership and through its councils, boards, and committees, ANSI coordinates the efforts of hundreds of organizations in the United States that develop American National Standards. One of the procedures used to gain ANSI approval of a standard as an American National Standard is the canvass method. In this method, the sponsor of the standard, in Ada's case, the Ada Joint Program Office, conducts a canvass or mail poll of organizations known to have direct and material interest in the subject covered in the scope of the standard, in order to obtain evidence which will indicate to ANSI that a consensus exists for approval of the standard as an American National Standard. The Ada 9X Project Office, operating as an AJPO agent, will interact closely with ANSI throughout the entire revision process to insure that all ANSI procedures are followed and all requirements are met.

11. Defense Standardization Division

The Defense Standardization Division operating under the Defense Quality and Standardization Office is responsible for all matters concerning defense standardization and specification program policies, procedures and instructions including nongovernment standard adoption. Per the Defense Standardization Manual, DOD 4120.3-M CH 5, 3-700, 17 April 1987, "DOD activities shall use Non-Government Standards (NGS) to the maximum extent practical, feasible, and economical." In keeping with this policy, and in accordance with the DOD adoption procedures of nongovernment standards as described in DOD 4120.3-M CH 5, 3-703, the Ada 9X Project Office will work closely with the Defense Standardization Division throughout the Ada 9X Project to expedite the DOD adoption process of the ANSI approved standard (reference 8).

12. International Standards Organization (ISO)

ISO, the largest international standards organization, covers a multitude of standardization areas of which Ada is one. Ada is coordinated by Working Group 9 (WG-9) under Standards Committee 22 (SC 22) on Languages under the ISO and International Electrotechnical Commission (IEC) Joint Technical Committee 1 on Information Technology; thus Ada is coordinated by ISO/IEC JTC 1/SC 22/WG-9. ANSI is the Secretariat for ISO/IEC JTC 1. All members of the US delegation of WG-9 are ANSI representatives. Since it is essential to the continued success of Ada to maintain consistency among the ANSI, the DOD, the ISO and the NIST standards, the Ada 9X Project Office will interact closely with WG-9 for information exchange on issues related to the Ada 9X Project. WG-9 will also have an opportunity to review and comment on all Ada 9X Project Documents.

13. National Institute for Standards and Technology (NIST)

The National Institute for Standards and Technology, formerly the National Bureau of Standards, is located within the US Department of Commerce. The National Computer Systems Laboratory located within NIST is responsible for adoption of federal information technology standards involving information processing, security and telecommunications.

Ada is currently a Federal Information Processing Standard, FIPS PUB 119. The Ada 9X Project Office will work closely with the National Computer Systems Laboratory throughout the Ada 9X Project to expedite the NIST adoption process of the ANSI approved revised standard.

14. Ada Board

The Ada Board currently advises the AJPO Director with regard to policy and other issues related to the Ada Program. In this capacity, the Ada Board may be called upon to advise the Director on Ada 9X issues. The Ada Board will have an opportunity to review and comment on all Ada 9X Project Documents.

15. Support Team

There will be several support teams that will assist the Ada 9X Project Office in the accomplishment of various management, technical, and administrative tasks associated with the project. These teams may consist of Federally Funded Research and Development Center (FFRDC) employees, or competitively selected contractors. For simplicity, throughout the Ada 9X Project Plan, these teams will be referred to as "the Support Team", even though in reality there may be several different teams.

Specifically, the Support Team will assist the Ada 9X Project Office in:

- Collecting/Acknowledging Revision Requests
- Establishing and maintaining a revision request database
- Preparing public status reports and maintaining public bulletin boards
- Preparing presentations and daily correspondence, and performing other administrative duties essential to the successful operation of the Project Office
- Preparing statement of work tasks
- Reviewing Ada 9X Project progress
- Developing planning documents based on the Ada 9X Project Plan
- Identifying candidates for the various teams
- Organizing and conducting meetings/ workshops
- Publishing and distributing draft documents for review and comment
- Conducting standardization activities
- Performing the Complex Issues Study
- Implementing the Education/Training Plan
- Developing the Long-Term Maintenance Plan

16. Ada Community

The success of the Ada 9X Project depends on the support and participation of the Ada community. The Ada 9X Project Office will conduct the entire Ada 9X Project in an open manner with ample opportunity for public participation. Ada 9X is a community project.

Figure 1 depicts the Ada 9X Project management approach and key participants.

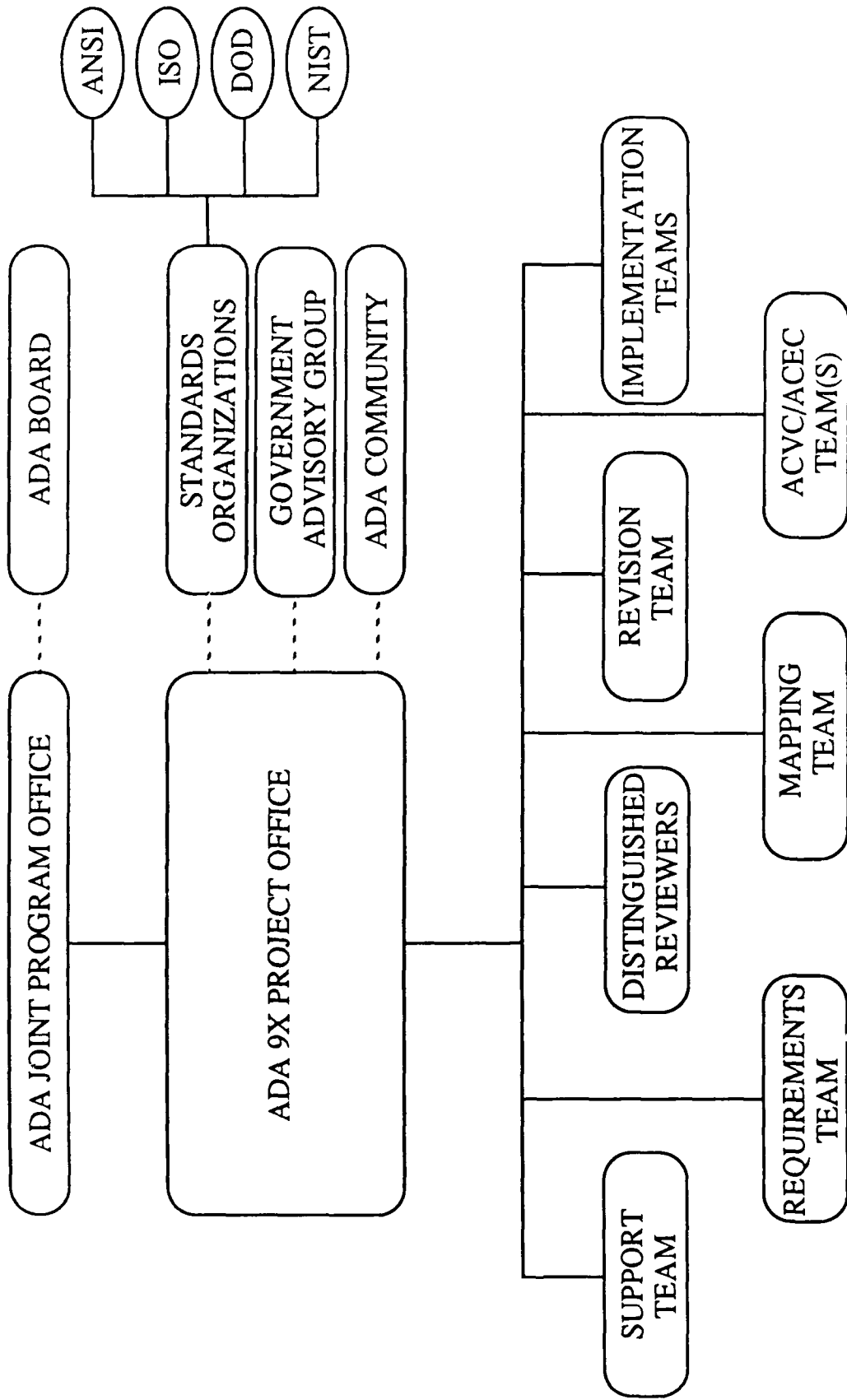


FIGURE 1. ADA 9X PROJECT MANAGEMENT APPROACH/KEY PARTICIPANTS

IV. DELIVERABLES

This section delineates each of the deliverables of the Ada 9X Project. All of the deliverables will be available to the public with the exception of a few planning documents that will be for internal use only (e.g., requirements plan, mapping plan). Working as a whole, the Ada 9X Project contractors, technical consultants, and government advisors are responsible for the development of all of the documents. However, in order to more clearly reflect the areas of prime responsibility, each deliverable description specifies the primary contributor.

1. Ada 9X Project Plan

The Ada 9X Project Plan provides a detailed and organized approach to the accomplishment of the Ada 9X Project. The plan describes project objectives, approach, management concept, and schedule for all Ada 9X Project activities. The Ada 9X Project Plan is evolutionary and will be updated periodically to reflect changes in approach or schedule. The Ada 9X Project Manager is primarily responsible for developing and maintaining the plan.

2. Complex Issues Report

The Complex Issues Report will describe the results of the Complex Issues Study which is focused on studying select complex language issues and developing possible solutions. This report will provide additional focused input to the Mapping and Revision Teams in dealing with some of the more complex issues. This report will be similar in format to the Mapping Document. The Support Team is primarily responsible for this report.

3. Request Status Report

The Request Status Report will describe the status of all revision requests submitted. The requests will be tracked from initial submission through the requirements, mapping and revision phases. This report will be issued periodically as required. The Support Team is primarily responsible for this report.

4. Requirements Plan

The Requirements Plan will provide the detailed plan for developing the requirements for the revision of ANSI-MIL-STD-1815A. The plan will describe the activities, approach, and schedule for developing the Requirements/Justification Document. The Support Team is primarily responsible for this plan.

5. Requirements/Justification Document

The Requirements/Justification Document will describe the requirements for the Ada 9X revision. The revision requests will serve as the basis for developing these requirements. The guiding philosophy for the inclusion of a requirement in the baseline is: maximum positive impact with minimum negative impact to the Ada community. Detailed justification will also be

provided for inclusion or non-inclusion of all revision requests. The Requirements Team is primarily responsible for developing this document.

6. Mapping Plan

The Mapping Plan will describe the activities, approach and schedule for mapping the Ada 9X requirements as described in the Requirements/Justification Document into the actual changes in the Language Reference Manual. The Support Team is primarily responsible for developing this plan.

7. Mapping Document

The Mapping Document will describe the language-specific issues with recommended solutions based on the Requirements/Justification Document. Complete resolution of an issue may not always be possible at this stage. However, a discussion of alternate solutions and corresponding advantages/disadvantages will be included. The Mapping Document will serve as the baseline for making the actual changes to the Language Reference Manual and the Rationale Document. The Mapping Team is primarily responsible for developing this document.

8. Revision Plan

The Revision Plan will describe the activities, approach and schedule associated with revising the standard based on the Requirements/Justification Document, the Mapping Document, Complex Issues Report, and Implementation results. The Support Team is primarily responsible for the development of this plan.

9. Revised Language Reference Manual (LRM)

The Revised LRM will describe the revised standard based on the Requirements/Justification Document, the Mapping Document, the Complex Issues Document, and the Implementation results. The Revision Team is primarily responsible for developing this document.

10. Rationale Document

The Rationale Document will describe the rationale for all modifications to the Language Reference Manual. In cases where several solutions were proposed by the Mapping Team, the Rationale Document will address the use of one approach over another. The Revision Team will be primarily responsible for developing this document.

11. Implementation Plan

The Implementation Plan will describe the activities, approach and schedule for the implementation demonstration which will be performed to provide a credible demonstration of the utility and implementability of the revised language. The Support Team is primarily responsible for developing this plan.

12. Implementation Report

The Implementation Report will describe the approach to implementing language changes, performance results based on running GFE benchmarks, and recommended ACVC/ACEC tests. The Implementation Teams are primarily responsible for developing this report.

13. Standardization Plan

The Standardization Plan will describe the activities, approach and schedule for coordinating the standardization procedures of ANSI, the DOD, ISO, and NIST in order to insure that the revised language retains multi-standard status. The Support Team is primarily responsible for the development of this plan.

14. Approved ANSI Standard

One of the goals of the revision process is the approval of the revised language by ANSI. The Ada 9X Project Office is primarily responsible for obtaining ANSI approval.

15. DOD Adoption

One of the goals of the revision process is the adoption of the revised ANSI standard by the DOD. The Ada 9X Project Office is primarily responsible for obtaining DOD adoption.

16. ISO Adoption

One of the goals of the revision process is the adoption of the revised ANSI standard by ISO. Close coordination between ISO WG-9, the international community, ANSI and the Ada 9X Project Office throughout the revision process is essential to achieving ISO adoption. The Ada 9X Project Office is primarily responsible for working closely with ISO to insure Ada retains its multi-standard status (reference 9).

17. NIST Adoption

One of the goals of the revision process is the adoption of the revised ANSI standard by NIST. The Ada 9X Project Office is primarily responsible for obtaining NIST adoption.

18. Transition Plan

The Transition Plan will contain policy and procedure recommendations for introducing the revised standard. The plan will address compiler validation issues, "grandfathering" policy, new system use, and recommended transition schedules. The Government Advisory Group is primarily responsible for developing this plan.

19. Education/Training Plan

The Education/Training Plan will describe the activities, approach and

schedule for developing and conducting an education/training program for the revised standard. The Support Team is primarily responsible for developing this plan.

20. Education/Training Program

The Education/Training Program will provide the necessary instruction to learn about revised language features of the standard: what they are, and how to use them. The Support Team is primarily responsible for developing this program.

21. ACVC/ACEC Update

The ACVC/ACEC test suites will be updated to reflect the revised features of the standard. This update will be based on the recommendations in the Implementation Report. The ACVC/ACEC Team(s) is primarily responsible for this update.

22. Implementer's Guide

The Implementer's Guide will describe implementation implications of the revised Language Reference Manual and the conditions to be checked by validation tests. The ACVC/ACEC Team(s) is primarily responsible for development of this document.

23. Long-Term Maintenance Plan

The revised standard will require long-term maintenance (e.g., collection of revision requests, language interpretation, additions to the ACVC/ACEC test suites). The Support Team is primarily responsible for developing this plan.

Figure 2 depicts the deliverable items and the groups of primary responsibility.

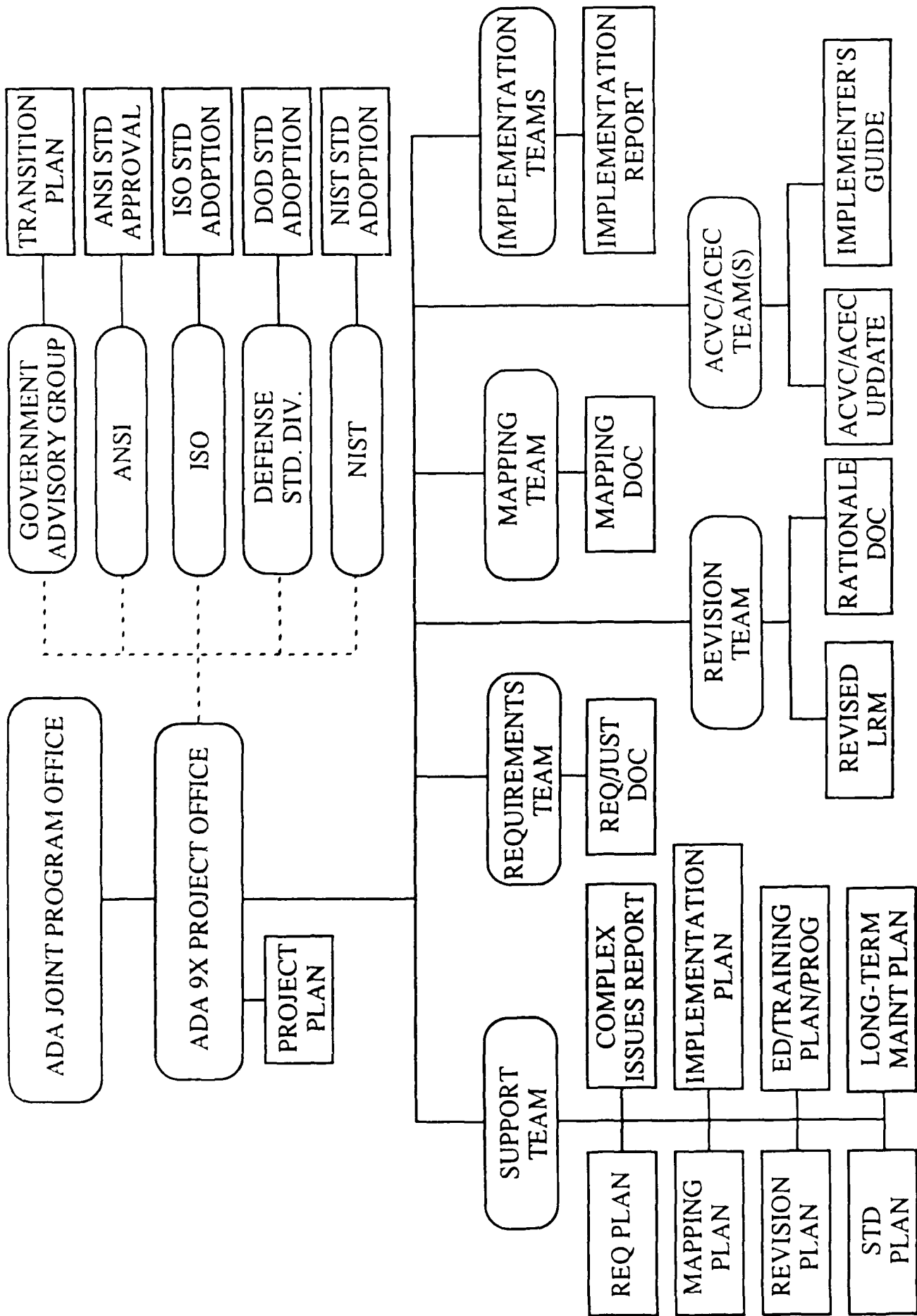


FIGURE 2. DELIVERABLES / PRIME CONTRIBUTOR

V. WORK BREAKDOWN STRUCTURE

Figure 3 depicts the Ada 9X Project Work Breakdown Structure (WBS) which includes the following areas of Project Office management responsibility.

- Management
- Revision Process
- Standardization Process
- Transition
- Support

ADA 9X PROJECT

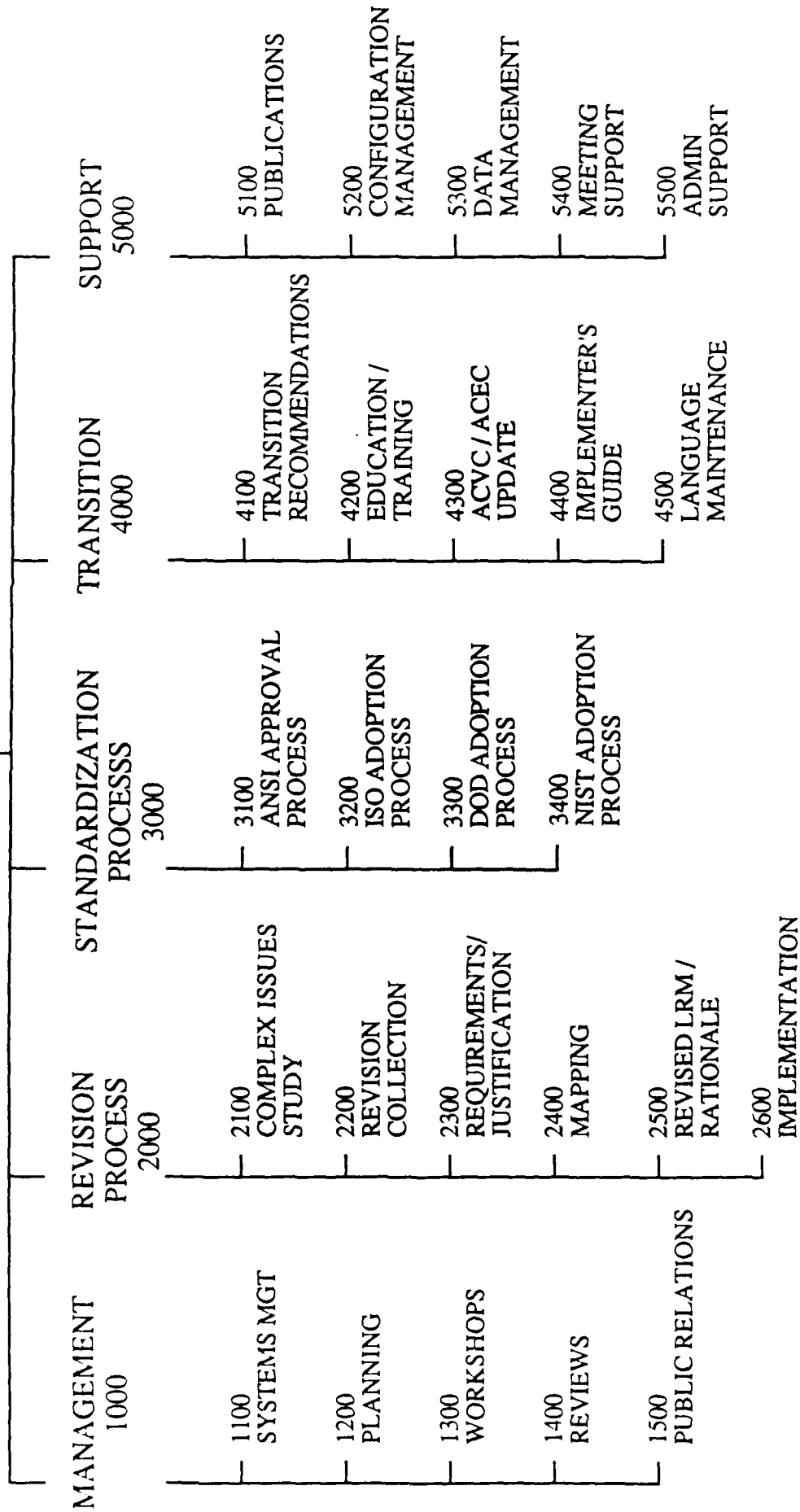


FIGURE 3. WORK BREAKDOWN STRUCTURE

1. 1000 Management

a. 1100 Systems Management

This WBS element provides for management of the Ada 9X Project including coordination between working groups, and technical direction/management of contractual activities.

b. 1200 Planning

This WBS element provides for the planning necessary to follow through and complete the Ada 9X Project. It further provides for the updating of the Ada 9X Project Plan on an annual basis, and the development of the Requirements Plan, the Mapping Plan, the Revision Plan, the Standardization Plan, and the Implementation Plan.

c. 1300 Workshops

This WBS element provides for the organization and management of Ada 9X workshops. The purpose of these workshops is to encourage the Ada community to participate in the Ada 9X Project. Workshops will be conducted during various phases of the project to focus on specific aspects of the effort (e.g., requirements, mapping, revision, implementation).

d. 1400 Reviews

This WBS element provides for the preparation and presentation of Ada 9X Project technical reviews to the Ada community at various phases of the effort.

e. 1500 Public Relations

The Ada 9X Project will be conducted in a very open manner. It is essential to the success of this project that an "open door" policy between the Ada 9X Project Office and the public exists. To that end, periodic status reports will be delivered to the public via various means (e.g., the press, electronic bulletin boards). Furthermore, presentations at various public forums will be conducted.

2. 2000 Revision Process

a. 2100 Complex Issues Study

This WBS element provides for focused study on various complex issues with recommended alternatives for language specific solutions. It further provides for these issues/solutions to be published in the Complex Issues Report.

b. 2200 Revision Collection

This WBS element provides for the collection of the Ada 9X revision requests, the assignment of an accession number, and the acknowledgement of receipt.

c. 2300 Requirements/Justification

This WBS element provides for the development of the Ada 9X requirements and accompanying justification which will be recorded in the Requirements/Justification Document and subject to update throughout the Ada 9X Project.

d. 2400 Mapping

This WBS element provides for the mapping of the requirements to language specific issues with recommended implementation solutions. It further provides for the publication of the Mapping Document recording this information.

e. 2500 Revised Standard (LRM)/Rationale

This WBS element provides for the revision of the LRM and supporting rationale. The revision will be based on the requirements, mapping, and complex issues study results, and must also reflect the results of the implementation demonstration. It further provides for the publication of the Revised LRM and Rationale Documents.

f. 2600 Implementation

This WBS element provides for the implementation of the revised language in order to demonstrate that the language meets the requirements of the Ada community. The demonstration will also provide data to the Revision Team concerning the utility and implementability of the revised language. This WBS element also provides for the development of the Implementation Report which describes the implementation approach, performance results, and recommended ACVC/ACEC tests.

3. 3000 Standardization Process

a. 3100 ANSI Approval

This WBS element provides for the approval of the revised language by ANSI. ANSI approval will be sought via the canvass process which includes development of a balanced canvass list, balloting, request disposition, and possibly reballoting.

b. 3200 ISO Adoption

This WBS element provides for the adoption by ISO of the ANSI approved revised language. ISO adoption will be achieved through close coordination between the Ada 9X Project Office, ANSI and ISO WG-9. The ANSI and ISO schedules for standardization will be coordinated to the maximum extent possible to minimize the effort and time required for both processes and to insure the revised language retains its multi-standard status.

c. 3300 DOD Adoption

This WBS element provides for the adoption by DOD of the ANSI

approved revised standard, in accordance with DOD policy to adopt nongovernment standards where appropriate. Close coordination with the Defense Standardization Division throughout the Ada 9X Project will facilitate the accomplishment of this goal.

d. 3400 NIST Adoption

This WBS element provides for the adoption by NIST of the ANSI approved revised standard. Close coordination with NIST's National Computer Systems Laboratory throughout the Ada 9X Project will facilitate the accomplishment of this goal.

4. 4000 Transition

a. 4100 Transition Recommendations

This WBS element provides for the development of recommended policy for transitioning the revised standard into use. This recommended policy will be recorded in the Transition Plan. While this document will be delivered to the DOD sponsored AJPO, the recommendations will be suitable for use as a guide by other government agencies as well.

b. 4200 Education/Training

This WBS element provides for the development of a plan and subsequent implementation of an education/training program highlighting the revised aspects of the new standard. Products of this WBS element include a plan, courseware, and a pilot seminar.

c. 4300 ACVC/ACEC Update

This WBS element provides for the update of the ACVC/ACEC test suites to reflect the new features in the revised standard. These tests will be based in part on the recommendations made by the Implementation Teams.

d. 4400 Implementer's Guide

This WBS element provides for the update of the Implementer's Guide to reflect the changes in the revised standard.

e. 4500 Language Maintenance

This WBS element provides for a plan for insuring that the revised standard is maintained. Language maintenance includes revision request collection, language interpretation, and resolution of implementation issues.

5. 5000 Support

a. 5100 Publication

This WBS element provides for the publication and distribution of Ada 9X Project documents, both draft and final.

b. 5200 Configuration Management

This WBS element provides for the Configuration Management of all Ada 9X Project documents, revision requests, and the formal revision process (e.g., formal balloting, public comment, etc.)

c. 5300 Data Management

This WBS element provides for the systematic maintenance and storage of all documentation and data related to the Ada 9X Project. It further provides for the distribution of data as required.

d. 5400 Meeting Support

This WBS element provides for the technical support required in planning, preparing, conducting and reporting on formal Ada 9X Project meetings.

e. 5500 Administrative Support

This WBS element provides for the administrative support required to execute the Ada 9X Project Plan including activities related to: organizing and conducting workshops; preparing correspondence, reports and presentations; and the successful operation of a project office.

VI. SCHEDULE

Figure 4 depicts the master schedule.

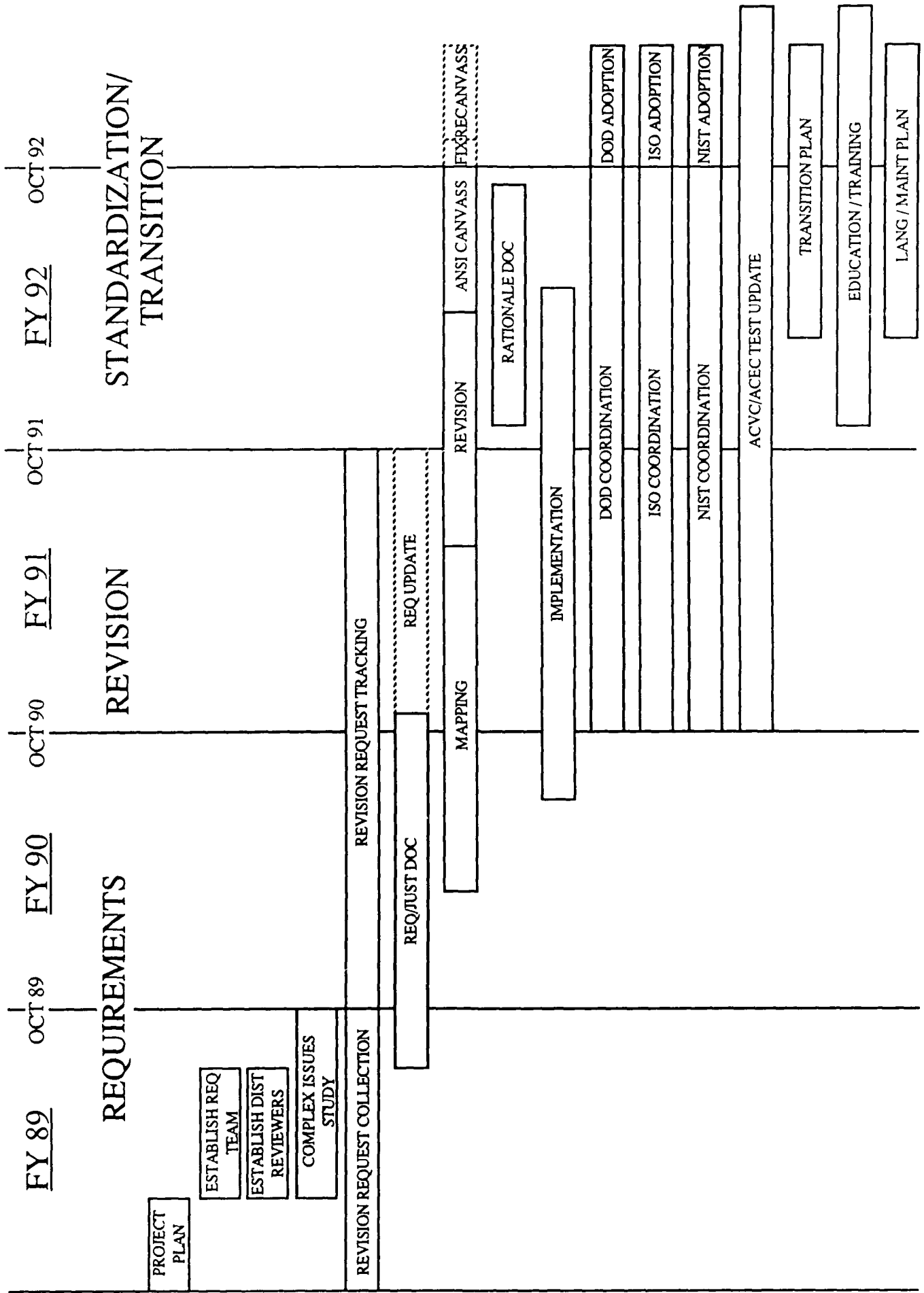


FIGURE 4. ADA 9X PROJECT SCHEDULE

VII. REFERENCES

- (1) Ada Board's Recommended Ada 9X Strategy, Ada Board Report, Office of the Under Secretary of Defense for Acquisition, Washington, D.C., September 1988.
- (2) Ada Language Commentaries, Vols 1 & 2, Ada Joint Program Office, Washington, D.C., Defense Technical Information Center Report AD A197 564, AD A201 024, September 1987, June 1988.
- (3) Reference Manual for the Ada Programming Language, ANSI/MIL-STD-1815A, US Department of Defense, Government Printing Office Report 008-000-00394-7, February 1983.
- (4) Ichbiah, J.D., Barnes, J.G.P., et al., Rationale for the Design of the Ada Programming Language, Defense Technical Information Center Report AD A187 106, 1987.
- (5) ANSI Guide to the Canvass Method, Draft, American National Standards Institute, New York, October 1988.
- (6) Procedures for the Development of American National Standards, American National Standards Institute, New York, September 1987.
- (7) Goodenough, J.B., The Ada Compiler Validation Capability Implementer's Guide, Version 1, SofTech Inc., Defense Technical Information Center Report AD A189 647, December 1986.
- (8) Defense Standardization and Specification Program Policies, Procedures, and Instructions, Office of the Under Secretary of Defense for Research and Engineering, Washington, D.C., DOD 4120.3M, August 1978, Change 5 - April 1987.
- (9) Lee, J.A.N., "A Briefing on Information Processing Standards in the International Arena," Prepared for the Institute for Defense Analyses, Washington, D.C., October 1983.

APPENDIX A

AJPO Ada 9X Announcement/Revision Request Form



OFFICE OF THE DIRECTOR OF
DEFENSE RESEARCH AND ENGINEERING

WASHINGTON, DC 20301

(R&AT)

October 20, 1988

Dear Ada Colleagues:

The Ada Joint Program Office (AJPO) has initiated the process for revision of ANSI/MIL-STD-1815A in accordance with Department of Defense (DoD) and American National Standards Institute (ANSI) procedures. The revised standard, commonly called "Ada 9X," will be developed in a manner that encourages broad input and review from both DoD and non-DoD sources, including the international standards community.

The federal advisory committee Ada Board provided recommendations to the AJPO regarding Ada 9X ("Ada Board's Recommended Ada 9X Strategy," September 1988). Currently, a formal Ada 9X project plan is under development. To assist the AJPO in the Ada 9X effort, Ms. Christine Anderson has been designated as the Ada 9X project manager. She has received the full support of the Air Force Armament Laboratory at Eglin Air Force Base, Florida in this endeavor.

In order to expedite the process, the AJPO is initiating the collection of revision requests at this time. Requests should be focused on language changes that have significant utility to a wide group of Ada users. All requests must be accompanied by sound, well articulated justifications. Ada commentaries previously approved by the AJPO will automatically be considered during this revision process and need not be resubmitted. All requests should be submitted in accordance with the attached format. Requests should be sent either via electronic mail to Ada9X@ajpo.sei.cmu.edu or via surface mail to:

Ada Joint Program Office
Ada 9X Project
Room 3E114, Pentagon
Washington, D.C. 20301-3080

All requests will be made available to the public via electronic means through the Ada Joint Program Office.

Sincerely,

A handwritten signature in cursive script that reads "Virginia L. Castor".

Virginia L. Castor
Director
Ada Joint Program Office

Attachment:
(Ada 9X - Revision Request Format)

January 1989
Revised Form
(Previous version will
also be accepted)

**Ada 9X
REVISION REQUEST FORMAT**

(Please submit one request per form)

DATE: Provide date that the request is prepared.

NAME: Provide name of the individual who has prepared the request.

ADDRESS: Provide the name of the individual's organization and mailing address, including an e-mail address, if applicable.

TELEPHONE: Provide telephone number of individual. If request is from outside the United States, please include the appropriate country and city codes.

ANSI/MIL-STD-1815A REFERENCE (Section, Paragraph Number): If no chapter is particularly relevant, please so state.

TITLE: Provide a short title or key words characterizing the request.

PROBLEM: Briefly state the problem. Indicate the most critical aspects to be kept in mind for arriving at a solution, particularly if only a partial solution is possible.

IMPORTANCE: Choose one of the following ratings to describe the importance of the request with respect to the overall Ada community, and discuss the consequences if the request is not satisfied by the revision.

ESSENTIAL: The revised standard is unlikely to be accepted if this revision request is not supported.

IMPORTANT: Nice to have but not essential. Should be supported if minimum negative impact to implementations.

ADMINISTRATIVE: Technical correction that makes the standard more consistent with the design intent or less subject to misunderstanding.

CURRENT WORKAROUNDS: Provide specific examples of workarounds currently being used that allow partial solution to the problem.

POSSIBLE SOLUTIONS (Optional): Discuss possible solutions for addressing the stated problem.

Submit completed form to:

The Ada Joint Program Office
ATTN: Ada 9X Project
Room 3E114, Pentagon
Washington DC 20301-3080

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for Public Release; Distribution is unlimited.	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S)		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION Air Force Armament Laboratory	6b. OFFICE SYMBOL (If applicable) FXG	7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State, and ZIP Code) Eglin AFB FL 32542-5434		7b. ADDRESS (City, State, and ZIP Code)	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Ada Joint Program Office	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code) 3E114, Pentagon Washington, D.C. 20301-3081		10. SOURCE OF FUNDING NUMBERS	
		PROGRAM ELEMENT NO. 63756D	PROJECT NO.
		TASK NO.	WORK UNIT ACCESSION NO.
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12. PERSONAL AUTHOR(S) Christine M. Anderson			
13a. TYPE OF REPORT Interim	13b. TIME COVERED FROM Oct 88 TO Dec 88	14. DATE OF REPORT (Year, Month, Day) January 1989	15. PAGE COUNT 42
16. SUPPLEMENTARY NOTATION			
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FIELD	GROUP	SUB-GROUP	
		Ada, Ada 9X, language revision	
19. ABSTRACT (Continue on reverse if necessary and identify by block number)			
<p>This report constitutes the Ada 9X Project Plan which outlines the approach for the revision of ANSI/MIL-STD-1815A, the Ada programming language. The overall goal of the Ada 9X Project is to revise the standard to reflect current essential requirements with minimum negative impact and maximum positive impact to the Ada community. The Ada 9X process is a revision and not a redesign and should be viewed as a natural part of the language maturation process. The Ada 9X Project is sponsored by the Ada Joint Program Office and managed by the Ada 9X Project Office at the Air Force Armament Lab Eglin Air Force Base, Florida.</p>			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL Christine M. Anderson		22b. TELEPHONE (Include Area Code) (904) 882-2961	22c. OFFICE SYMBOL AFATL/FXG