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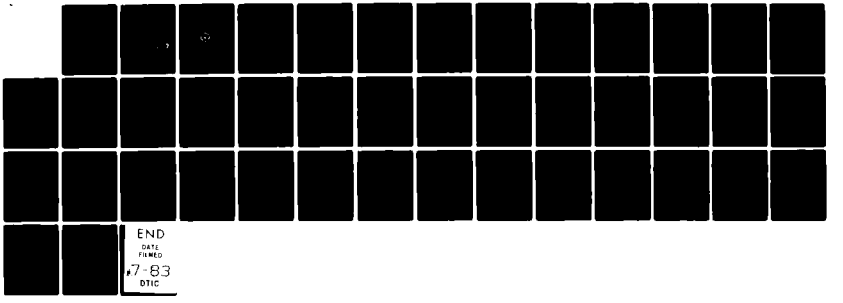

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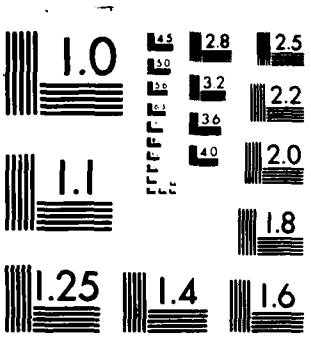

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This document identifies the scope, sub-objectives and strategies designed to provide the conceptual appraoch for accomplishment of the STARS Program objectives in the acquisition functional task area. Its main purpose is to help guide the implementation planning process.

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SOFTWARE TECHNOLOGY FOR ADAPTABLE, RELIABLE SYSTEMS (STARS) FUNCTIONAL TASK AREA STRATEGY FOR ACQUISITION

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FOREWORD

This strategy document is one of eight functional task area strategies produced by the STARS Joint Task Force. All of the documents produced by the Task Force, including the general STARS Program Strategy document, are listed in the STARS Joint Task Force Report.

This document identifies the scope, sub-objectives and strategies designed to provide the conceptual approach for accomplishment of the STARS Program objectives in the acquisition functional task area. It identifies and describes the high-level activities, products and capabilities. In order to provide full understanding, background and rationale material is sometimes covered that is also in STARS Program Strategy.

These functional task area strategy documents do not attempt to delineate the detailed plans, costs and procedures for bringing the proposed products and capabilities into being and do not identify the form of the particular projects that will undertake the work nor the organizations in which the work will be accomplished. Instead, these strategies are intended to guide the process of such implementation planning and accomplishment.

Indeed, because of the high degree of linkage among the functional task areas, implementation plans and acquisitions may well combine related capabilities and products across areas. Individual projects may tackle only part of one subtask from a functional area or several subtasks from several functional areas.

Thus, this functional task area strategy describes broad, achievable requirements for accomplishing the relevant STARS objectives. Its main purpose is to help guide the implementation planning process.

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1.0 OVERVIEW

1.1 Scope of Task Area

The scope of the acquisition task area encompasses the entire spectrum of the acquisition process as applied to mission critical computer resources including systems, software, and related technologies. Additionally it includes a direct linkage to all of the other STARS program task areas.

1.2 Purpose

The purpose of this task area is to improve existing acquisition procedures, regulations, business practices and incentives relating to software acquisition, and to remove impediments in the acquisition process currently hindering efficient software development and support.

1.3 Goals and Objectives

The specific goals and objectives of the Acquisition Task Area are the improvement of all business and contract related policies and practices, attainment of a higher degree of uniformity in the application of acquisition policies and practices; and an improvement of the tools associated with the acquisition of systems and software in order to streamline, simplify and accelerate the acquisition process; and to foster a more effective DoD contractor relationship. Major emphasis is to be placed on computer software associated with "mission critical" applications and embedded computer systems, and the integration of this software with the surrounding hardware.

1.4 Strategy

The overall Acquisition Task Area has been divided into five major task elements. Tasks 1, 2 and 5 are critical to the success of the acquisition area task. Tasks are identified as follows:

1.4.1 Task 1. Define Acquisition Process and Identify Issues

This task should systematically identify opportunities to improve the system acquisition process. This task would identify specific issues, regulations, solicitation provisions and contract clauses which impede or impact acquisition effectiveness and timeliness of mission critical software acquisition.

1.4.2 Task 2. Implement Acquisition Improvements

The purpose of this task should be to provide an orderly approach for instituting both near-term and long-term improvements to streamline and accelerate the acquisition process. It would address the application of new contracting and business approaches and new technology to support and improve, in the near term, the acquisition process. This task would provide a means for incorporating in the long term, new methods and technological breakthroughs in the acquisition of mission critical software systems. Recommended improvements resulting from the Task 1 efforts as well as suggested improvements from other sources within the Government/Industry/Academic Community would be acted on under this task.

1.4.3 Task 3. Impact of New Technology on Systems

The purpose of this task should be to determine the impact of new technology on systems being acquired. This would be a three-part task focusing on current and emerging technology for systems being acquired. The objective of this task would be to derive detailed reward/risk factors; a descriptive summary of lessons learned, and a model for transitioning software related technology into acquisition programs.

1.4.4 Task 4. New Technology for System Acquisition Process

The objective of this task should be to survey and analyze the potential impact that emerging technology may have on improving the acquisition management process. Those technologies that offer potential savings and can improve the process should be implemented and assessed. The success/failure impact that the technology has on improving the system acquisition process should be measured and evaluated.

1.4.5 Task 5. Establish a Software Acquisition Panel

This task should assist in establishing a Software Acquisition Panel for implementing measures to improve the Defense Software acquisition process and to provide uniform software acquisition policies and procedures across the military services.

1.5 Linkage to Other Task Areas

Linkages between most of the Software Initiative Tasks and mutual impacts should be identified. Section 3.0 presents linkages between the Acquisition Task and these other tasks, as viewed by the Chairman, of all other task areas as a result of the Raleigh Workshop.

2.0 PLAN DETAILS

2.1 A. Define Acquisition Process and Identify Issues (Task 1)

2.1.1 Purpose

The purpose of this task would be to systematically identify opportunities to improve the system acquisition process. The task should be structured into a four-step process for identifying specific problems and challenges impacting on effective acquisition of mission critical software:

a. Review the system acquisition process as implemented in actual programs and policy guidance and regulations including current contracting vehicles and incentive structures.

b. Identify the specific activities within the system acquisition process which require and involve software consideration and requirements.

c. Identify points at which the system acquisition process impacts software acquisition and life cycle

d. Identify specific issues and opportunities to improve the acquisition process.

2.1.1.1 Subtask A.1 Definition. Review the system acquisition process so as to consider and understand the fundamental structure within which mission critical software is developed and acquired. The majority of this software is acquired as an integral part of the system/subsystem acquisition process. This subtask should consider the defined system acquisition process from the perspective of scope, applicability, process, and variations of implementation.

a. Scope. The system acquisition process start with the initial mission element need statement (MENS) or other equivalent operational capability requirements statement. The process continues through program go ahead, direction, and development to operational deployment and life cycle support. This total span would be considered for impact on software acquisition.

b. Applicability. The System Acquisition Process is applied in a wide range of systems which include software. These range from systems of systems, to functional subsystems such as radar, sonar, communications, fire control, electronic warfare (EW) and other systems. In addition, major modifications to existing defense systems are implemented within the system acquisition process. This subtask would examine this wide range of applications to identify opportunities for improving the process.

c. Process. The System Acquisition Process consists of several phases and steps within these phases. This subtask would formulate a model of the phases and steps to focus on the identify the activities and products of this process which impact the software acquisition and development.

d. Terms. A set of uniform acquisition definitions and terms would be identified and applied to provide consistent and effective communication of the need and opportunities to improve the process. It is intended that this specific activity would implement the recommendations of the Defense Science Board (DSB) regarding promulgation of uniform Mission Critical Computer Resource (MCCR) terminology.

2.1.1.2 Subtask A.2 Impacts of Acquisition Process. This subtask should closely review the System Acquisition Process, as defined and considered in Subtask A.1, for impacts on the software acquisition process and activities. The purpose of this subtask would be to systematically identify the decision points and specific decisions and evolving requirements definitions which offer opportunities to incorporate a software perspective in the process. A review for appropriateness, adequacy and effectiveness of the various software policies and their implementation by the Defense Acquisition Regulation (DAR) and Federal Acquisition Regulation (FAR), DoD Directives, Instructions, and including Service implementing regulations and procedures. This review should specifically include examination and consideration of DoD rights in data and computer software clauses and data acquisition approaches. This is a necessary step to avoid missing otherwise invisible opportunities to improve the defense software acquisition process. The need for both earlier involvement and

operational/support considerations may be surfaced in this manner. Further, this review should include a review of current approaches to protection of software including proprietary, classification, and foreign export issues. In particular, STARS needs early recommendations in this area for its own use.

2.1.1.3 Subtask A.3 Software Activities. The intent of this subtask should be to identify and define the software activities which must be completed as part of the system acquisition process. Contractual vehicles, policies, regulations and standards, and the implementation thereof,* management and contracting acquisition tools and data bases that could be expanded to improve the software acquisition process would be identified and assessed. This subtask should review the findings and recommendations listed in the Final Report of the Defense Science Board Task Force on Embedded Computer Resources (ECR) Acquisition and Management dated November 1982. Those problems, deficiencies, impediments, and restrictions which are identified would constitute candidate areas where actions can be directed.

2.1.1.4 Subtask A.4 Specific Issues and Opportunities. The candidates identified in Subtask A.3 should be expanded into specific issues and opportunities for improvement. These issues and opportunities would be considered and expressed in terms of potential payoff for changing the process. Additionally, where applicable, recommendations would be prepared to institute contract incentives to improve productivity and software engineering practices, to reward contractors for developing and using appropriate tools and for developing a high quality software product.

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*It should be noted that each service implements these policies and regulations in their own way under the broad policy guidance of DoD Directive and Instructions.

2.2 B. Implement Acquisition Improvements (Task 2)

2.2.1 Purpose

The purpose of this task should be to provide an orderly approach for instituting both near-term and long-term improvements in the acquisition process. It would address the application of new contracting and business approaches and new technology (tools and methods).

2.2.2 Strategy

This task would review both the candidate areas for improvement developed under Task 1 and suggested improvements received from other sources within the government, industry, and the academic community. An essential element of this review would be to identify which improvements are attainable within the current acquisition policies and regulations,* and which improvements are not.

Alternative solutions for each candidate opportunity would be identified and evaluated. The "best" candidate should be selected, and measurement criteria should be identified to evaluate the impact of implementing the change. An overall plan would be established for instituting each change which identifies cost, schedule and the process for implementing the improvements. Each plan must also provide a means for assessing the results of implemented changes and using the information acquired to adjust the process as necessary.

It must be noted that the acquisition process would be incrementally changed due to changing software technology and its impact on information management. The need for change would be recognized by government observation of the results of reduced acquisition schedules and by industry recommendations for changes that would

*Improvements which are possible through proper education of either or both government and industry personnel.

improve both software quality and productivity. An approach to protection of software should be established.

2.2.3 Examples of Candidate Near-Term Improvements

1. The government has Government Furnished Property/Government Furnished Equipment (GFP/GFE) software tools applicable and already being used on procurements. It is now practical to send a magnetic tape containing the GFP/GFE tools with the RFP. This would result in more accurate cost and schedule responses since the contractor could perform a preliminary evaluation of the tools during the proposal effort. Enhanced or improved tools might subsequently be provided GFP/GFE throughout the contract. Specific examples of GFP/GFE are as follows:

   a. Jovial compiler

   b. Software development tool sets (linkers, loaders).

2. Rapid prototyping of new, first-time, software could be used very early in the acquisition phase. This could be before or concurrent with the concept definition phase. The payoff would be a quick refinement of the requirements and an indication of feasibility and risk. The acquisition approach would be parallel awards based on quick reaction proposals an evaluations. The revolutionary concept would be that the prototype software would be truly a throw-away item (similar to many hardware prototypes).

3. Innovative acquisition strategies have already been used in contracts issued under the DoD-manufacturing Technology Program (MANTECH) and the Industrial Modernization Incentive Program (IMIP). These new, innovative contracting strategies and business approaches should be tested, evaluated and publicized and expanded to include the acquisition of software. Some of these strategies involve shared cost, innovative licensing, and protection of both the governments and industry's rights.

4. Increased emphasis could be directed to have the Program Managers address the systems and software engineering issues during the DSARC process on major systems.

5. Expanded education of the Contracting Community (Contracting Officers, Data Managers, Defense Contract Administrative

Services (DCAS) etc.) on software acquisition concerns and issues could immediately help to improve and accelerate the acquisition process.

2.2.4 Examples of Candidate Long-Term Improvements

1. As GFP/GFE tool sets become increasingly available, contract language needs to better convey their intended use. In the case where the government has a logistic plan for using a specific tool set for procurred software: the RFP should specify the tool set or GFP/GFE; the contractor should be given the option of using the GFP/GFE tools or using "in-house" tools for development; the RFP and contract should call out that final delivery (block deliveries) will be made using the GFE/GFP tool set. This would provide government logistic capability and maximize contractor productivity.

2. Traditional request for proposals (RFP) call for a software Preliminary Design REview (PDR) 30 to 90 days after award. When Ada and its associated methodologies are used, more "front end" time is required. There will, however, be a long-term payoff for the additional "front end" effort. The RFP and contract need to reflect this fact.

3. A review and modification of IR&D rules to encourage useful software projects which incorporate new methods and technological breakthroughs such as Ada, VHSIC, Artificial Intelligence (AI), and support environments can be used to improve the software acquisition process.

2.3 C. Access Impact of New Technology on Systems (Task 3)

2.3.1 Purpose

The purpose of this task should be to determine the impact of new technology on systems being acquired. This would be a three-part task focusing on current and emerging technology. The objective of this task would be to obtain:

1. A detailed compendium of reward/risk factors associated with emerging technology.

2. Descriptive summaries of lessons learned while applying current technologies.

3. A model for transitioning software related technology into new acquisition programs.

2.3.1.1 Subtask C.1. Conduct analyses of emerging technologies to determine "reward/risk factors" for acquisition programs preparing to use these technologies. The purpose of this segment would be to assess new technology rewards in terms of: shorter development period, increased programmer productivity, improved software quality and reliability, lower life cycle cost, enhanced software supportability and adaptability, and other factors. In liability, start-up/front end cost, support availability, and other factors will be identified and quantified.

The following are a partial list of emerging technologies which are candidates for this research:

a. Ada/Ada environments

b. VHSIC and near VHSIC products

c. Artificial intelligence and associated languages, e.g., PROLOG

d. New computer architectures

The planned output would include a compilation of reward/risk factors. * The resulting data would be provided to government and industry for use in future acquisition/development strategies and system design trade studies.

2.3.1.2 Subtask C.2. Conduct research on a number of ongoing programs using state-of-the-art technology to document acquisition lessons learned.

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*The list of reward/risk factors must be continually updated and kept current in order to be a useful document.

The following technologies are candidates for this subtask research:

a. Design automation: automated software design programs, computer assisted design, computer assisted manufacturing and other evolving computer assisted functions.

b. Networking: assess success/failure of system control philosophies, protocols, contention avoidance approaches, textual/graphic information optimization and other features.

c. Distributed processing: identify architectural constraints, system control features, fail soft, fail safe methodologies, and system optimization.

d. Mass storage technologies: describe benefits, spectrum of use, supportability, durability, maintainability, reliability, and other features.

e. Transportable software: define specification features enhancing transportability, outline documentation requirements, and describe approaches to reduce risk when reusing applications and support software.

2.3.1.3 Subtask C.4. Conduct research on past programs for examples of highly successful/unsuccessful software technology transfer. Document factors enhancing the technology transfer process.

Using information gathered in the above research, develop model contracts for software technology transition. Disseminate this information to interested government agencies and industry.

2.4 D. Improve Acquisition By Using New Technologies (Task 4)

2.4.1 Purpose

Emerging and available technologies should be analyzed to determine their applicability to the process of systems/software acquisition. Examples of the application of these technologies to the acquisition process are:

1. Electronic information transfer (in lieu of hard copy)

   a. Proposals

   b. Technical order data

   c. Engineering data

   d. Software documentation.

A survey should be conducted of the automated management tools now available. Determine the feasibility of integrating these tools to operate as a single data base for a given system being acquired. These tools include, but are not limited to:

Pert

Gantt

CSCS/C

Software releases

Hardware releases.

Several actual system acquisition programs should be instrumented. Instrumentation should be applied from DoD requirements generation, at least through acceptance/delivery of the first production item. Instrumentation well into the system life cycle would be desirable.

The data obtained from such instrumentation would be used to derive quantitative parameters useful in the system acquisition process. Examples are:

- IV&V--is the real value worth the cost?
- Can success/failure of a system acquisition process be quantified? Predicted? When?
- Cost effectiveness of new DARs & FARs changes.
- Software productivity measurements.

- o Software cost modeling effectiveness/accuracy.
- o Software error disposition (how many are fixed, forgotten, worked around, not discovered until after system is fielded?)
- o Ultimate compliance of the produced system with the original performance specification (system specs.)

An appropriate DoD office/activity should be identified to act as a focal point for both the implementation and assessment of the success/failure of efforts to improve the systems acquisition process by application of new technology.

2.5 E. Establish a Software Acquisition Panel (Task 5)

It is recommended that an Acquisition Panel be established by the Under Secretary of Defense for Research and Engineering to serve as the DoD focal point for implementing measures to improve and unify policy, practices, and procedures related to the acquisition of Defense systems employing Mission Critical Computer Resources. It is also recommended that the Acquisition Panel be responsible to the OSD entity responsible for overall management of Mission Critical Computer Resources (MCCR) within the Department of Defense (such as the Defense Computer Resources Board proposed in the current draft of DoD Directive 5000.29). It is recommended that this panel be composed of members representing various DoD elements significantly impacted by or having significant impact upon Defense software acquisition. A proposed organizational arrangement depicted in Figure 1 is discussed below in detail.

It is intended that the Software Acquisition Panel facilitate sound and logical business and contract practices associated with all facets of Defense software acquisition; and to provide appropriate incentives to encourage enhanced contractor participation, productivity, software quality, and software reliability. In order to implement these objectives, the Acquisition Panel would recommend

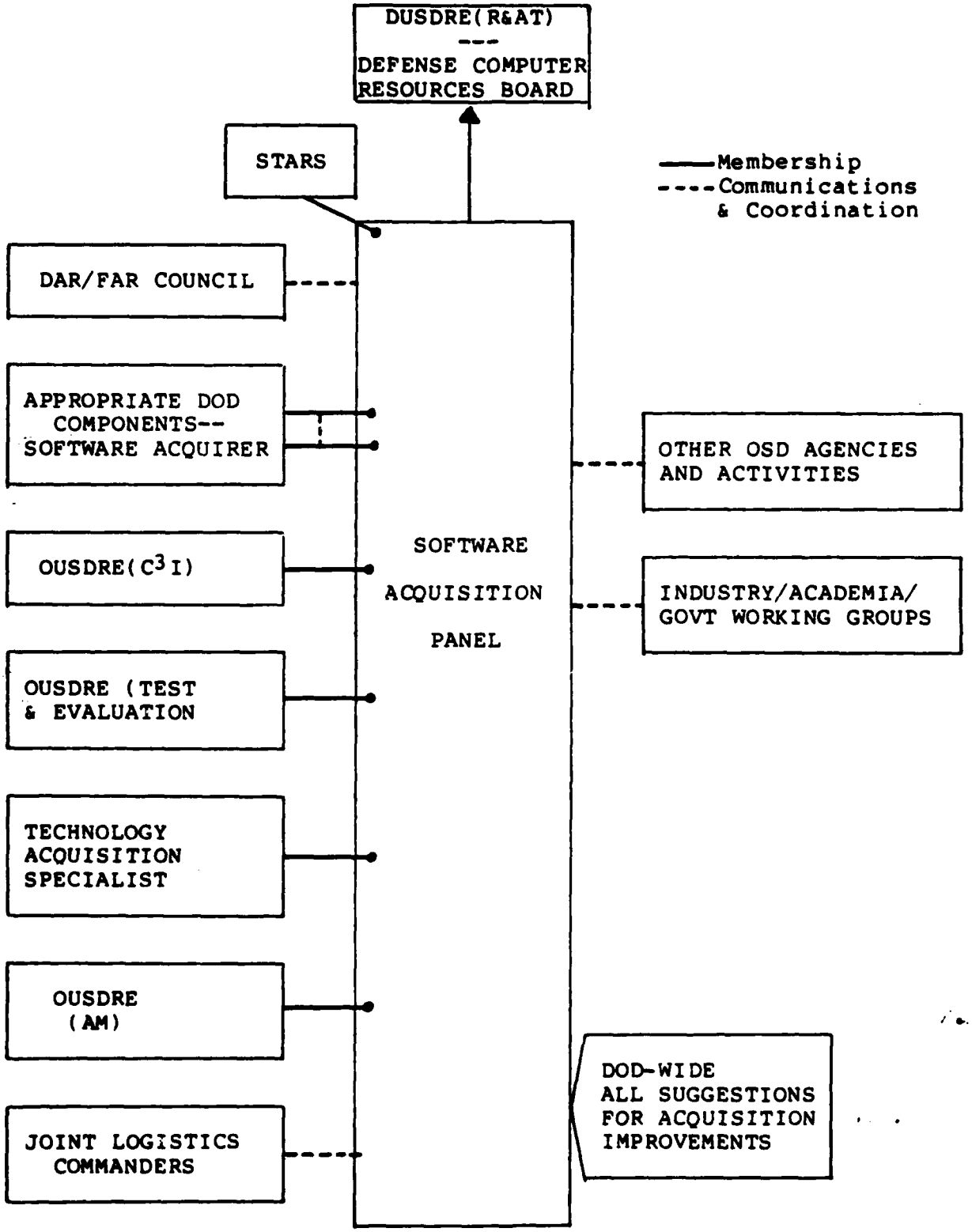


FIGURE 1. Software Acquisition Panel

appropriate acquisition policy, contract incentive mechanisms, and related guidelines to encourage contractor participation in Defense software efforts; encourage use of modern software practices and appropriate tools; encourage development of reusable software components; and facilitate optimization of life cycle costs.

2.5.1 Responsibilities of the Acquisition Panel

The Software Acquisition Panel would be responsible for:

a) Identifying ways in which the Defense System Acquisition Review Council review process could be strengthened and made more effective with regard to Defense software acquisition;

b) Identifying those aspects of the Defense Acquisition Regulation (DAR) [or its successor Federal Acquisition Regulation (FAR)] which are considered to be an impediment to achieving the goals and objectives of the software initiative and its related acquisition goals and recommending appropriate changes;

c) Identifying and recommending appropriate actions for improving Defense software acquisition procedures, processes, and related directives or instructions.

d) Management of software acquisition tasks as well as other software initiative efforts impacting the software acquisition process.

Recommendations or requests for implementation of specific improvement measures would be forwarded by the Acquisition Panel to the appropriate implementation authority after appropriate coordination with the OSD MCCR management entity discussed above.

It is recommended that the Acquisition Panel membership include a representative from each appropriate Defense component acquisition activity principally responsible for embedded computer systems software acquisition; a STARS project office member; a member from the Office of the Under Secretary of Defense for Research and Engineering (OUSDRE) responsible for Command, Control, Communications, and Intelligence (C^3I); a member from the office of the

Director, Defense Test and Evaluation; a technology acquisition specialist member from the office of the Director, Defense Test and Evaluation; a technology acquisition specialist member approved by the ADUSDRE(R&AT); and a productivity specialist member approved by the ADUSDRE(AM-Productivity).

2.5.2 Establishment of Acquisition Panel Working Groups

It is considered essential that the Acquisition Panel should establish and maintain a dialogue with representatives of various DoD, government, academia and user activities which are especially involved or impacted by the Defense software acquisition process, and it is further recommended that this dialogue be facilitated by the Acquisition Panel establishing various working groups to work with and support the Acquisition panel as follows:

2.5.2.1 Industry/Academia/Government Wroking Groups. It is considered essential that industry/academia/government working groups be established related to relevant areas of acquisition activity to facilitate review and comment when appropriate, and to provide recommendations from those communities to be readily considered. Membership in one or more of these working groups should include a representative from the Defense Systems Management College (DSMC). It is also recommended that interested individuals and private organizations, industry associations, and representatives from other government agencies be solicited for such participation.

2.5.2.2 User Working Groups. It is recommended that specialized working groups be established specifically to address concerns and requirements of the software end user and the MCCR acquisition communities.

2.5.3 Coordination with the STARS Project Office

The Acquisition Panel should work in coordination with the STARS program office regarding STARS identified task efforts, and task efforts carried out by the Acquisition Panel should be funded by the STARS office. it is recommended that the Acquisition Panel be responsible for management and oversight of all acquisition related activities.

2.5.4 Coordination with the Joint Logistics Commanders

It is recommended that the Acquisition Panel maintain close liaison and coordination with the efforts of the Joint Logistics Commanders regarding their efforts to improve the acquisition of Defense software. It is further recommended that the representatives on the Acquisition Panel from each service principal acquisition activity also serve as the liaison with the Joint Logistics Commanders/Joint Policy Coordinating Group for Computer Resources Management.

2.5.5 Coordination with the DAR/FAR Council

Because of the importance of ensuring effective coordination between the Acquisition Panel and those offices responsible for DoD acquisition policy, it is recommended that the Acquisition Panel coordinate closely with the Defense Acquisition Regulation (DAR) council and the Federal Acquisition Regulation (FAR) council, and with other appropriate offices within OSD. To this end, the Acquisition Panel should provide a representative to fully participate in DAR/FAR council and subcommittee deliberations in matters affecting Defense software acquisitions. It is further recommended that proposed changes to the Defense Acquisition Regulation (DAR) the fully coordinated with the Acquisition Panel.

2.5.6 Important Considerations and Recommendations

It is important to understand that the Software Acquisition Panel has, in the above discussion, been considered as limited to "software" to maintain literal consistency with the scope of the software initiative. However, in view of the complex actual interdependencies and interaction between software and embedded computer hardware in all phases of mission critical computer resources development this limitation is considered to be inappropriate and artificial. Therefore it is recommended that serious consideration be given to broadening the scope of responsibility of the Acquisition Panel from that of "software acquisition" to that of "mission critical computer resource acquisition".

It is further recommended that the Acquisition Panel specifically undertake, on a priority basis, the following measures:

a) ensure that a uniform definition of software acquisition terminology is promulgated;

b) investigate, define, and implement appropriate contract incentives, guidelines, and business arrangements;

c) define and implement a contractor Work-Breakdown Structure reporting and control system specialized for Defense Software acquisition requirements;

d) foster an improved understanding within the contracting community regarding complexities involved in acquisition of Defense software; and

e) collect cost and other data necessary to maintain improved understanding and oversight of acquisition of Defense software, and to derive and validate appropriate Defense software cost estimation predictive models.

f) review for appropriateness, adequacy and effectiveness the implementation of various software policies and their implementation in the Defense Acquisition Regulation (DAR) and Federal Acquisition Regulation, DoD directive and instructions, and implementing regulations and procedures. This review should specifically include examination and

consideration of DoD rights in data and computer software and acquisition approaches. Furthermore, because it is only through successful and effective acquisition of Defense software in the future that the goals and objectives of other software initiative task areas would be fully realized, it is recommended that the Acquisition Panel be established as soon as possible, and its efforts undertaken on a priority basis.

3.0 LINKAGES TO OTHER TASK AREAS

3.1 General Statement

The Acquisition Task Area would be directly linked to all of the other task areas within the STARS Program. Additionally, there would be major cross links with other task areas in the Software Acquisition Task Area. In general, the Acquisition Task Area would receive recommendations, proposals and study results from the other task areas for use in improving the total life-cycle acquisition process. As required, other task areas would work with the Acquisition Task Area in assuring the correct implementation of proposed changes to the software acquisition process.

3.2 Specific Relationships

At the present time, the specific relationships between the Acquisition Task Area and the other task areas might be split into two major categories: a generic set of relationships, and a unique set of relationships. Examples are as follows:

1. Generic:
    a. Incentive structures - general.
    b. Incentive structures - for different contractual relationships.
    c. "Model" contract requirements.
    d. A standardized Statement of Work (SOW).
    e. A definition of all aspects of the software acquisition process.
2. Unique
    a. Inputs on manpower and training needs for the Human Resources Task Area.

b. Identification of measurement/metric parameters for use by the Measurements Task Area.

3.3 STARS Program R&D Products

The Acquisition Task Area should act as the program focal point for "field" test and evaluation of all acquisition-related products generated by the other task areas. Results of the actual testing in the field (that is at such on-site locations as the AFPROs, NAVPROs, and DCASs, etc.) would subsequently be feedback to the specific task area for further study and analysis, modifications, updates, etc., as required.

4.0 EFFORT

4.1 Effort By Activities

1. The support efforts identified in Section 2 will be performed by contractors yet to be determined.

2. Acquisition-related research tasks will build upon the current technology baseline and the applicable outputs of the software initiative workshop. Additional tasks will be identified as the end of FY83. It is expected that these tasks will be formulated from multiple sources, including the initial meetings of the Acquisition Oversight Panel.

4.2 Schedule/Milestones (Proposed)

Figure 2 presents a milestone chart for the five Acquisition Area tasks. Specific events associated with operations of the Acquisition Panel are given below.

EVENTS	FY83
1. Acquisition Panel Charter Prepared	Apr
2. Acquisition Panel Membership Established.	Apr
3. 1st Meeting of Acquisition Panel.	TBD
4. 1st FY Review Report Acquisition Process Findings.	Sept
5. 1st FY Review Report Technology Transfer and Insertion.	Sept
6. 1st FY Planning Document Prepared	Sept
7. Acquisition Panel Software Initiative "Background" Document Generated	Sept

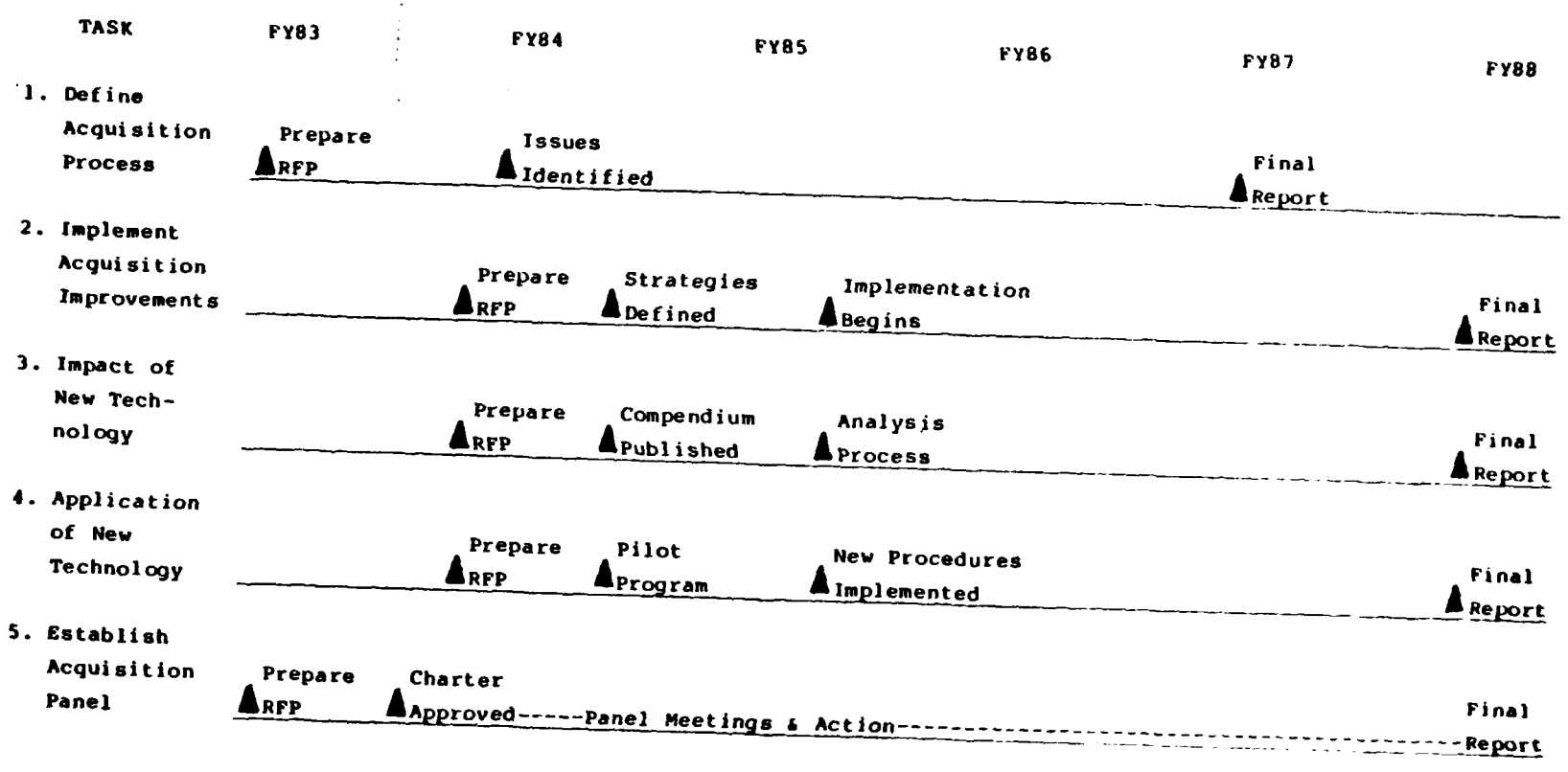


FIGURE 2. Milestone Chart for Acquisition Area Tasks

EVENTS	FY84 to FY88
1. Periodic Meetings of Acquisition Panel (frequently to be established)	TBD
2. Priority Action Acquisition Process Issue Report	As Required
3. FY Review Report of Acquisition Process Findings	Annually/FY
4. FY Review Report Technology Transfers and Insertions	Annually/FY
5. Fiscal Year Planning Document	September of each FY

5.0 OPPORTUNITIES

5.1 Review Ongoing Initiatives and Programs Such as the Following

DoD's Acquisition Improvement Initiatives to improve operational readiness of our weapon systems, the IDA/OSD R&M Improvement Study that addresses artificial intelligence, and the Industrial Modernization Incentives Program that is addressing software productivity.

5.2 Information Resources

1. Embedded Computer Resources References (see references)

2. GAO
   1980 ADP Bibliography
   1981/2 ADP Bibliography Topics (unpublished)
   GAO Report: "Wider Use of Better Computer Software Technology Can Improve Management Control and Reduce Costs" dated April 29, 1980.

3. Deputy Secretary of Defense Memo dated April 30, 1981: "Improving the Acquisition Process."

4. DoD "Embedded Computer Resources Standardization Program Plan," (Draft) dated September 15, 1982.

5. "Usability of Military Standards for the Maintenance of Embedded Computer Software," Normal F. Schneidewind, June 1982.

5.3 Current Activities

1. Joint Logistic Commanders, Joint Policy Coordination Group on Computer Resources Management (JLC, JPCG-CRM).

2. Electronic Industries Association (EIA) Review of Proposed ECRS Standards.

3. Embedded Computer Resources Standardization Program.

4. Industrial Modernization Program.

6.0 EMBEDDED COMPUTER RESOURCES REFERENCES

6.1 DoD Directives, Instructions and Standards

1. DoDD 4105.55, "Selection and Acquisition of Automatic Data Processing Resources," dated 19 May 1972, incl. Changes 1,2, and 3

2. DoDD 4120.3, "Defense Standardization and Specification Program," dated 10 February 1979

3. DoDD 4120.18, "Metric System of Measurement," dated 28 January 1980

4. DoDI 4120.20 "Development and Use of Non-Government Specifications and Standards," dated 28 December 1976

5. DoDD 4120.21, "Specifications and Standards Application," dated 9 April 1977

6. DoDD 4155.1, "Quality Program," dated 10 August 1978, incl. Change 1

7. DoDD 5000.1, "Major System Acquisitions" dated 19 March 1980

8. DoDI 5000.2, "Major System Acquisition Procedures," dated 19 March 1980

9. DoDD 5000.3, "Test and Evaluation," dated 26 December 1979

10. DoDD 5000.28, "Design to Cost," dated 23 May 1975

11. DoDD 5000.29, "Management of Computer Resources in Major Defense Systems," dated 26 April 1976, incl. Change 1 (being revised)

12. DoDI 5000.31, "Interim List of DoD Approved High Order Programming Languages (HOLs)," dated 24 November 1976 (Revision in final coordination)

13. DoDD 5000.37, "Acquisition and Distribution of Commercial Products (ADCP)," dated 29 September 1978

14. DoDD 5000.39, "Acquisition and Management of Integrated Logistic Support for Systems and Equipment," dated 17 January 1980

15. DoDD 5000.40, "Reliability and Maintainability," dated 8 July 1980

16. DoDI 5000.5x, "Instruction Set Architecture (ISA) Standardization Policy for Embedded Computers," (In final coordination)

17. DoDD 5010.12, "Management of Technical Data," dated 5 December 1968, incl. Change 1

18. DoDD 5010.19, "Configuration Management," dated 1 May 1979

19. DoDD 5100.40, "Responsibility for the Administration of the DoD Automatic Data Processing Program," dated 19 August 1975, incl. Change 1

20. DoDD 5200.28, "Security Requirements for Automatic Data Processing (ADP) Systems,"

21. DoDD 7920.1, "Life Cycle Management of Automated Information Systems (AIS)," dated 17 October 1978

22. DoDI 7920.2, "Major Automated Information Systems Approval Process," dated 20 October 1978

6.2 Army Documents

1. Assistant Secretary of the Army Policy Letter, subject: "Standardization of Embedded Computer Resources," dated 1 July 1980

2. AR 18-1, "Army Automation Management," dated 15 August 1980

3. AR 18-12, "Catalog of Standard Data Elements and Codes," dated 29 March 1974

4. AR 70-1, "Army Research, Development, and Acquisition," dated 1 May 1975

5. AR 70-10, "Test and Evaluation during Development and Acquisition of Materiel," dated 29 August 1975

6. DARCOM Reg. 70-16, "Management of Computer Resources in Battlefield Automated Systems," dated 16 July 1979

7. AR 70-27, "Outline Development Plan/Development: Plan/Army Program Memorandum/Defense Program Memorandum/Decision Coordinating Paper," dated 17 March 1975

8. AR 70-29, "Production Testing of DSA-managed Items," dated 27 May 1969

9. AR 70-37, "Configuration Management," dated 1 July 1974

10. AR 70-38, "Research, Development, Test, and Evaluation of Materiel for Extreme Climatic Conditions," dated 5 May 1969

11. AR 71-3, "User Testing," dated 8 March 1977

12. AR 310-3, "Preparation, Coordination, and Approval of Department of Army Publications," dated 20 December 1968

13. AR 310-25, "Dictionary of US Army Terms," dated 15 September 1975

14. AR 380-380, "Automated Systems Security," dated 14 October 1977

15. AR 700-127, "Integrated Logistics Support," dated 11 April 1975

16. AR 702-2, "Uniform Quality Control System," dated 3 December 1970

17. AR 702-3, "Army Materiel Reliability, Availability, and Maintainability," dated 15 November 1976

18. AR 702-4, "Procurement Quality Assurance," dated 3 August 1976

19. AR 750-1, "Army Materiel Maintenance Concepts and Policies," dated 1 April 1978

20. AR 1000-1, "Basic Policies for Systems Acquisition," dated 1 May 1981

21. Technical Bulletin 18-115, "Army Information Processing Standards (AIPS)," dated 3 July 1980

6.3 Navy Documents

1. SECNAVINST 3560.1, "Tactical Digital Systems Documentation Standards," dated 8 August 1974

2. SECNAVINST 5000.1A, "System Acquisition in the Department of the Navy," dated 17 November 1978

3. SECNAVINST 5200.32, "Management of Embedded Computer Resources in the Department of the Navy Systems," dated 11 June 1979

4. SECNAVINST 5231.1, "Management of Automated Data Systems Development," dated 25 February.

5. SECNAVINST 5233.1A, C-1, "Department of the Navy Automated Data System Documentation Standards," dated 30 August 1974

6. WS-8506, "Requirements for Digital Computer Program Documentation," dated 1 November 1971

7. TADSTAND 2, "Standard Requirements for Tactical Digital Computer Program Documentation," dated 1 November 1974

8. TADSTAND 3, "Standard Requirements for Inter-digital Processor Interface Documentation," dated 5 November 1974

9. TADSTAND 9, "Software Quality Testing Criteria Standard for Tactical Digital Systems," date 18 August 1978

10. TADSTAND A, "Standard Definitions for Embedded Computer Resources in Tactical Digital Systems," dated 2 July 1980

11. TADSTAND B, "Standard Embedded Computers, Computer Peripherals, and Input/Output Interfaces," dated 2 July 1980

12. TADSTAND C, "Computer Programming Language Standardization Policy for Tactical Digital Systems," dated 2 July 1980

13. TADSTAND D, "Reserve Capacity Requirements for Tactical Digital Systems," dated 2 July 1980

6.4 Air Force Documents

1. AFR 57-4, "Modification Program Approval," dated 15 December 1977, incl. Change 1; AFSC Sup. 1, dated 1 April 1974

2. AFR 65-3, "Configuration Management," revised 1 September 1974; AFSC Sup. 1, dated 25 July 1975

3. AFR 80-14, "Test and Evaluation," dated 19 July 1976; AFSC Sup. 1, dated 3 January 1977

4. AFR 122-9, "The Nuclear Safety Cross-Check Analysis and Certification Program for Weapon Systems Software," dated 22 October 1976; AFSC Sup. 1, dated 22 March 1977

5. AFR 122-10, "Nuclear Weapon System Safety Design and Evaluation Criteria," dated 27 November 1978

6. AFR 300-8, "Security Requirements for Automatic Data Processing Systems (ADPS)," dated 2 June 1974

7. AFR 300-10, "Computer Programming Languages," dated 15 December 1976

8. AFR 800-2, "Acquisition Program Management," dated 14 November 1977

9. AFLCR 800-12, "Acquisition of Support Equipment," dated 20 May 1974

10. AFR 800-14, V.I, "Management of Computer Resources in Systems," dated 12 September 1975; AFLC Sup. 1, dated 15 October 1976; AFSC Sup. 1, dated 8 August 1977; ESD Sup. 1, dated 8 August 1977

11. AFR 800-14, V.II, "Acquisition and Support Procedures for Computer Resources in Systems," dated 26 September 1975; AFLC Sup. 1, dated 18 October 1976; ESD Sup. 1, dated 25 November 1975

12. AFR 800-19, "System or Equipment Turnover," dated 27 May 1975

13. AFLCR 800-21, "Management and Support Procedures for Computer Resources Used in Defense Systems," dated 4 January 1980

14. AFR 800-28, "Air Force Policy on Avionics Acquisition and Support," dated 11 September 1978

6.5 Standardization Documents

1. DoD-STD-100C, "Engineering Drawing Practices," revised 22 December 1978; Notice 1, dated 30 April 1980

2. MIL-STD-109B, "Quality Assurance Terms and Definitions," dated 4 April 1969

3. MIL-STD-143B, "Order of Precedence for the Selection of Standards and Specifications," dated 12 November 1969

4. MIL-STD-470, "Maintainability Program Requirements (for Systems and Equipment)," dated 21 March 1966

5. DoD-STD-480A, "Configuration Control - Engineering Changes, Deviations and Waivers," dated 12 April 1978

6. MIL-STD-481A, "Configuration Control - Engineering Changes, Deviations and Waivers (Short Form)," dated 18 October 1972

7. MIL-STD-482A, "Configuration Status Accounting Data Elements and Related Features," dated 1 April 1974

8. MIL-STD-483 (USAF), "Configuration Management Practices for Systems, Equipment, Munitions and Computer Software," revised 1 June 1971; Notice 2, dated 21 March 1979

9. MIL-STD-490, "Specification Practices," revised 18 May 1972

10. MIL-STD-721B, "Definitions of Effectiveness Terms for Reliability, Maintainability, Human Factors and Safety," revised 10 March 1970

11. MIL-STD-756A, "Reliability Prediction," dated 15 May 1963

12. MIL-STD-757, "Reliability Evaluation from Demonstration Data," dated 19 June 1964

13. MIL-STD-785B, "Reliability Program for Systems and Equipment Development and Production," revised 15 September 1980

14. MIL-STD-1472B, "Human Engineering Design Criteria for Military Systems, Equipments and Facilities," revised 10 May 1976; Notice 2, dated 10 May 1978

15. MIL-STD-1521A (USAF), "Technical Reviews and Audits for Systems Equipments and Computer Programs," dated 1 June 1976; Notice 1, dated 27 September 1978

16. MIL-STD-1553B, "Aircraft Internal Time Division Command/Response Multiplex Data Bus," dated 21 September 1978; Notice 1, dated 12 February 1980

17. MIL-STD-1589B (USAF), "JOVIAL (J73)," dated 6 June 1980

18. MIL-STD-1679 (NAVY), "Weapon System Software Development," dated 1 December 1978

19. MIL-STD-1750A (USAF), "Sixteen-Bit Computer Instruction Set Architecture," dated 2 July 1980

20. MIL-STD-1753, "FORTRAN, DoD Supplement to American National Standard X3.9-1978," dated 9 November 1978

21. MIL-STD-1815, "Ada Programming Language," dated 10 December 1980

22. MIL-STD-1862, "Instruction Set Architecture for the Military Computer Family," dated 28 May 1980

23. DoD Standard 7935.1-S, "Automated Data Systems Documentation Standards," dated 13 September 1977

24. MIL-Q-9858A, "Quality Program Requirements," dated 16 December 1963

25. MIL-S-52779A (AD) "Software Quality Assurance Program Requirements," dated 1 August 1979

26. ANSI/IEEE Std, 416-78 "Standard ATLAS Test Language"

27. FIPS Pub 11-1, "Dictionary for Information Processing," dated 30 September 1977

28. FIPS Pub 24, "Flowchart Symbols and their Usage in Information Processing," dated 30 June 1973

29. FIPs Pub 30, "Software Summary for Describing Computer Programs and Automated Data Systems," dated 30 June 1974

30. FIPS Pub 41, "Computer Security Guidelines for Implementing the Privacy Act of 1974," dated 30 May 1975

31. "CMS-2A Programmer's Reference Manuals," M-5049 and M-5044 FCDSSA, San Diego, CA December 1978

32. "CMS-2M Computer Performance Specification," NAVELEX 0967LP-598-2210 October 1978

33. "SPL/1 Language Reference Manual," 5490-163 EF;vjs, NRL, Washington, DC

6.6 Guidelines and Miscellaneous References

1. ASD-TR-76-11, "Management Guide to Avionics Software Acquisition; Vol. 1, An Overview of Software Development and Management, (AD A030591); Vol. II, Software Acquisition Process (AD A0309392); Vol. III, Summary of Software Related Standards and Regulations (AD A030593); Vol. IV, Technical Aspects Related to Software Acquisition (AD A030594)," June 1976

2. ASD-TR-78-6, (AD A058428), "Engineering Guide to Avionics Software Acquisition: Requirements, Specifications, and Standards"

3. ASD-TR-78-7, (AD A058429), "Engineering Guide to Avionics Software Acquisition: Reviews and Audits"

4. ASD-TR-78-8, (AD A059068), "Airborne Systems Software Acquisition Engineering Guidebook for Quality Assurance," November 1977

5. ESD-TR-75-85, (AD A016488), "An Air Force Guide to Monitoring and Reporting Software Development Status," September 1975

6. ESD-TR-75-91, (AD A016401), "Software Acquisition Management Guidebook: Requirements, Specifications and Standards," October 1975

7. ESD-TR-75-365, (AD A020444), "An Air Force Guide to Contracting for Software Acquisition," January 1976

8. ESD-TR-76-159, (AD A0207051), "An Air Force Guide to Software Documentation Requirements," June 1976

9. ESD-TR-77-16, (AD A035924), "Software Acquisition Management Guidebook: Statement of Work Preparation," January 1977

10. ESD-TR-77-22, (AD A037115), "Software Acquisition Management Guidebook: Life Cycle Events," February 1977

11. ESD-TR-77-130, (AD A038234), "Software Acquisition Management Guidebook: Software Development and Maintenance Facilities," April 1977

12. ESD-TR-77-254, (AD A047308), "An Air Force Guide to Computer Program Configuration Management," August 1977

13. ESD-TR-77-255, (AD A047318), "Software Acquisition Management Guidebook: Software Quality Assurance," August 1977

14. ESD-TR-77-263, (AD A048577), "Software Acquisition Management Guidebook: Verification," August 1977

15. ESD-TR-77-326, (AD A053039), "Software Acquisition Management Guidebook: Validation and Certification," August 1977

16. ESD-TR-77-327, (AD A053040), "Software Acquisition Management Guidebook: Software Maintenance," October 1977

17. ESD-TR-78-117, (AD A052567), "Software Acquisition Management Guidebook: Reviews and Audits," November 1977

18. ESD-TR-78-139, (AD A055573), "An Air Force Guide to the Computer Program Development Specification," March 1978

19. ESD-TR-78-140, (AD A055574), "Software Acquisition Management Guidebook: Software Cost Estimation and Measurement," March 1978

20. ESD-TR-78-141, (AD A055575), "Software Acquisition Management Guidebook: Series Overview," March 1978

21. "Tactical Embedded Computer Software Audit Manual," dated 2 May 1980 (available from HQ NAVMAT-08Y)

22. "EIA Configuration Management Bulletin No 4-1A, Configuration Management for Digital Computer Programs (Definitions)," (available from Electronic Industries Association, Engineering Department; 2001 Eye Street, N.W. Washington, DC 20006)

23. "The DACS Glossary, A Bibliography of Software Engineering Terms," October 1979 (available from Data and Analysis

Center for Software, RADC/ISISI, Griffiss Air Force Base, NY 13441)

24. Public Law 89-306, 89th Congress, H.R. 4845, dated 30 October 1965, "Brook's Bill"

ACKNOWLEDGEMENTS

With the growing dependence on computers and software in both major and minor systems, special management attention at all levels of the DoD and its components has been directed to assure that computer resources are treated as important subsystems throughout the development, acquisition and support phases of the life cycle of defense systems. Because of this, a Software Acquisition Task was identified as a major area that should be addressed under the STARS Program.

This technical strategy reflects the consensus of the Acquisition Task Panelists at the DoD Software Initiative Workshop at Raleigh, North Carolina held on 7-9 February 1983. The strategy also reflects the input received both verbally and in writing from the workshop attendees. The following individuals participated on the Acquisition Task Panel at the Workshop.

Mr. Bernie Zempolich - Co-Chairperson (NAVAIRSYSCOM)

Mr. Burt Newlin - Co-Chairperson, ISD (AM)

Mr. Joe Beardwood - Vice-Chairperson, (Institute for Defense Analyses)

Mr. John P. Harding (Litton)

Col. Edward T. Akerlund (Air Force)

Mr. Jon S. Squire (Westinghouse Elec. Corp.)

Mr. Norm V. Brown (Navy)

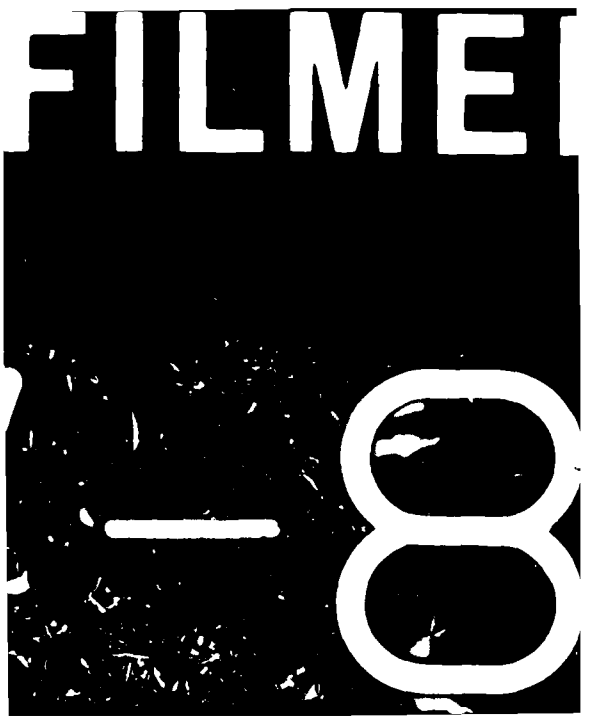
Mr. Stanley P. Meyers (Grumman Aerospace)

Mr. Al Patterson (Air Force)

Mr. Owen L. McOmber (Navy)

Mr. Joseph [illegible] Ceran (Computer Sciences Corp.)

Mr. Philip S. Babel (Air Force)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