



DEFENSE INFORMATION SYSTEMS AGENCY
JOINT INTEROPERABILITY AND ENGINEERING ORGANIZATION
11440 ISAAC NEWTON SQUARE, NORTH
RESTON, VIRGINIA 22090-5006

DTIC

ELECTE

JAN 7 1993

AD-A259 330



1992

N REPLY
EFER TO:TBBG

MEMORANDUM FOR: Defense Technical Information Center (DTIC)

SUBJECT: National Security Industrial Association Report to the Joint Tactical Command, Control, and Communications Agency on the Study of DoD/Industry Partnership in the Development and Application of Standards

1. In October 1988, the Joint Tactical Command, Control, and Communications Agency and the National Security Industrial Association agreed to conduct a joint study to analyze the process of developing military communications standards. The study identified several problems with the standards development process, and provided recommendations for process improvements or organizational improvements to solve the problems. The joint study began in May 1989, and concluded in August 1991, with the publication of the subject report. Copies of the report are enclosed for input into the DTIC data base. Also enclosed are copies of DTIC Form 50 and Standard Form 298. The report's information is available for use by the public, industry and government agencies with out restrictions.

2. Although the scope of the study was limited to the processes associated with developing communications standards in the MIL-STD-188/187 series, the recommendations of the study were sufficiently generic to be applicable to all categories of information technology standards.

3. The Defense Information Systems Agency's Center for Standards has already implemented several of the recommendations of the study. For example, the Center for Standards has: (1) eliminated the distinction between tactical and long-haul communications standards; (2) reclassified information technology standards into three areas: information transfer, information content, and information processing; and (3) established steering committees and secretariat support for these technology areas.

Approved for public release
Distribution Unlimited

"FORMERLY JOINT TACTICAL COMMAND, CONTROL AND COMMUNICATIONS AGENCY"

DISA Memo, TBBG, National Security Industrial Association Report to the Joint Tactical Command, Control, and Communications Agency on the Study of DoD/Industry Partnership in the Development and Application of Standards

4. Should you have questions on the report, you may direct them to Mr. Gary L. Koerner at DSN 364-8015, or commercial (703) 487-8015.

3 Enclosure a/s



RICHARD O. SAVOYE
Chief, Standards Management
Division

Accession For	
DTIC	☒
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
See Index/Spec	
Dist	Special
A-1	

"FORMERLY JOINT TACTICAL COMMAND, CONTROL AND COMMUNICATIONS AGENCY"



**REPORT TO THE
JOINT TACTICAL COMMAND, CONTROL, AND
COMMUNICATION AGENCY (JTC³A)
ON THE STUDY OF
DOD/INDUSTRY PARTNERSHIP IN THE DEVELOPMENT
AND APPLICATION OF STANDARDS
FIRST ISSUE**

**BY THE
NATIONAL SECURITY INDUSTRIAL ASSOCIATION
C³I COMMITTEE**

AUGUST 1991

93-00115

93 1 04 197

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE August 1991		3. REPORT TYPE AND DATES COVERED First Issue
4. TITLE AND SUBTITLE DoD / Industry Partnership in the Development and Application of Standards			5. FUNDING NUMBERS N/A	
6. AUTHOR(S) National Security Industrial Association (NSIA) C3I Committee				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) National Security Industrial Association National Headquarters 1025 Connecticut Ave. NW Washington, DC 20036			8. PERFORMING ORGANIZATION REPORT NUMBER N/A	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Defense Information Systems Agency Joint Interoperability and Engineering Organization Center for Standards 11440 Isaac Newton Square, North Reston, VA 22090-5006			10. SPONSORING / MONITORING AGENCY REPORT NUMBER N/A	
11. SUPPLEMENTARY NOTES Prepared with the objective of enhancing DoD Information Technology Standards use and development processes.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Public availability with no limitations.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) <u>GENERAL:</u> The Department of Defense and the Services do not have a paucity of standards. On the contrary, there exists a standard or, in most instances, standards, which address virtually anything and everything purchased and utilized by the DoD. A problem appears to be the acceptance and application of these standards by industry operating in our competitive democratic society. All too often conflicts develop between the application of established DoD/Service standards and what is perceived to be the good of a given company or the unfair advantage of another. Consequently, systems and equipments do not work together without the expense and inherent operational drawbacks of developing and using "black boxes". Furthermore, the pace of technology change sometimes outstrips the pace of standardization, thus rendering standards obsolete or requiring frequent change. Hence there is a need for a re-examination of the process for establishing DoD standards and the application of this process to JTC3A's mission.				
14. SUBJECT TERMS Standards, Information Systems, Information Transfer, Information Processing, Telecommunications, Data Communications			15. NUMBER OF PAGES 26	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE U	19. SECURITY CLASSIFICATION OF ABSTRACT U	20. LIMITATION OF ABSTRACT	

FINAL REPORT OF THE NSIA STANDARDS WORKING GROUP

1.0 INTRODUCTION

1.1 GENERAL

*"Working Group...
formed in 1989 for the
purpose of improving
DoD/Industry
partnership in the
development and
application of
telecommunications
standards"*

This report summarizes the activities, findings, conclusions, and recommendations of the National Security Industrial Association (NSIA) C3IC Standards Working Group. This Working Group (WG), composed of individuals whose corporate organizations are members of NSIA, was formed in 1989 for the purpose of improving DoD/Industry partnership in the development and application of telecommunications standards. The specific goals are given in the "Terms of Reference", which are included in this report as Attachment A. The industrial members of the WG were supported by various representatives from DoD. The list of active participants is given in Attachment B. The WG began its activities on May 11, 1989, and held its last working meeting on September 11, 1990.

1.2 METHOD OF OPERATION

After a review of the goals specified in the "Terms of Reference," the WG expressed its goals in the form of five questions. These questions form the basis of the Working Group's findings, conclusions, and recommendations, which are presented in Sections 2, 3, and 4 of this report.

*Briefings held with key
participants in DoD and
Commercial standards
process*

The WG gained much detailed insight regarding the DoD process of developing telecommunications standards by means of briefings given by active participants in the development process. Briefings were selected to expose both the positive and negative aspects of the current DoD standards development process. Representatives from DCA, as well as industry, gave briefings and each presenter was subjected to questioning. A list of people who briefed the Working Group is included as Attachment C. These briefings are documented in the meeting minutes which are available at the NSIA C3IC Office.

*Results of previous
studies were reviewed*

In addition to briefings, the WG researched and summarized the findings of other efforts that had addressed various aspects of the DOD standards process. The "Shea", "Costello," and "Toth" reports and many

others were reviewed for applicability to the objectives of this Working Group. A list of these reports and other pertinent reference material is found in Attachment D.

The WG noted that because of DoD concern with the standards development process and its desire to improve it, there have been some changes and improvements that have already occurred during the course of the study. Part of this change may in part be due to DoD participation in the Working Group. Due to the "moving target" aspect of this phenomenon and the need to promulgate the conclusions of this study, the Working Group has not attempted to incorporate these changes, nor does the Group feel that these changes would significantly impact the recommendations of this study.

"Working Group members have considerable experience in the development and utilization of standards"

Lastly, it should be stated that a number of WG members have considerable experience in the development and utilization of DoD and commercial standards. This experience was valuable in the analysis of information presented to the WG, and was helpful in the development of the recommendations of the Working Group. The Industrial members of the Working Group would like to particularly thank the DoD consultants and presenters for their openness and frankness in leading the Group through the existing standards development processes.

1.3 FOCUS OF THE EFFORT

Telecommunications standards are necessary to ensure interoperability of systems. However, to fully meet the needs for interoperability, it is not sufficient to have a technical capability for systems to exchange electronic signals. Compatible electronic and physical interfaces, link and network protocols are the foundations for building interoperable systems. The form, format, and structure of data to be shared between systems must also be standardized.

"...within the Government responsibility...is divided to such an extent that coordinated achievement of interoperability goals is severely hampered"

The Working Group observed that within the Government, responsibility for various categories of telecommunications and information system standards is divided to such an extent that coordinated achievement of interoperability goals is severely hampered.

The efforts of the WG were focussed on improvement of the development of telecommunications standards;

however, the Working Group recommends that the same consideration and conclusions should be applied to other types of standards such as ADP and FIPS. A consolidated and uniform standards development process would probably be most efficient and effective.

20 FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

2.1 QUESTION 1

How can the DoD process of developing telecommunications standards be shortened?

2.1.1 Findings

Telecommunications technology is being introduced at an accelerating rate, and the management of the standards development process is becoming an increasingly complex problem. There are several commercial telecommunications associations working to coordinate the development of commercial standards. They typically take two to four years to process standards for emerging technology. The DoD also develops telecommunications standards. That process consumes from 1 to 10 years, depending on priority.

The timely development of standards requires an interested set of parties who will participate in and support the development process early in its life cycle. That process is currently not achievable because DoD support of standards development is inconsistent. For example, service budgets earmarked for standards development are poorly administered, often too meager, and are easily diverted. Also, the Services have conflicting priorities that often mitigate against the development of universal standards. Service labs and contractors often have a vested interest in supporting the service position on the requirements and solution.

2.1.2 Conclusions

The current DoD standards development process is not producing timely standards on a consistent basis. Although it is unrealistic to expect to compress the DoD standards development cycle below the time required for processing commercial standards, a streamlining of the DoD standards process could provide a two to four year process for all high priority standards. That may seem

*Commercial standards
... take "two to four years
... for emerging
technologies"*

*"...DoD support of
standards development
is inconsistent"*

*"...current...process...
not producing timely
standards on a
consistent basis."
"...unrealistic to expect
to compress the...
development cycle below
the time required for...
commercial standards."*

only a marginal improvement, but in fact it is very significant, for it would help advance the process into a leading edge capability, as compared with the current process that is focussed on documenting historical developments. The problem of capturing new technology will remain a challenge that must be addressed by long-range C³ architectural planning, as well as the timely development of the MIL-STD-187 series of planning standards.

"DoD needs to impact interoperability problem earlier in the... development process."

"Standards must be established before industry has established strong corporate proprietary interests and before the services have committed major funding to development."

In addition to not providing timely results, the current standards process has the wrong temporal framework. DoD needs to impact the interoperability problem earlier in the life cycle development process. Standards must be established before industry has established strong corporate proprietary interests and before the Services have committed major funding to development. DoD is concentrating too much on documenting existing designs, which tend to carry old technology into new standards, and should be spending more effort on future standardization requirements. This shift of emphasis to emerging technologies would most likely require different technical personnel, as well as a change in management procedures. The development of advanced technology standards should be recognized as a controversial process. There are associated risks, as well as the obvious cost of providing appropriate technical personnel. The payoff in implementing new technology should be a measurable improvement in the interoperability of future systems and a resultant increase in operational capability. The Services do have truly different requirements and priorities, therefore the Services should be individually and separately involved in the standards process. However, there must be provision for the timely support of DoD-wide interests in the standards process. Service funding is consistent with the need to be responsive to unique Service requirements, but it simply is not supportive of joint or combined interoperability requirements, and it is not sufficiently consistent to support the timely development of standards.

2.1.3 Recommendations

"...dedication of resources and a revised organizational structure must be implemented..."

Analysis of the DoD telecommunications standardization process clearly indicates that dedication of resources and a revised organizational structure must be implemented, if standards are to be developed in a timely manner.

"DoD should place more emphasis on...advanced technology."

DoD should place more emphasis on facilitating the implementation of advanced technology. To help accomplish this, DCA should coordinate closely with DARPA and the Services to define and implement research for advanced C³ system architectures. The coordination should result in DCA documenting advanced technology forecasts or bulletins for the operational users to incorporate into their C³ objective architectures. The increased use of the MIL-STD-187 series of standards is encouraged.

It should be emphasized that shortening the development cycle to less than 2 years could result in technically flawed standards or result in a lack of consensus and acceptance. Further, because of the voluntary and cooperative nature of an effective standards development group, it is not advisable to mandate that standards be developed in less than 2 years.

2.2 QUESTION 2

How can DoD exploit existing commercial standards?

2.2.1 Findings

"DoD standards... misapplied or not appropriately tailored to the requirements."

It was found that sometimes DoD standards were misapplied or not appropriately tailored to the requirements. In many cases, the procurement activity unnecessarily imposed military standards and specifications where a commercial standard could be used or where no standard was required. Unfortunately, when a military standard or specification is included in a procurement, there is no easy mechanism currently available by which that particular requirement can be critically reviewed and challenged to ensure that it is not only appropriate, but that it is also absolutely necessary. The DoD mindset appears to be that it is safer and prudent to include additional capabilities offered by MIL-STDs to address any potential or unforeseen eventuality. This problem is further exacerbated when RFPs dictate solutions rather than define the minimum set of requirements. The result is a significant increase in cost, longer development schedules, and less flexibility available to contractors in developing innovative, cost-effective solutions to the Government's requirements.

Similar problems were identified by the Defense Science Board Task Force on Specifications and Standards report issued in April, 1977. This task force, chaired by Joseph F. Shea, was convened in 1974 to "identify the factors contributing to unnecessary contract costs arising from Military Specifications and Standards." The task force found that major unnecessary costs associated with military specifications and standards arose from:

- a. Over-interpretation by the government and industry
- b. Misapplication in RFPs and contracts
- c. Uncontrolled incorporation by reference (specification tiering)
- d. Redundant proofs of compliance and rigid enforcement

"In the 13 years since... (Shea) report was issued, the working group found little apparent improvement in the way military specifications and standards were being applied to RFPs and contracts."

In the 13 years since that report was issued, the Working Group found little apparent improvement in the way military specifications and standards were being applied to RFPs and contracts. In theory, MIL-STDs are created to address "military-unique requirements" that are not directly incorporated into a commercial standard. In practice, these "unique requirements" often exceed the minimum interoperability requirements or duplicate them.

2.2.2 Conclusions

The scope and quality of commercial standards is sufficiently broad to provide a substantial basis for DoD technical standardization needs without any significant modification. Military standards will continue to be needed for unique requirements, such as anti-jam/low probability of intercept waveforms and to meet security or TEMPEST needs.

2.2.3 Recommendations

"Recommended actions formulated by the Shea task force are still valid today..."

Recommended actions formulated by the Shea task force are still valid today and, along with this WG recommendations, are summarized as follows:

- a. The senior service and agency acquisition executives must review needs and applicability of all DoD standards in each procurement to see

if they can be replaced with commercial standards and/or whether a standard is required at all. Some key issues to be examined include:

- Technical performance compliance
 - Interoperability requirements
 - Cost impacts
 - Logistical support
- b. Encourage improved communications between users/program managers and standards developers (i.e., DoD) on key drivers/needs for new standards and/or required updates or modifications to existing standards.

2.3 QUESTION 3

What should the DoD's role be in the development of commercial standards?

2.3.1 Findings

"Early and extensive participation of DoD personnel in the commercial standards... process... would substantially increase the likelihood that the commercial standards be seriously considered and evaluated for inclusion in the services procurement."

DoD can realize lower costs, quicker deployment, and greater capabilities by use of NDI (or modified NDI) equipment conforming to commercial standards. The degree of applicability of commercial standards to DoD requirements depends to a large extent on the amount of DoD involvement in the development of a particular standard. Early and extensive participation of DoD personnel in the commercial standards development process could help ensure that unique DoD requirements are considered (if appropriate) in these commercial standards. Such an effort would substantially increase the likelihood that the commercial standard be seriously considered and evaluated for inclusion in the Services procurement.

Most commercial standards organizations work on a consensus basis. Decisions are typically made on technical merit and cost effectiveness. Standards committee members who are informed, technically astute, prepared, and regularly attend committee meetings typically have a major impact on the outcome of these commercial standards. On the other hand, those organizations that do not make such commitments

are relegated to spectator status and typically have no major effect on the outcome. The DoD, for example, does not have consistent and adequate representation to commercial standards organizations. Thus, DoD has minimal impact on most commercial telecommunications standards. Specific identified DoD problem areas include:

- a. Inconsistent attendance at standards fora (due in part to a lack of TDY funds)
- b. Attendance by the wrong people (for example, technically unqualified)
- c. Attendance by individual(s) who do not represent a unified service or DoD position.
- d. Government representation that is not adequately prepared to address or protect DoD interests, or to negotiate DoD positions.

2.3.2 Conclusions

When DoD brings its needs and requirements to the commercial standards process, the requirements typically contain solution-oriented, implementation, or product-based inputs. Such inputs are not appropriate in the standards development process.

To achieve development of commercial standards that address and satisfy Service needs, DoD must take a more pragmatic approach. DoD's ability to influence commercial standards development is strongly related to its investment in the process. DoD's investment is much less than that of the commercial sector and appears to be diminishing.

2.3.3 Recommendations

DoD should strengthen and streamline the current program to oversee and coordinate participation in commercial standards development. Such a process should include a central coordination function to coordinate information that is to be submitted by DoD to commercial standards development groups. In addition, this coordination function should identify organizations developing standards that could have an impact on the DoD. The priority commercial standards efforts should receive adequate funding, staffing with

"DoD's ability to influence commercial standards development is strongly related to its investment in the process."

"DoD should strengthen and streamline the current program to oversee and coordinate participation in commercial standards development."

technically qualified people, and sufficient resources for preparation and participation.

2.4 Question 4

How can DoD achieve broader acceptance of its standards?

2.4.1 Findings

"Standards developed with a consensus and participation of all parties with a vested interest are generally widely accepted."

Standards developed with a consensus and participation of all parties with a vested interest are generally widely accepted. Conversely, those developed without a consensus and participation are not. "Parties with a vested interest" include users, planners, program managers and logistics people, and manufacturers. When any segment is excluded from the process, some major consideration is inevitably overlooked. Those who are excluded from participation will often seek alternatives to the standard.

The current standards development process does allow all parties to comment on draft standards, but it is often done too late in the development cycle for any significant changes to be seriously considered. Furthermore, these comments are often not reviewed in a public forum, but in a Government-only forum. This can lead to a standard that has not undergone the necessary deliberation to achieve cost effectiveness. The end result contradicts the requirement for openness, fairness, and full participation in the standards process.

"There are no formal means to establish the user requirements that form the basis of a standard."

There are no formal means to establish the user requirements that form the basis of a standard. Requirements are informally directed by the JTSSG and executed by the JTSSG WG. Cost factors are not adequately considered in the DoD standards process, resulting in standards that can cost too much, do not meet users needs, are not expandable, serve only a unique community, and are not easily implemented.

"Many DoD standards are close to obsolescence by the time they are approved."

Most of JTC³A's standards work is focused on existing designs and capabilities. Many DoD standards are close to obsolescence by the time they are approved.

"Standards will gain broader acceptance if all parties with vested interests have the opportunity to participate in the development of the standard."

"The DoD working groups should be open to all interested parties, and 'ANSI type' rules should govern the interchange of ideas and resolution of technical issues."

2.4.2 Conclusions

Standards will gain broader acceptance if all parties with vested interests have the opportunity to participate in the development of the standard.

Standards that lead to cost effective solutions will receive broader acceptance.

Without some formal cost/benefit review, the DoD is vulnerable to publication of mandatory standards that are not cost-effective. However, it is apparent that a *detailed* cost/benefit analysis could be neither practical nor accurate.

The lack of a formal requirements analysis can result in standards that do not solve the user's problem, will not meet or expand to meet future needs, and are not cost effective.

2.4.3 Recommendations

The DoD working groups should be open to all interested parties, and "ANSI type" rules should govern the interchange of ideas and resolution of technical issues.

Some form of cost-benefit analysis should be conducted. The analysis should consider whether the standard is required, alternatives, cost of implementation, recurring cost, and the willingness of industry to invest. The analysis should be performed in a public forum and should be performed early enough in the process to affect the technical direction of the standard.

A formal requirements analysis should be developed prior to or coincident with the front-end development (of the standard); this document should represent consolidated minimum requirements for the new standard.

2.5 QUESTION 5

How should emerging technology be exploited in the standards process?

2.5.1 Findings

In reviewing the current set of JTC³A developed telecommunications standards, the NSIA Working

"Standards development based on current designs/technologies leads to several problems and shortfalls..."

Group found that most standards reflected mature or aging technologies, and that only a few standards reflected new or emerging technologies. It appears that the current standards development process is focused primarily on documenting current proven concepts and designs as opposed to trying to establish standards for future emerging technologies. Standards development based on current designs/technologies leads to several problems and shortfalls including:

- Preferential treatment is given to the developer/manufacturer of the product on which the standard is based,
- Flexibility to accommodate technology advancements is usually not considered,
- Products developed based on new emerging technologies are built in the absence of any applicable standard(s) with new standards being unilaterally and *de facto* established by the product developer.

It is difficult to achieve an optimum balance between incorporation of current and future technologies and maintaining stability of telecommunications standards. The financial and operational penalties for being "off-target" can be significant.

Infusion of new technologies into existing standards is optimally accomplished when the original standard is a product of forward thinking and is designed to be upgraded in a hierarchical manner. Crash standardization efforts that are driven by short-term programs tend to be technology limited, costly, and difficult to upgrade.

Some degree of backward interoperability is typically provided in most standardization upgrades.

2.5.2 Conclusions

"New standards, as well as standards that undergo major revisions, should be designed with a planned upgrade path."

New standards, as well as standards that undergo major revisions, should be designed with a planned upgrade path. The upgrade path should be both technology and requirements based.

To help avoid program specifics or limited standards, the standardization process needs to be an ongoing

effort. The standards working group should continue development of follow-on capabilities and insertion of new technology after the initial release of the standard.

2.5.3 Recommendations

"A requirements forecast and corresponding upgrade plan should be ongoing and released with each new standard..."

A requirements forecast and corresponding upgrade plan should be ongoing and released with each new standard development or major revision. The forecast should as a minimum address life cycle costs, future equipment requirements, and interoperability. The upgrade plan should detail the standards architecture, how it satisfies the requirements forecast and the planned standardization evolution. These activities should be started and completed before a "short-fuse" program drives the standard architecture.

A qualified body should be given the responsibility for deciding if and when the next levels of capability should get incorporated into the standard.

3.0 TESTING RECOMMENDATION

3.1 FINDINGS

During the course of the case studies reviewed by the NSIA Working Group, it was determined that some DoD standards had been implemented on new systems in the development process without adequate testing. In some cases, the standard inhibited achieving the desired operational capabilities of the system or precluded the application of potentially useful alternative technical solutions. This WG also observed that although current DoD guidance for standards development mandates that testing be performed to prove the concept, it is not always done.

The existence of standards and claims of equipment compliance do not guarantee interoperability. Most telecommunication standards are sufficiently complex that omissions or misinterpretation can easily occur during the implementation process.

3.2 CONCLUSIONS

"Thorough testing is required to identify and correct problems and to ensure interoperability..."

Thorough testing is required to identify and correct problems and to ensure interoperability between different systems or equipment.

3.3 RECOMMENDATIONS

The DoD standards process should ensure that testing is conducted throughout the development process. Testing, whether performed by industry or by the Government, should validate aspects such as proof of concept, conformance, interoperability, and certification/compliance. An interoperability test center (e.g., JITC at Ft. Huachuca, AZ) should be given the responsibility to perform interoperability tests and pass judgement when systems fail.

4.0 PROCEDURAL RECOMMENDATION

"...a new process be adopted for the purpose of developing DoD telecommunications standards....by...using methods similar to those currently employed in the commercial standards arena."

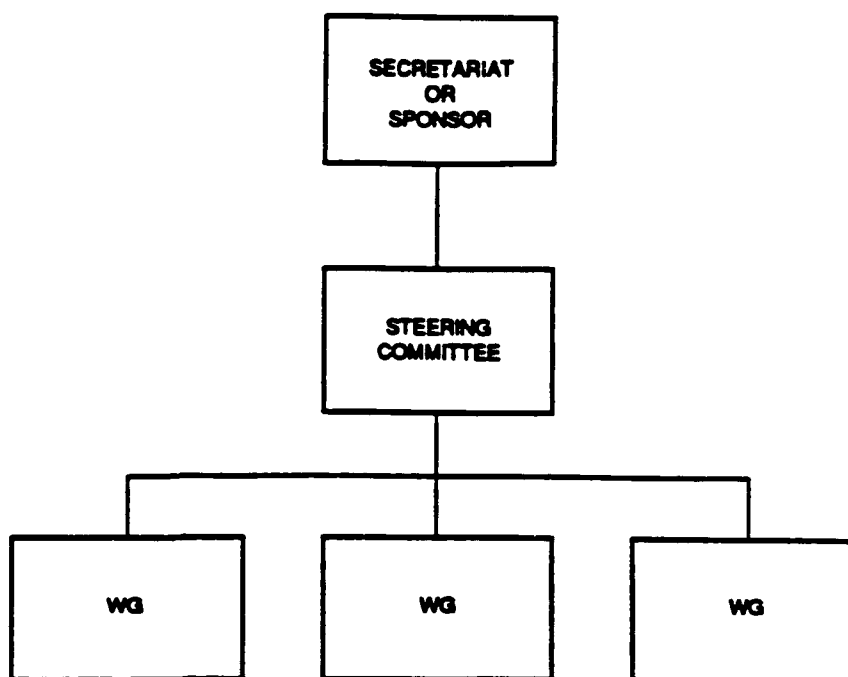
The NSIA Working Group recommends that a new process be adopted for the purpose of developing DoD telecommunications standards. This WG believes that adopting the procedure described herein is essential to implementing the recommendations given by the WG. The objective of this recommendation is to simplify and technically upgrade the process of developing DoD telecommunications standards. It is proposed that this be achieved by modifying the current process to include industry participation using methods similar to those currently employed in the commercial standards arena. It will require changes in existing organizations, in existing DoD procedures, and in the DoD thought process.

4.1 ORGANIZATIONAL STRUCTURE

"...strong suggestion that the proposed structure closely follow 'ANSI' rules to ensure fairness and consensus."

The structure to support the proposed procedure is given in Figure 1. This section contains a description of the structure, the underlying precepts, and many of the features of such a structure. A key element is that our proposed approach is patterned after tried and successful commercial models, such as the ITU (CCITT) and the Exchange Carrier Standards Association (ECSA) and its "T1" standards Working Group. A second key element is the strong suggestion that the proposed structure closely follow "ANSI" rules to ensure fairness and consensus. These elements are essential for the success of any standards development process.

Although proposed functional responsibilities for the three tiers shown in the organizational chart are given in a later section, some of the salient points that apply to the proposed groups are given here. First, the "Sponsor"



CE-T-0090

Figure 1. Standards Development Structure

"... 'Sponsor' must function in a role that is similar to the CCITT Secretariat..."

must function in a role that is similar to the CCITT Secretariat and the ESCA Secretariat in that its primary function is to facilitate and support the work of the Steering Committee (SC) and the WGs. It should not dominate these groups or dictate what is to be done or how it is to be done. Second, it should receive and analyze requests for standards and forward requests to the SC for its action. The Sponsor is an administrative group, not technical, and neither it nor its agents participate in the technical work of developing standards.

A third key element of this concept is that the function of the Sponsor is to provide funds that allow DoD organizations to participate with the WGs in preparing standards. Summary descriptions of the SC and WG functions are contained in a later section. Basically, the SC maintains technical oversight of the WGs, and the WGs perform the all important task of developing and writing the standards.

42 PRECEPTS

"...Working Groups must be composed of individuals from manufacturers and DoD who have... 'direct and material interest'..."

Prior to a description of the functions of the proposed structure, it is necessary to establish some of the underlying principles that must be accepted for the proposal to succeed. First and foremost, the WGs must be composed of individuals from manufacturers and DoD personnel who have first-hand experience with communications equipment and systems. These individuals are key to the success of the process. They must be members of organizations that have a "direct and material interest" in the standard. It is not sufficient for either party to delegate the standards development task to other intermediary groups or organizations because such groups do not meet the "direct and material interest" test and will not "live" with the results of their work.

With open participation, "...each participant feels 'ownership' of the resultant standard..."

Second, assuming that all interested users and manufacturers have been invited to participate in WGs and that they do indeed actively participate in the work, each participant then feels "ownership" of the resultant standard; its acceptance is therefore all but guaranteed. As a corollary to this idea, any person or group who declines the invitation to participate effectively waives the right to object to the draft standard.

In practice, it is necessary to distribute final draft standards, not for comment, but for final approval (for the record) by the participants. The current so-called "circulate for comment" exercise becomes unnecessary because all interested parties have been a part of the development process.

"...consensus...means... all participants have been heard, and that all dissenting opinions have been fully addressed."

A third precept is that of consensus. This means that all participants have been heard, and that all dissenting opinions have been fully addressed. (ANSI and the ECSA have more rigorously defined the term consensus.) As a result no one participant dominates the development work, and the group is able to work towards the common goal.

"...fairness...means... all parties who have an interest...invited to participate...and... present their views..."

A fourth precept is fairness. This means that all parties who have an interest in the standard have been invited to participate, and that all participants, large and small, have the opportunity to present their views and have their views fully considered by the WG.

"Within...long-term Working Groups, the continued dialogue...will generate the synergism that is needed to produce a truly successful standard."

"...standards...should be periodically updated to incorporate new technologies and new requirements."

Sponsor provides "enabling" function that would support the standards working groups and Steering Committee."

A fifth precept, which is key to the success of this proposal, is that the WGs must function as permanent groups, not temporary *ad hoc* groups as is now prescribed. This represents a significant change in current DoD practices, but this must change because the current *ad hoc* approach is part of the problem of incorporation of new technology into existing standards. Within such long-term WGs, the continued dialogue between practical, experienced users from the military and technologists from manufacturers will generate the synergism that is needed to produce a truly successful standard. Furthermore, the participation of a number of competing industry technologists is the only practical vehicle for incorporation of up-to-date technologies. This competition and cooperation cannot be mandated by DoD or anyone else; it must come from the minds of the participants.

A sixth precept is that standards must be viewed as a snapshot in time, and even after release, they should be periodically updated to incorporate new technologies and new requirements. The "permanent" nature of the WGs is needed to support this idea. Whenever possible, interoperability and other standards should be written so as to permit future improvement while providing "backwards compatibility" with earlier versions.

4.3 RESPONSIBILITIES

The Sponsor would provide an "enabling" function that would support the standards working groups and Steering Committee. The specific responsibilities are summarized below.

- a. The Sponsor should provide funds to meet the out-of-pocket costs that would be incurred by the DoD participants in the WGs. At present, funding is a primary reason for inadequate DoD participation in standards activities. It seems that although people are available, TDY funds frequently are not. The Sponsor can authorize and control the needed funds, thus removing one of the existing barriers to DoD participation.
- b. The Sponsor should provide administrative support, such as selecting and reserving meeting locations, issuing meeting notices, maintaining attendance lists, reproducing and mailing technical contributions prior to

meetings, reproducing and mailing meeting reports, and maintaining files of all documents.

- c. The Sponsor should serve as an interface to ANSI, and should ensure that the ANSI style rules are adopted and are followed by all WGs.
- d. The Sponsor should maintain and regularly update a file of all individuals and organizations who have an interest in those standards and technology subjects that are under the purview of this structure. This list should be composed of commercial manufacturers, military users of equipment, and any others who have a direct and material interest in the development and implementation of the standard. The Sponsor's list should include military commands, individual companies, and other organizations and industry groups, such as EIA, NSIA, IEEE, etc.
- e. The Sponsor should maintain a baseline file of all interoperability standards within its responsibility. This should include the current issue plus previous revisions, as well as the justification for revisions.

44 STEERING COMMITTEE

The SC would be equivalent in concept to the ECSA T1 Advisory Group. Its responsibilities are defined below.

"The Steering Committee should oversee technical work of working groups...should serve as the interface with the U.S. CCITT..."

- a. The SC should oversee the technical work of the WGs. WG Chairmen will be members of the SC.
- b. The SC should serve as the interface with the US CCITT in submitting technical contributions to the CCITT. The SC will approve such contributions prior to forwarding.
- c. The SC should make recommendations on WG procedures, assign projects to WGs, and interface with the Sponsor.
- d. The SC should be composed of individuals selected by the WG membership. The selection process should be designed to provide a cross-section of membership.

The SC should also validate any requirement for development of a standard prior to the onset of work. Requirements may come from any source, including DoD users, manufacturers, CINCs, PMs, etc. Such requirements should go directly to the Sponsor, then to the SC for validation.

4.5 WORKING GROUPS

"The Working Groups must be composed of technically qualified representatives of manufacturers and DoD, as well as DoD user organizations."

The WGs must be composed of technically qualified representatives of manufacturers and DoD, as well as DoD user organizations.

The WGs would receive assignments from the SC and develop fully detailed standards up through a final draft. The WG should ensure that the draft is technically complete and accurate, and is consistent with other associated standards, both DoD and commercial. The WG would submit its final draft through the SC and Sponsor for administrative approvals.

The WG should review the need for a standard and if it does not agree that the proposed standard is needed, it shall so inform the SC.

The WG membership should submit all inputs to the group by means of written "contributions" that have been distributed by the Sponsor.

The WG membership should elect a Chairman from its membership who will conduct all WG meetings in accordance with the rules and procedures established by the Sponsor and the direction established by the SC.

The WG may establish sub-WGs if deemed necessary.

The WG should, if necessary, prepare technical inputs to other national or international standards bodies. These should be submitted to the SC for review and forwarding.

4.6 ADDITIONAL DETAILS OF RECOMMENDATION

It is suggested that the distinction between tactical and long-haul standards be eliminated, and that standards classifications based on technology areas be established. This emulates the practices of the ITU and the US-based T1 Standards Committee.

The WGs should be given a mission, not based on one standard, but on a technology area that will embrace a number of related standards. This will encourage better technical participation, and will encourage participation by parties in both the DCA and commercial standards bodies. This will provide formal, as well as informal, cross-fertilization among these groups.

Participating organizations, such as manufacturers, must be willing to share proprietary rights if they wish to introduce their technology into a standard. This includes providing unrestricted rights to all other participants.

"Industry must play an active and equal role in the development of DoD interoperability standards."

In summary, Industry (manufacturers) must play an active and equal role in the development of DoD interoperability standards, starting with the verification of the need for a standard all the way through the completion of the standard document.

5.0 CONCLUSIONS

It is recommended by the NSIA Working Group that the Office of the Secretary of Defense implement the recommendations of this study report and appoint a lead agency such as the DCA to provide the secretariat for the proposed telecommunications standards development process.

Attachment A

TERMS OF REFERENCE DOD/INDUSTRY PARTNERSHIP IN THE DEVELOPMENT AND APPLICATION OF STANDARDS BY THE NSIA COMCAC FOR THE DEFENSE COMMUNICATIONS AGENCY JTC3A

GENERAL: The Department of Defense and the Services do not have a paucity of standards. On the contrary, there exists a standard or, in most instances, standards, which address virtually anything and everything purchased and utilized by the DoD. A problem appears to be the acceptance and application of these standards by industry operating in our competitive democratic society. All too often conflicts develop between the application of established DoD/Service standards and what is perceived to be the good of a given company or the unfair advantage of another. Consequently, systems and equipments do not work together without the expense and inherent operational drawbacks of developing and using "black boxes". Furthermore, the pace of technology change sometimes outstrips the pace of standardization, thus rendering standards obsolete or requiring frequent change. Hence there is a need for a re-examination of the process for establishing DoD standards and the application of this process to JTC3A's mission.

PROPOSAL: It is proposed that the NSIA COMCAC undertake a joint study with JTC3A to analyze the present process of developing standards and recommend changes to this process that would lead to the establishment of standards widely acceptable to both DoD and industry.

TERMS: In order to ensure preparation of a useful analysis and report, the study will be conducted in accordance with the terms defined herein.

1. JTC3A will coordinate and arrange for necessary briefings, documentation, and points of contact necessary to conduct the study.
2. The study effort will be conducted at no direct cost to the government.
3. The final report will be unclassified.
4. a. The study will examine the present process and attempt, through case studies, to abstract the characteristics of the process which determine success or failure in the establishment of standards. This will include thorough examination of regulations, guidance, procedures, etc., pertaining to the present process. Case studies will be conducted on recent systems, such as Regency Net and HFAJ, to understand fully the application of the process and the forces at work in establishing standards. The study will consider the time required to establish a standard and whether it can be shortened.

- b. The study will focus on telecommunications standards and those ADP standards associated with data communications. (Consideration of ADP standards related solely to data processing functions, e.g., the instruction set architecture for mainframes, will be deferred.) The exploitation of commercial hardware and software and the role of commercial standards will be a focus of the study. The implications of standards, or the lack thereof, for the acquisition process and for logistical support will be identified.
- c. The study group will seek to meet with the various organizations who participate in the standards process, as well as the affected end user and the program managers. Federal Government, DoD and industry inputs will be incorporated.
- d. The study group will recommend changes in the standards process aimed at achieving broader acceptance of DoD standards, the convergence of DoD and commercial standards, the simplification and shortening of the process. The report will address the participants, the motivations, the inhibitors, and the organizational barriers. From a technical standpoint, the report will consider what should be standardized, the relationship between standards and technology exploitation, and the implications of new technologies and technology trends on the entire process.

SCHEDULE: To be determined

Attachment B

NSIA STANDARDS WORKING GROUP

MEMBERSHIP LIST

NSIA Standards Working Group

Myron E. Fox, Chairman
Director of Communications
Engineering
GTE Government Systems Corp.

William L. Beamish
Engineering Manager
Harris Corporation

John J. Falbo
ARINC Research Corp.

Ernest Marmaras
Vice President, C3I Systems
BDM International

Dr. Vitas A. Mikenas
Senior Systems Eng.
Harris Corporation

William D. Zirbel
Senior Analyst
SAIC

Paul J. Nordquist
Manager of Research & Development
MSE Engineering
GTE Government Systems Corp.

DoD Consultants

Robert C. Gagnon
Office of the Asst. Sec. of Defense
Defense Quality and Standardization
Office

LTC Dwight Lee, USA
OJCS, (J-6F), The Pentagon

Gary L. Koerner
JTC3A, Defense Communications
Agency

Otto Schultz
Chief, Technical Standards Office,
JTC3A
Defense Communications Agency

Gerald Shamla
Assistant Director, Washington
Operations, JTC3A
Defense Communications Agency

COMCAC Interface

Allan F. Beaupre
Vice President & General Manager
Harris Corporation

Attachment C

PRESENTATIONS TO THE NSIA STANDARDS WORKING GROUP

Title	Presenter	
DCA Technical Standards	Otto Schultz	JTC3A
The DCA Standards Process	Maj. Sive	JTC3A
Case Study-HF Modem	Vitas Mikenas	Harris
Case Study-HF ALE	Joe Whitney	ISC
The DCA Standards Process	Bob Gagnon	OASD (P&L)
CCITT and ECSA Standards	Demos Kostas	GTE Teleops
TIA and EIA Standards	Hal Berge	TIA
	Jack Kinn	EIA
Case Study-Fiber Optic Std.	Joe Whitney	ISC
Objectives of DCA Standards	John Keane	Maden Tech.
State of Interoperability	Gerald Shamla	JTC3A
Standards Working Group Report	Gerald Shamla	JTC3A
The Digital FAX Standard	Gene Gavenman	Ricoh
The Digital FAX Standard	Steven Rogers	Cryptek
	Neel Price	Cryptek
JTC3A Standards Activities	Bill Blohm	JTC3A

Attachment D

NSIA STANDARDS WORKING GROUP

DOCUMENT LIST

STANDARDIZATION REPORTS

"An Assessment of the US Defense Standardization & Specification Program,"
R.B. Toth Assoc. (Toth Report) Jan 1984

"Panel on Standardization," Joint Logistics Commanders Dec 1988

"Use of Commercial Components in Military Equipment," Final Report of the
Defense Science Board, 1986 Summer Study Jan 1987

"Use of Commercial Components in Military Equipment," Defense Science Board
Jun 1989

"Report of the Task Force on Specifications And Standards," Defense Science
Board (Shea Report) Apr 1977

"Enhancing Defense Standardization, Specifications and Standards:
Cornerstones of Quality," Report of the Secretary of Defense (Costello Report)
Nov 1988

"The Armed Services' Tactical Communication Systems Still Cannot Work
Together in Joint Operations," Second Report by the Working Group on
Government Operations (Brooks Report) Apr 1987

MANUALS, POLICIES & DIRECTIVES

Standardization Directory (FSC Class and Area Assignments) Defense
Standardization and Specification Program SD-1 1 May 1989

"An Overview of the Defense Standardization and Specification Program (DSSP),"
SD-8 1 May 1983

"Locating Off-the-Shelf Items," SD-5 Feb 1989

"DCA Interaction with Non-Government Standards Bodies," Defense
Standardization and Specification Program, SD-9 Apr 1984

"Defense Standardization and Specification Program Policies, Procedures and
Instructions," Defense Standardization Manual, DCA 4120.3-M Aug 1978

Subject: Defense Standardization and Specification Program Number 4120.3
10 Feb 1979

Subject: Development and Use of Non-Government Standards Number 4120.20
28 Mar 1988

Subject: Acquisition Streamlining, Number 5000.43 15 Jan 1986

Subject: Mandatory Use of Military Telecommunications Standards in the MIL-STD-188 Series, Number 4640.11 21 Dec 1987

Subject: Formal Coordination of Proposed Change 7 to the Defense Standardization Manual DCA 4120.3-M, Defense Quality and Standardization Office 16 Jun 1989

"National Security Telecommunications Policy," The White House, Directive No. 97, Unclassified Version of NSDD-97 8 Aug 1983

"The Basics of Developing Standards and Handbooks in the MIL-STD-188 Program," The 188 Working Group Sep 1986

"Program Plan for Tactical Communications System Technical Standards," (Standardization Area:TCTS) 30 Mar 1981

"Standards for Long Haul Communications," Program Plan, Department of Defense 30 May 1984

"Standards and Specifications, Order of Preference for the Selection of," Military Standard, MIL-STD-970 1 Oct 1987

"Commonly Used Acronyms," DCA, JTC3A, Ft. Monmouth JTC3A Pamphlet 5010 Oct 1988

"Development of Military Standards and Handbooks in the 188 Series," Executive Handout Booklet, Prepared by PRC Kentron (Undated)

"Standards Status Chart," JTC3A, Technical Standards Office 17 Apr 1989

NON-DoD PUBLICATIONS

"Reference Guide for Fiber Optic Test Procedures," EIA Component Bulletin, CB9-F, EIA Mar 1987

"Current EIA/TIA Standards, Interim Standards, Specifications, and Technical Publications on FIBER OPTICS," EIA (Undated)

"1989 Catalog of EIA & JEDEC Standards & Engineering Publications," EIA 1989

Attachment E

LIST OF ABBREVIATIONS AND ACRONYMS

ADP	Automated Data Processing
ANSI	American National Standards Institute
C3I	Command, Control, Communications, and Intelligence
CCITT	Consultative Committee on International Telegraph and Telephone
CINC	Commander in Chief
COMCAC	Command, Control, and Communications (Now called C3I)
DARPA	Defense Advanced Research Projects Agency
DCA	Defense Communications Agency
DoD	Department of Defense
ECSA	Exchange Carrier Standards Association
EIA	Electronic Industries Association
FIPS	Federal Information Processing Standards
IEEE	Institute of Electrical and Electronics Engineers
ITU	International Telecommunications Union
JITC	Joint Interoperability Test Center
JTC^{3A}	Joint Tactical Command, Control, and Communications Agency
JTSSG	Joint Telecommunications Standards Steering Group
NDI	Non-Development Item
NSIA	National Security Industrial Association
PM	Program Manager
RFP	Request for Proposal
SC	Steering Committee
TIA	Telecommunications Industry Association
WG	Working Group