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DEFENSE SYSTEMS MANAGEMENT COLLEGE

PROGRAM MANAGEMENT COURSE
INDIVIDUAL STUDY PROGRAM

PARTITIONING OF MILITARY
SPECIFICATIONS AND STANDARDS

STUDY PROJECT REPORT
PMC 77-2

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DEFENSE SYSTEMS MANAGEMENT COLLEGE

STUDY TITLE:

PARTITIONING OF MILITARY SPECIFICATIONS AND STANDARDS

STUDY PROJECT GOALS:

To identify, define, and assess improving cost effectiveness by partitioning military specifications/standards used in the acquisition process.

STUDY REPORT ABSTRACT:

Over the years military specifications and standards have been criticized by both contractors and the government as sources of poor performance, goldplating, program delays, and excessive costs. In 1975 the Department of Defense initiated a program requiring tailoring and the specific application of specifications and standards as a solution to these problems. Tailoring only alleviates part of the problem, however, and has been a source of conflict among those attempting to employ it in their programs.

This report describes a cost effective alternative to tailoring called partitioning. Partitioning employs an applicability matrix to portray specification requirements. It lessens the administrative burden, and improves coordination and responsiveness between the government and industry.

SUBJECT DESCRIPTORS:

Systems Engineering Management, Specifications and Standards (10.05.07)

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PARTITIONING OF MILITARY SPECIFICATIONS AND STANDARDS

Study Project Report

Individual Study Program

Defense Systems Management College

Program Management Course

Class 77-2

by

Robert J. Pratt
Major USAF

November 1977

Study Project Advisor
Mr. Wayne J. Schmidt

EXECUTIVE SUMMARY

This report discusses the problems associated with the application of military specifications and standards in acquisition programs. Over the years military specifications and standards have been criticized by both contractors and the government as sources of poor performance, goldplating, program delays, and excessive costs.

As a result of preliminary results released by the Defense Science Board Task Force on Specifications and Standards in 1975 which indicated the problem was in the application of specifications and not the specifications themselves, then Deputy Secretary of Defense, William P. Clements issued a memorandum to the Secretaries of the Military Departments on the subject of specifications and standards application. Following receipt of this memorandum each of the military departments initiated action to implement the specific application and tailoring of specifications and standards. Since that time increased emphasis has been placed on tailoring.

Tailoring only alleviates part of the problem, however, and it has severe limitations. A key indication of the limitations is the real world conflict between program management offices and the custodians of the specifications and standards who are responsible for its content. Another indication of limitations is the severe administrative impact tailoring creates on the already heavily burdened program management offices.

The report explores an alternative to tailoring called partitioning. This process involves the addition of permanently appended applicability matrix tables to selected specifications or standards thereby facilitating advance selection of specification requirements custom fit to the procurement regardless of commodity type or acquisition phase.

Partitioning offers a cost effective alternative to the tailoring concept by lessening the administrative burden on program management offices, improving coordination with specification custodians, and improving responsiveness from industry on tailoring proposals/contracts. Increased management attention of the partitioning concept is encouraged.

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SECTION I

Purpose

The purpose of this report is to evaluate the problems associated with the application of military specifications and standards in acquisition programs, and the corrective action being initiated to alleviate these problems. The report covers the evaluation of the problem, and its current status. An attempt is made to identify, describe, and assess a cost effective alternative to tailoring called partitioning. The objective here is to generate increased attention to partitioning as a means of alleviating the adverse impact of current tailoring policies and practices on the program management office.

Introduction

Over the years military specifications and standards have been criticized by both contractors and the government as sources of poor performance, goldplating, program delays, and excessive costs. The application of specifications and standards in acquisition programs has been the subject of considerable discussion and study. These studies have indicated that past practices of wholesale inclusion of specifications and standards in Requests for Proposals and resultant contracts have resulted in unnecessary costs and, in some instances, program failure.

This report focuses initially upon the basic problem of applying military specifications and standards, since a clear understanding of this problem is vital to a discussion of the currently preferred solution --tailoring. Past efforts at describing the problem which led to development of the tailoring concept have failed in this author's opinion to place sufficient emphasis on the impact of any proposed solution on the program management office. This impact will be evaluated as a key ingredient to solution of the problem.

An in-depth analysis of the current policy on tailoring is also made as a lead to a subsequent presentation of the partitioning concept as a cost effective alternative. The partitioning concept is illustrated to demonstrate its utility in the selective application of specifications and standards.

SECTION II

The Problem and Factors Leading Up to It

Economic conditions of the past several years have brought about a great concern for reducing the cost of weapon system acquisition. The shrinking value of the DoD budget has acted to reduce purchased quantities while increasing the need for greater excellence in the fewer acquired products. This fact coupled with increasingly higher costs of procured items, creates a predicament for the military acquisition community of having to do more with less.

Direction emanating from all levels within the Department of Defense and Congress indicates the requirement for identifying and eliminating high cost drivers in the acquisition process. As a result, many aspects of military procurement are undergoing critical examination in an attempt to develop workable methods for reducing acquisition costs. The requirements contained in military specifications and standards are but one of the facets of military procurement that are being examined.

Over the years specifications and standards have been blamed for poor performance, goldplating, delivery delay and excessive costs. They have been widely and variously criticized by the defense industry, military users, program managers, the General Accounting Office, and Congress.

Closer examination of the problem discloses a fundamental conflict between trends in the acquisition process and the application of military specifications and standards. Current emphasis on fly before buy in the acquisition process has resulted in the development of more comprehensive specifications and standards. Increasing emphasis on the development phase resulted in greater detail in specifications and standards especially those related to development testing and manufacturing processes. Reduced quantities of procured items resulted in more restrictive specifications and standards. All of these trends demonstrate an awareness of the increasing need for excellence particularly on the part of the specification people who are doing their best to specify a better product. The result of such awareness, however, is higher costs.

Numerous studies have been conducted as a result of the criticism levied at military specifications and standards. Foremost among these was a study conducted by the Defense Science Board Task Force on Specifications and Standards. The Task Force was chartered in 1974 as a panel of the Defense Science Board by Deputy Secretary of Defense William P. Clements under the Chairmanship of Dr. Joseph F. Shea, Senior Vice President, Raytheon Company. Comprised of military and civilian executives from both DOD and industry, this committee was tasked to identify the factors contributing to unnecessary contract costs arising from military specifications and standards and to recommend appropriate action to be implemented through Department of Defense Directives and Instructions (3:I-1).

Their preliminary findings released in 1975 concluded that, contrary to popular belief, the content of specifications and standards is not the primary contributor to unnecessary contract costs. The main cause of cost escalation was identified to be in the misapplication, misinterpretation, overdemonstration of compliance and rigid enforcement of specifications and standards in Requests for Proposals and contracts. Contractor and Government Management seemed equally at fault, but for different reasons. Government authorities were motivated to avoid the risk of failure so as to fully protect Government interests, while contractors were motivated to comply rather than risk nonconformance in a highly competitive market place. This overly conservative application of military specifications and standards, coupled with an inherent resistence to change in the DOD acquisition process, results in unnecessary costs (3:1-1).

In their final report issued in April, 1977 the Task Force concluded that although it is not feasible to eliminate military specifications and standards, the cost of their development and application could be reduced if the following would occur:

1) DOD must institute an effective program to introduce flexibility, judgment and contractor latitude and incentives in the application of specifications. The application climate would improve if Industry will accept the discipline inherent in the Defense Standardization Program as a way of life, resist the tendency to overreact, and establish practices which conform without increasing costs. At the same time, however, the Government must recognize the inherent arbitrary nature of standardization and be willing to tailor specifications to the particular needs of a program.

2) Conservatism of the procurement environment which

encourages cautious conformance rather than forceful ingenuity, must be overcome. This could be accomplished by educating and motivating the Program Manager and functional support organizations to realize that strict, parochial application of specifications and standards is neither required nor desired.

3) Improvements must be made in specification development particularly in the General Requirements and Management categories. Such improvement could be assisted by the consolidation of specifications across services and the development of national standards (3:V-II).

Before discussing how some of these Task Force conclusions are being implemented, however, we need to review the past and present application of military specifications and standards in the acquisition process.

SECTION III

The Application of Military Specifications and Standards

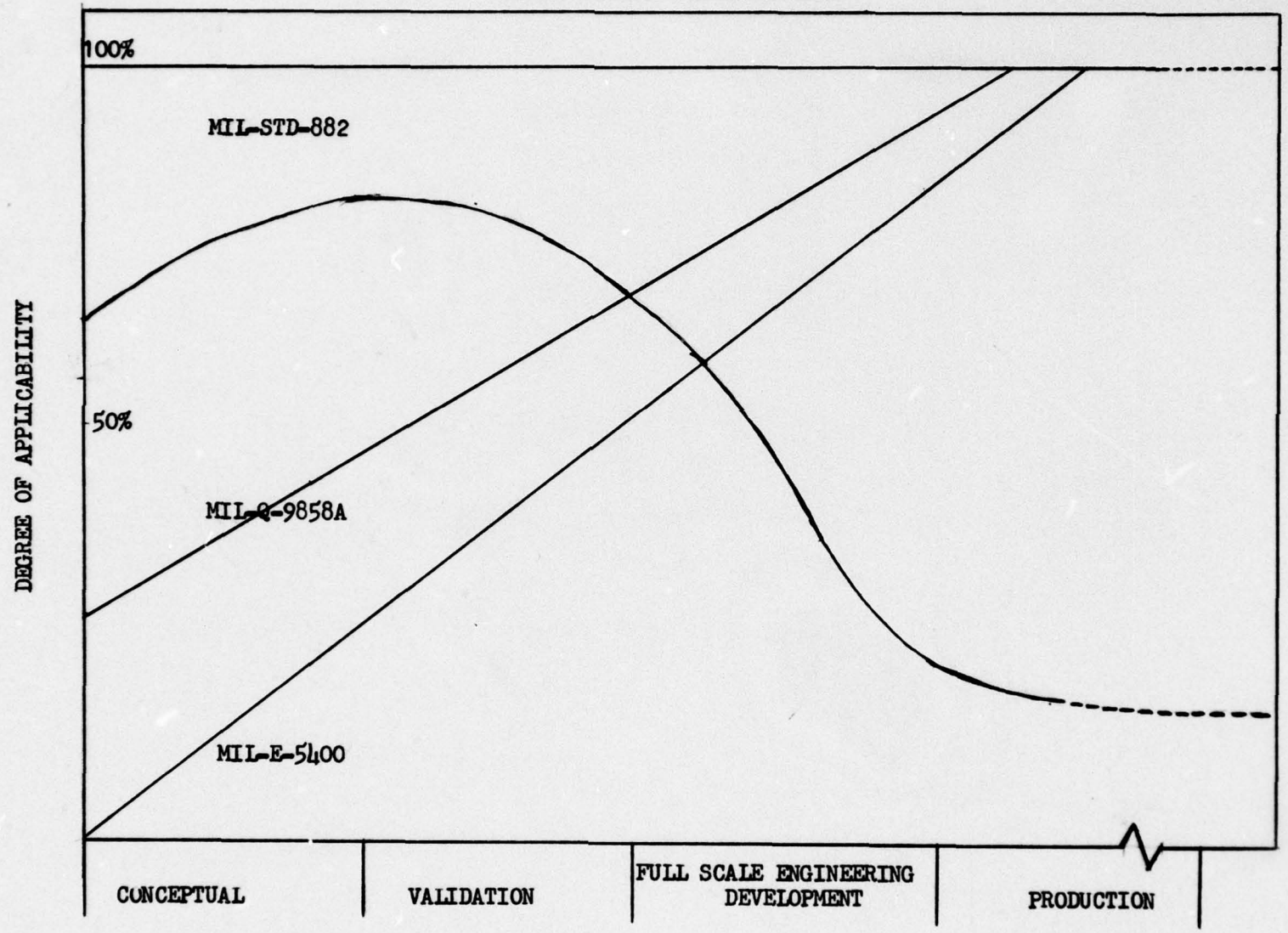
In reaction to higher costs and the decreasing value of the DOD budget, the procurement side of the House has adopted several techniques aimed at stretching the dollar. Included among these techniques are design to cost, contractor maintenance, and limited commitment development. Although well intended, a number of these techniques create difficulties in the selection of the appropriate military specifications and standards requirements for contractural application.

The limited commitment contracting method is a good example. This method is aimed at minimizing the possibility of going into volume production with an inferior weapon and the penalties associated with latent discovery and correction. Under this method the contract may be limited to a single phase development and perhaps one or two hardware models to be used in competition.

The difficulty which arises with the specification application under this method is caused by the lack of development sequencing parameter in the majority of specifications and standards. For example, consider a MIL SPEC whose requirements sequence is similiar to the MIL-E-5400 curve illustrated in Figure 1 (1:4). Requirements sequenced in this manner are

Figure 1

SPECIFICATION APPLICABILITY



usually dependent on the existence of completed engineering data, and, in many cases, production implementation for total compliance. Imposition of the total specification requirements in a limited development phase type contract necessitates unnecessary contractor expenditures and massive variations in the interpretation of what constitutes compliance with requirements on both the part of the contractor and the cognizant contract administration agency. If competing contractors are involved, the problem is further magnified.

Another phenomena associated with the current application of specifications and standards is the fan out effect inherent in the traditional military specifications referencing practice. The fan out effect, which is also commonly referred to as a specification tree effect, describes a situation wherein a single specification included in a contract references other associated specifications and standards with which a contractor must comply to fulfill compliance with the top level specifications. It has been alleged that the fan out effect can result in up to 600 specifications being invoked because of a single specification call out (1:2). Under certain contractual circumstances, these referenced requirements can unnecessarily drive costs upwards.

A final characteristic associated with the application of specifications and standards pertains to their impact on limited and small quantity acquisitions. As is commonly known, the genesis of most specifications and standards is based on experience--some good and some bad. Military specification requirements concentrate on conditions found to

be troublesome on equipments procured in large enough quantities, or of sufficient technical prominence, to warrent widespread concern. A common erroneous assumption made is that the detailed requirements based on experience with large quantity acquisitions will impact exactly the same on small scale quantity acquisitions. Certain of these requirements, such as process control criteria, drawings and engineering data, configuration control and interchangeability, which are prevalent concerns in mass production, have questionable economic justification when quantities are small. Nevertheless, there is abundant evidence of their costly application on limited and small quantity acquisitions.

SECTION IV

Tailoring - A Solution?

Among its proposed solutions to the specifications and standards application problem the Defense Science Board Task Force included the concept of tailoring. According to the Task Force, tailoring is "the process of using common sense in the application of specifications and standards..." (3:I-7). "In essence," they said, "this means using the specifications as a reasonable starting point, but modifying their applicability to suit the circumstances of a given program" (3:I-7). The effect of such a process is to remove non-essential requirements from Requests for Proposals and Contracts for each specific procurement.

The concept of tailoring proposed by the DSB Task Force was based on their observation that nearly half the failures in subsystem qualification testing represented not an outright failure in the "go/no go" sense, but rather a failure to meet an essentially arbitrary specification requirement which was frequently insignificant to the intended mission. In their opinion, tailoring would encourage responsible people to understand the real requirement and be in a position to waive and/or change the specification. Tailoring would, therefore, highlight the essential functional and physical properties of an item and prevent dissipation of resources on nonessential requirements (3:I-8).

As a result of the DSB Task Force recommendations, tailoring of specifications and standards has become the current DOD buzzword. In our academic professional schools students are being instructed to pare down their requirements to only the essentials through tailoring. Many of our military and civilian leaders within DOD are espousing tailoring as an effective approach to defining realistic requirements in programs.

On 4 August 1975, then Deputy Secretary of Defense, William P. Clements, issued a memorandum to the Secretaries of the Military Departments on the subject of specifications and standards application. Based on the DSB Task Force preliminary findings available to him at that time, he instructed his staff and the Service Secretaries to initiate appropriate procedures, regulations and policies to correct the problem areas identified by the Task Force. His desire was "...to promote and foster a mutually compatible program to institute effective cost reduction techniques in the acquisition process." (3:Appendix G).

Each of the military departments has initiated action to implement the specific application and tailoring of specifications and standards. Within the Army, the Development and Readiness Command (DARCOM) issued a letter on 25 September 1975 which established and implemented comprehensive application and tailoring procedures. The letter identified specific specifications and standards to be tailored, required formal certification of tailoring by functional technical groups, and also required retention of formal records reflecting the degree of tailoring (3:V-7).

On 7 October 1975, the Navy Chief of Naval Operations (CNO)

issed a letter formally implementing OSD policies. The Navy Electronics Command (NAVELEX) established a formal management level review board to implement the specification application and tailoring instructions. Naval Air Systems Command (NAVAIR) established an ad hoc committee to determine how the instructions would be implemented within their command (3:V-8).

The Air Force has gone the farthest of the three Services in formalizing the specific application and tailoring concept. On 12 June 1975 the Air Force Systems Command issued AFSC R 800-25 entitled "Application of Military Specifications and Standards to DOD Procurements." Further initiatives are now being implemented by the various AFSC Divisions, such as the Aeronautical Systems Division (ASD), and the Space and Missile Systems Organization (SAMSO), through issuance of handbooks and guides covering the detailed procedures of application and tailoring of specifications (3:V-8).

Two basic changes were also made to the Armed Services Procurement Regulation to cover the subject of selective application and tailoring specifications and standards. The first of these, ASPR 1-1202(a), establishes specific policies which replaced blanket application of specifications and standards with the mandatory requirement that these documents be tailored when invoked (2:1:182). The second change, ASPR 1-1202(e), tightened feedback procedures covering interim changes or corrections to specifications and standards required to effect a procurement (2:1:182). This provision is intended to thereby reduce, or at least, achieve increased control over the impact of unnecessary specification and standards changes.

in a program.

In April 1977 the DOD issued a new directive, DODD 4120.21, addressing Specifications and Standards application. This document directs the Services to establish procedures for selective application and tailoring of military specifications and standards. It also directs the Services to impose only "essential system needs," to avoid "blanket contractual imposition," and to solicit recommendations from prospective contractors (4:3). These procedures apply throughout the acquisition process and each program is required to document the extent to which specifications, standards and data item descriptions have been tailored. In addition, the directive requires the establishment of a review board structure within each Service to review the effectiveness of the tailoring achieved on each program. Program managers are further directed to submit the degree of tailoring accomplished on their program for DSARC review.

A legitimate question at this point might be just how does a program manager apply the tailoring process to his program. Enclosure 1 to DODD 4120.21 provides the answer (4:Encl. 1). It describes tailoring as a four step process:

1) Selection from the total realm of specifications and standards, those that may have application to a particular program.

2) Review and evaluation of those selected to identify those documents having specific application.

3) Tailoring of each applicable document to include only those provisions required for the specification application so that each document imposes only the minimum necessary requirements in the solicitation and contract.

4) Examination of document requirements surviving this process to specifically tailor them to support the particular system during acquisition and life cycle ownership.

Proponents and critics of the tailoring concept each agree on its utility as a means of reducing costs of the acquisition process as contemplated by Secretary Clements. Critics are quick to point out, however, that tailoring requires a considerable manpower resource investment which they do not have the capability to make. In the ideal sense, as illustrated in the four step process outlined above, all specifications and standards to be imposed on a program should be tailored. In the real world, however, there are far too many to be completed prior to issuance of a Request for Proposal. In addition, as is frequently pointed out by many critics, it is difficult to determine "a priori" which ones will present problems as the development goes along. Program managers have also complained of the continuing need to reaccomplish the tailoring process for each phase in the acquisition process. This imposes a considerable workload, and frequently the program office does not possess the expertise within its confines or in its functional support divisions to accomplish the task.

Fortunately, the DSB Task Force was alert to the real world situation involving tailoring. They concurred in the impracticality of tailoring each specification before calling it out. They recognized that such a process would extend the definition/validation phase of a program unnecessarily, and would place an almost impossible burden on the already overloaded government program manager (3-II-1).

In their review they were able to identify specifications which either because of their wide usage, broad applicability, or both were prime candidates for misapplication and misinterpretation. These specifications and standards represent a finite group which have one common characteristic--they do not pertain to a procurable end item. Yet because of their wide usage and/or applicability, they act as cost drivers in a program (3:I-8). These specifications and standards cover requirements in such areas as:

-- General Design Requirements
-- Configuration Control
-- Quality Control, Inspection, Calibration
-- Reliability and Maintainability
-- Integrated Logistics Support
-- Human Engineering and Safety
-- Environmental Requirements and Test Methods
-- Documentation, Standardization
-- Packing, Packaging, Preservation, Transport (3:II-3).

Although the DSB Task Force recognized the difficulty associated with tailoring even those specifications and standards included in the above cost driver categories, they suggested that careful attention to approximately twenty such documents prior to the initiation of a program could reduce costs, and perhaps more importantly create an atmosphere which would encourage further tailoring as the program progressed (3:II-3).

Unfortunately, however, as one reviews the type of direction currently being published regarding specific application and tailoring by the Services and the ASPR Committee as illustrated earlier in this report, it is readily apparent that the emphasis is being placed on a comprehensive, all encompassing program involving all specifications and standards rather than the cost drivers. This type of emphasis

and the additional reporting and reviewing burdens being placed on both military and civilian program managers to justify tailoring, or the lack of it, on their programs has caused many to search for a more effective alternative. Is there one? Many think so. It's called partitioning.

SECTION V

Partitioning - An Effective Alternative

In their search for an effective alternative to the burdens of tailoring, a segment of military and industry managers have focused on a concept called partitioning. This concept employs an applicability matrix table, or set of tables in some cases, which are added permanently to selected specifications or standards. These tables provide advance selection of requirements custom fit to the needs of each buying activity using the document regardless of which commodity it is procuring or which phase of development is involved.

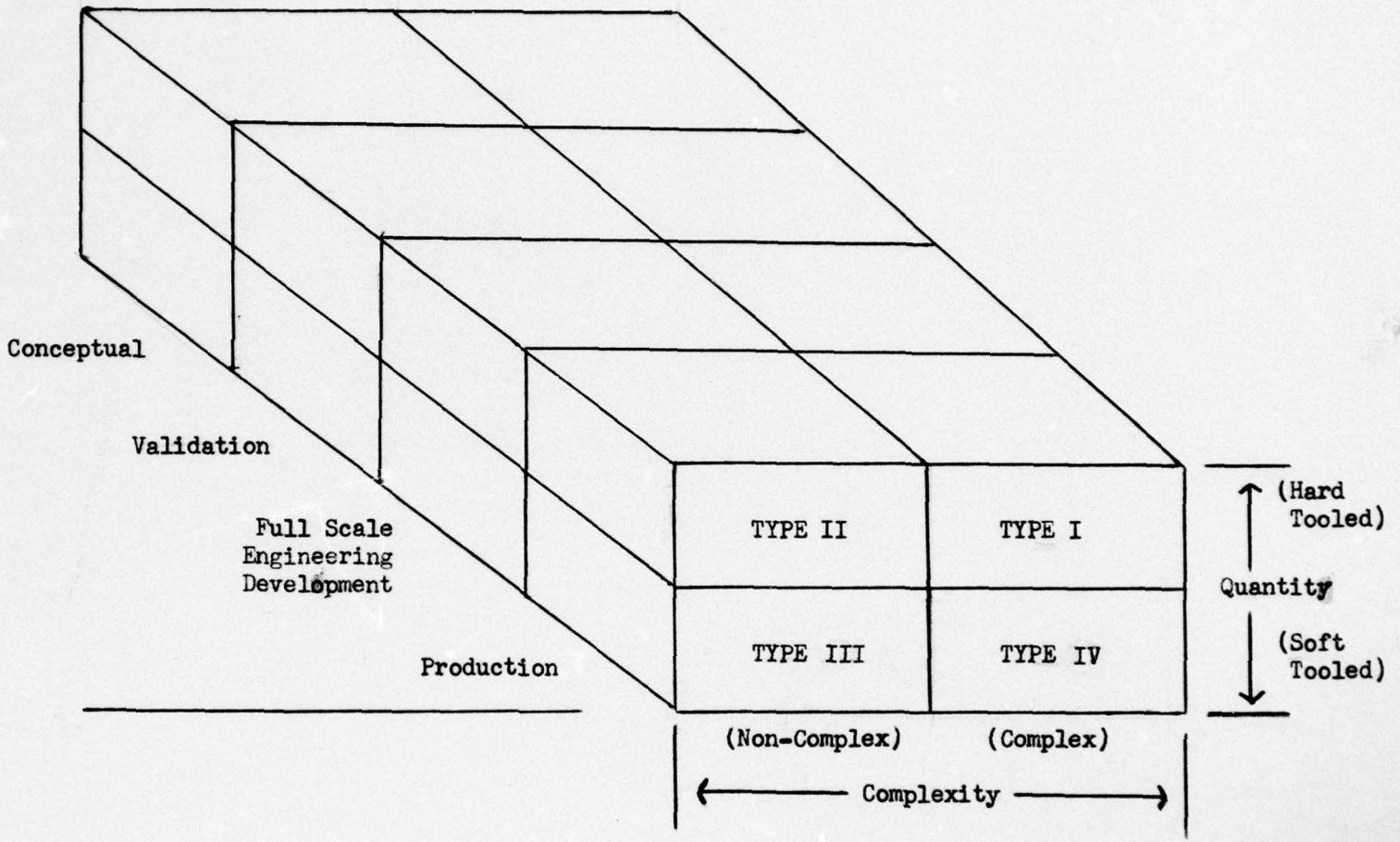
Under the partitioning concept the requirements of military specifications and standards would be partitioned into modularized sub-sets as indicated in Figure 2 (1:5). Each sub-set is described in a three dimensional configuration by the addition of two dimensions (the acquisition phase and the quantity) to the complexity dimension existent in current specifications and standards.

A significant characteristic of this model is that it offers four types of program option sequences. The Type I sequence corresponds to an acquisition program which concludes with the hard tooled production of complex articles.* The Type II sequence corresponds to the hard

*This could be considered the traditional type of acquisition program which fit military specification and standard requirements best.

Figure 2

THE PARTITIONING PROCESS



tooled production of non-complex articles. Type III and Type IV represent soft tooled production for complex and non-complex articles respectively.

The best illustration of this conceptualized model can be seen in Figure 3 (1:8). This form would appear as an appendix to the existing military specification or standard. In a matrix format this table simply indicates what part of the specification is essential or non-essential for each program type and phase. (The "E" indicates essentiality and the dashes non-essentiality.)

Responsibility for development of the basic matrix format for each selected specification or standard would be assigned to the preparing activity responsible for issuance of the specification or standard. This matrix would then be provided to the custodians (users) of the specification who supply matrix field information according to their buying organizations' needs. The custodians return the completed matrix(es) to the preparing activity for release as revision(s) to the basic document. Application of the specification requirements would thereby be controlled by the buying organizations' matrices.

A simplified illustration of matrix development is shown in Figure 4. Here we see the custodians (Army, Navy, Air Force) developing applicability matrices for each of the various commodity classes procured by their buying organizations. Upon return to the preparing activity, these matrices would be appended to the applicable specification or standard for subsequent contractual application by the buying organizations.

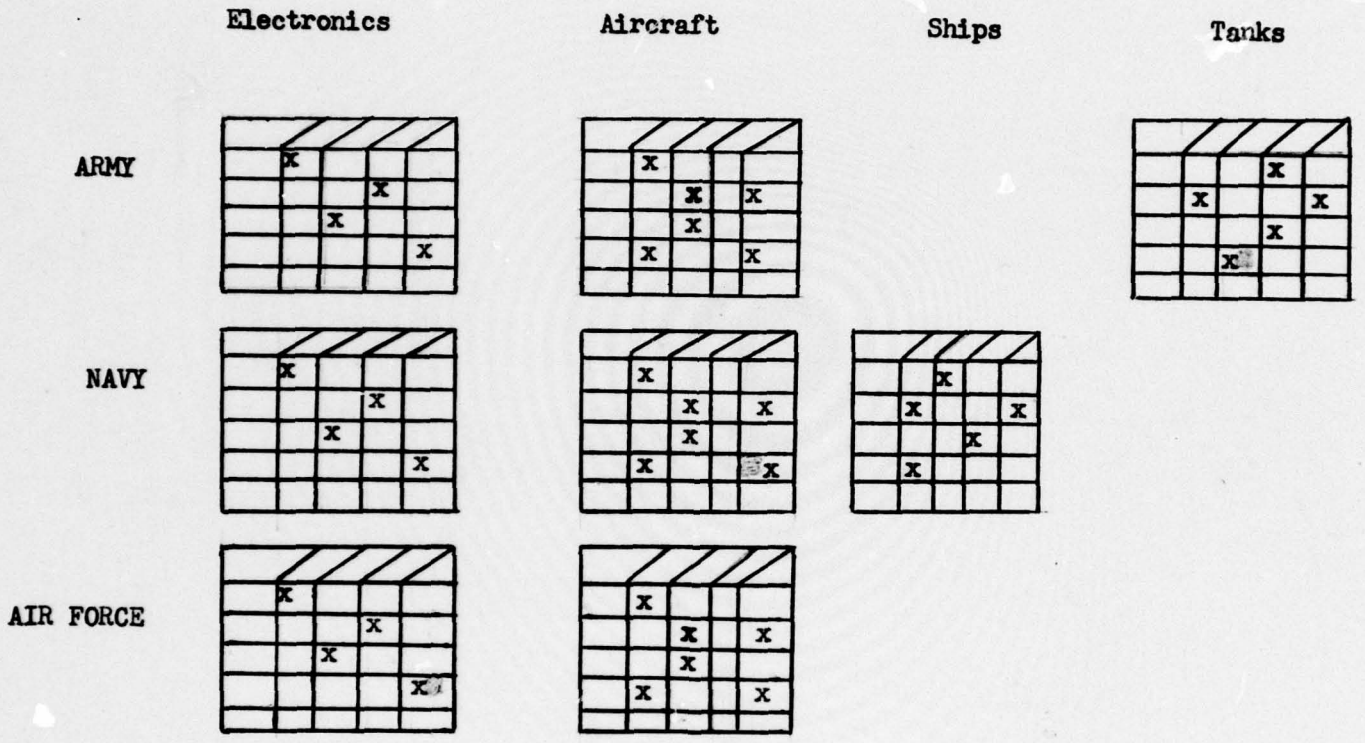
Figure 3

SAMPLE OF PROPOSED MATRIX

APPLICABILITY MATRIX																						
ACQUISITION PHASE	CONCEPTUAL				VALIDATION				FULL SCALE DEVELOPMENT								PRODUCTION			
HARDWARE MODEL	EXPLORATORY DEVELOPMENT				ADVANCED DEVELOPMENT				ENGINEERING DEVELOPMENT				PREPRODUCTION				PRODUCTION			
TYPE OF PROGRAM	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
PARAGRAPH NUMBER	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3.1.1.1.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	E	E	E	E
3.1.1.1.3.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	E	E	E	–
3.1.3	–	–	–	–	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
3.1.6.3.1	–	–	–	–	E	E	–	–	E	E	E	E	E	E	E	E	E	E	E	E
3.1.6.5	–	–	–	–	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
3.1.2.0	–	–	–	–	E	E	–	–	E	E	E	E	E	E	E	E	E	E	E	E
3.1.33.7 (a)	–	–	–	–	E	E	–	–	E	E	E	E	E	E	E	E	E	E	E	E
3.1.33.7 (b)	–	–	–	–	E	E	–	–	E	E	–	–	E	E	–	–	E	E	–	–

Figure 4

MATRIX DEVELOPMENT



The key feature of this approach is that it adds the applicability information to the document on a one time basis without disturbing the existing content. In this manner it offers a more cost effective alternative to satisfying the objectives of the DOD tailoring process by eliminating the repetitious rewriting exercises otherwise required of the program office as it attempts to retailor the specifications for each acquisition phase as the program progresses. With matrices appended to existing specifications and standards, the program office would merely need to select the applicable specification or standard for inclusion in the Request For Proposal or Contract. The matrix would indicate to the contractor which portions of the specification were applicable as a function of the acquisition phase being encountered through the solicitation.

Another feature of this approach which makes it desirable from a cost effective viewpoint is that it would increase responsiveness of industry to the proposed tailoring of the specifications and standards included in the proposal. The current application of the tailoring concept consists to a great extent of soliciting comments from industry on all specifications or standards without reference to any specific requirements. The partitioned specification or standard would ease the contractors' review and analysis of the proposal and permit him to address his comments to only those requirements indicated as being applicable. Experience clearly indicates that the current method of soliciting comments is ineffective since few, if any, contractors respond with comments during the pre-contractual phase for fear of being considered non-responsive.

Although the partitioning concept has not received widespread acceptance by the DOD policy makers, the DSB Task Force did indicate that a variant of this concept called sectionalizing is being used (3:V-6). Sectionalizing differs from partitioning by requiring grouping of all mandatory requirements, identification of optional requirements, ranges, variables, etc.. Each requirement is then structured to be independent of any other requirements in the document. The purpose and objective of each separately structured requirement are defined together with a statement of how it should be utilized in acquisition programs. A number of documents are now in the process of revision to adopt the sectionalizing technique (3:V-6).

Partitioning appears to offer a distinct administrative advantage over sectionalizing in that it can be incorporated into existing specifications and standards without disturbing their format. Sectionalizing requires the development of a completely new format.

SECTION VI

Conclusion

As a result of the outstanding efforts of the Defense Science Board Task Force on Specifications and Standards, the problems associated with the application of military specifications and standards are beginning to receive proper recognition. Many new initiatives have been implemented by DOD and the Services to alleviate those problems. Tailoring is emphasized as the panacea to their correction. Emphasis is also being placed on the high cost driver specifications and standards. Unfortunately, however, tailoring as it is currently being described will only alleviate part of the problem. In addition, tailoring has severe limitations.

Considerably more needs to be done to assure cost effective implementation of the tailoring philosophy. One such step should include an objective evaluation by the policy makers of the impact and real world effectiveness of current tailoring policies. Since partitioning offers an affordable, effective alternative to the approach, a second step should be increased attention to use of the partitioning concept on high cost driver specifications and standards.

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