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MILITARY HANDBOOK

A Guide for DOD-STD-2168 Defense System Software Quality Program

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FOREWORD

1. This military handbook is approved for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Armament, Munitions, and Chemical Command, Attn: SMCAR-BAC-S, Picatinny Arsenal, NJ, 07806-5000, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

3. The Department of Defense (DOD) is committed to improved defense system acquisition and development. DOD-STD-2168, Defense System Software Quality Program, and this handbook are intended to provide the framework for a software quality program during development and support of those systems.

4. DOD-STD-2168 is based on the principle that software has two vital and complementary components:

   (1) The desired quality must be built into the software; and

   (2) The software must be evaluated to determine that the desired quality has been achieved.

   The objective of the first component is to create a process that will produce the desired quality in the software product during development. DOD-STD-2167, Defense System Software Development, provides the standard framework for the development and documentation of software for Mission Critical Computer Resources (MCCR); DOD-STD-7935, DOD Automated Information Systems (AIS)

Documentation Standards, provides the framework for software documentation for Information Processing Standards for Computers (IPSC).

The objective of the *second component* is to create a process to provide an independent assessment of whether the desired quality has been achieved. DOD-STD-2168 provides the standard framework for this process.

5. This military handbook interprets DOD-STD-2168 and provides assistance to Government program managers and others responsible for imposing software quality program requirements on a contract.

6. Note that this handbook has been prepared to support the initial release of DOD-STD-2168, dated 1 April 1988, and the versions of documents referenced therein (see 6.2).

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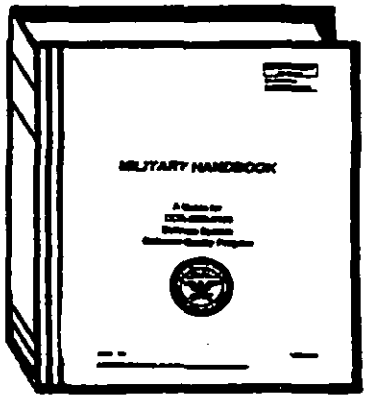
1. SCOPE

1.1 **Scope.** This handbook provides guidance to Government program managers and other program office staff responsible for applying DOD-STD-2168, Defense System Software Quality Program.

1.1.1 **Purpose of the handbook.** This handbook describes the intent of DOD-STD-2168's requirements, interprets those requirements, and provides recommendations for applying the standard on a software acquisition or support contract.



1.1.2 **Organization of the handbook.** This handbook is organized into six sections. This first section defines the scope, purpose, organization, and applicability of the handbook and DOD-STD-2168, provides wording for use in placing DOD-STD-2168 on a contract, describes key concepts of DOD-STD-2168, and provides general tailoring guidance. Sections 2 and 3, respectively, list the documents that are referenced by this handbook and the acronyms used in this handbook. Sections 4 and 5 present the text of each corresponding DOD-STD-2168 paragraph, provide an interpretation, and state the intent of each paragraph. Section 6 contains notes of explanatory nature.

1.2 **Organization of the standard.** DOD-STD-2168 is organized into six sections.

a. Sections 1 through 3 provide the Scope, Referenced Documents, and Definitions for specialized terms used in the standard.

b. Section 4 specifies general requirements for a software quality program. It has seven main features:

1) 4.1 specifies the objective of a software quality program.

2) 4.2 specifies the responsibilities of those who must implement the software quality program within a company.

3) 4.3, 4.4, and 4.5 require the software quality program to be documented and specify the role that that documentation is to have during the life of the contract.

4) 4.6, 4.7, and 4.8 specify the evaluations required by the standard, records to be maintained, and the requirement to enter problems found into a corrective action process.

5) 4.9 requires the contractor to maintain evidence that contractual requirements have been met.

6) 4.10 requires a contractor's management to review the software quality program.

7) 4.11 specifies the Government's rights of access to the contractor's facilities.

c. Section 5 is an explicit list of required evaluations and criteria for these evaluations: the specific components of the software quality program.

d. Section 6 is not contractually binding. It contains information explaining that the contractor can augment the activities required by the standard, the data requirements associated with the standard, and provides a list of key words.

1.3 Applicability.

1.3.1 Applicability of the handbook.

a. Contracts imposing DOD-STD-2168. This handbook may be used in preparing, negotiating, or modifying any software development or support contract that imposes DOD-STD-2168.

--> Note that DOD-STD-2168 is intended to apply both to software development and software support projects. For brevity of wording, the standard uses the phrase "software development" throughout, but 1.2.3 states that the words "software development" are to be interpreted as "software support" when appropriate.

b. Guidance for Government agencies. This handbook offers aid to Government agencies and should not be included in procurement packages or contracts as a contractually binding document.

1.3.2 Applicability of the standard. The applicability of DOD-STD-2168 is specified in 1.2 of the standard. The paragraphs below comment on that applicability.

a. Software products. DOD-STD-2168 applies to all software plans, all deliverable software documentation, and all software developed or delivered under the contract.

--> Note, however, that applicability to non-developmental software, non-deliverable software, and deliverable elements of the software engineering

and software test environments are limited to the specific requirements in 5.5, 5.6, and 5.7, respectively.

b. **Software development processes.** DOD-STD-2168 requires evaluations of the processes used in software development. DOD-STD-2168 uses the terms processes, activities, practices, and procedures interchangeably. The terms are synonymous in this context. All software development projects have such processes, activities, practices, and procedures regardless of whether they are documented. DOD-STD-2168 evaluations apply only to the software development processes required by the contract and those described in the software plans.

--> Note that process evaluations are not meant to included evaluations of the capabilities of managers, software engineers, or any other personnel who are associated with the project.

c. **Software development contracts.** DOD-STD-2168 is meant for application on a software development contract. When a Government agency, rather than a contractor, develops, enhances, or corrects software, DOD-STD-2168 may be applied to that agency. In this case, the term "contractor" throughout the standard applies to that agency, and the term "subcontractor" to any participating contractors of that agency.

--> Note that the standard is meant to be imposed on a software development contract and is not intended for application on a separate contract for independent verification and validation of the software products.

d. **Life cycle and acquisition phase.** DOD-STD-2168 may be applied at any time during acquisition or support when software products are specified, developed, or changed. DOD-STD-2168 is applicable to all software developed by the DoD.

1.4 Tailoring.

1.4.1 **What is tailoring?** Tailoring is the process of evaluating each requirement in a standard or DID to determine whether it is needed for a given project and deleting those requirements that are not needed. Tailoring is intended to eliminate unnecessary and duplicative requirements.

- For standards, requirements may be deleted, partially deleted, or a modified version of the requirement may be included in the SOW.

- For DIDs, requirements may be deleted or partially deleted, but not modified.

General tailoring guidance for standards is provided in DOD-HDBK-248, Guide for Application and Tailoring of Requirements for Defense Materiel Acquisitions. Detailed tailoring guidance for DOD-STD-2167 is found in MIL-HDBK-287, A Tailoring Guide for DOD-STD-2167A, Defense System Software Development. The tailoring steps provided in that handbook may also be applied to DOD-STD-2168.

1.4.2 **Why tailor?** DOD Directive 5000.43, Acquisition Streamlining, states that "Requirements that are not mandated by law or established DOD policy and that do not contribute to the operational effectiveness and suitability of the system, or effective management of its acquisition, operation, or support, shall be excluded." The intent of this directive is to avoid unnecessary costs and allow systems to be fielded sooner.

1.4.3 <u>What to tailor?</u> The objective of DOD-STD-2168's software quality program is to assure the Government program manager that software products and processes are progressing satisfactorily by providing visibility into a software development project. The insight given through a software quality program's evaluations are meant to reduce the risk of software failure, the risk of poor software maintainability, and the risk that products will not be delivered on time and within budget. Effective tailoring of the standard is based upon identifying and deleting those requirements in the standard that do not contribute to reducing these risks on a particular project. There are three key considerations to keep in mind when tailoring this standard:

- DOD-STD-2168 is meant to be self-tailoring. If a product or process is not specified in the contract or described in a software plan, the corresponding evaluation of that product or process does not apply. This means that:

  - o Requirements to evaluate non-existent products and processes are not applicable

  - o Requirements to use non-existent criteria can be ignored. For example, a requirement to evaluate a process for adherence to plans is not applicable if those plans are silent on the process.

- Section 4 of DOD-STD-2168 was not meant to be tailored. Only the specific evaluations and criteria listed in Section 5 should be possible candidates for tailoring as explained in Section 5 of this handbook.

- DOD-STD-2168's software quality program is meant to impose requirements on the software development contractor to evaluate himself. The Government program manager also has several other options for evaluation of the software

development activities and products for a given project. On some projects, it may make sense for the program manager to have several organizations performing evaluations of the contractor's products, while on other projects, selected evaluations may be tailored from DOD-STD-2168 for the contracted software development effort and performed by other agencies instead. Options available to the Government program manager include evaluations by:

- The cognizant Contract Administration Services organization
- A software Independent Validation and Verification contractor
- The Software Support Agency
- The Government Program Office.

1.4.4 **Contractor-recommended tailoring.** When contractors are asked to provide recommended tailoring of DOD-STD-2168, this handbook may be used to assist that effort. Final tailoring decisions remain the responsibility of the Government program manager.

1.5 Relationship to MIL-Q-9858.

1.5.1 **Hardware and software system.** When both hardware and software elements are present in a system, MIL-Q-9858, Quality Program Requirements, applies to the hardware elements and DOD-STD-2168 applies to the software elements. When a Government program manager applies both MIL-Q-9858 and DOD-STD-2168 to a development contract, the following phrase should be used for

referencing the standards in contracts in accordance with Federal Acquisition Regulation (FAR) 52.246-11:

"The Contractor shall comply with the specification titled MIL-Q-9858, Quality Program Requirements, for the hardware elements in this system and with the specification titled DOD-STD-2168, Defense System Software Quality Program, for the software elements in this system, in effect on the contract date, which are hereby incorporated into this contract."

–> Note that a Government program manager may apply only DOD-STD-2168 to a development that includes both hardware and software. In this case the above phase should be modified to:

"The Contractor shall comply with the specification titled DOD-STD-2168, Defense System Software Quality Program, as tailored for the contract, for the software elements in this system, in effect on the contract date, which are hereby incorporated into this contract."

1.5.2 **Software only system.** When a contract is for software only, only DOD-STD-2168 is applicable and MIL-Q-9858 should not be cited on the contract. When a Government program manager applies DOD-STD-2168 to a software only development contract, the following phrase should be used for referencing the standard in contracts:

"The Contractor shall comply with the specification titled DOD-STD-2168, Defense System Software Quality Program, as tailored for the contract, in effect on the contract date, which is hereby incorporated into this contract."

1.6 Key concepts of DOD-STD-2168.

1.6.1 Does not impose an organizational structure. DOD-STD-2168 specifies a software quality program requiring that certain evaluations take place. It does not require the contractor to have or develop a separate organization to perform those evaluations. The evaluations may be performed by any qualified personnel within a company who meet the criteria in 4.2 of the standard.

--> Note it may make sense on a project for software engineering or software test organizations to perform some of the DOD-STD-2168 evaluations, while other evaluations may be performed by software management, general management, or others in the company. While a separate software quality organization may perform DOD-STD-2168's evaluations, the standard specifically avoids mandating that such an organization exist.

1.6.2 Does not require a "2168 shop." The software quality program describes the contractor's plans for a software quality program to meet the requirements of a particular contract. The contractor is not required to have procedures for every requirement in DOD-STD-2168, only for those required by the contract.

--> Note that if the contractor has an existing, documented software quality program, DOD-STD-2168 allows the contractor to adapt that program for each contract on which DOD-STD-2168 is applied. The standard allows the contractor to reference procedures from his existing software quality program (if he has one) rather than including them in the Software Quality Program Plan (SQPP) for each project. The referenced procedures may not be required by contract to be deliverable, however, they must be made available to the government at the time of their review.

1.6.3 Defines software quality. In 3.5 of the standard, software quality is defined as "The ability of a software product to satisfy its specified requirements." This means that only the requirements specified for a product on the contract are to be used to evaluate the quality of that product. If the product meets contractual

specifications, it is, by DOD-STD-2168's definition, a quality product regardless of how others may interpret the quality of the product by other definitions.

1.6.4 **Does not specify requirements for the software design, for the documentation of the software, or for the processes and activities used to develop the software.** DOD-STD-2168 specifies the requirements for a software quality program. Its evaluation requirements are not meant to require the development of the software products or the performance of the software development processes or activities named by the evaluation. Such requirements must be imposed through the contract.

1.6.5 **Requires on-going evaluations.** DOD-STD-2168 requires on-going evaluations, performed in parallel with software development so that problems are detected early, and can be corrected early, rather than going unnoticed until software testing or deployment.

a. **Product evaluations.** DOD-STD-2168 requires evaluations of software products. These products include deliverable software, software plans and other software documentation, non-developmental software which is incorporated into deliverable software, and non-deliverable software used in the automated manufacturing of deliverable hardware or in the qualification or acceptance of deliverable software or hardware.

b. **Process evaluations.** DOD-STD-2168 requires evaluations of the contractor's adherence to software plans and to software development processes imposed on the contract. These evaluations are intended to determine whether the contractor "practices what he preaches" in software development for the project. Process evaluations are essential for ensuring quality is built into the product.

c. Other evaluations. In addition to product and process evaluations, DOD-STD-2168 requires evaluations of the contractor's software development library, subcontractor management, the preparations for acceptance inspection and preparation for delivery, and participation in formal reviews and audits.

--> Note that all problems or contractual nonconformances detected in the evaluations are to be entered into the contractor's corrective action process. DOD-STD-2168 does not task the contractor to have such a process. DOD-STD-2168 assumes that a corrective action process is tasked elsewhere in the contract.

1.6.6 Provides evaluation criteria. The evaluation criteria specified in DOD-STD-2168 are discussed below.

a. Compliance with the contract. This criterion requires the contractor to perform evaluations that determine whether requirements for products, processes, and activities specified in the contract have been met.

--> Note that contractual requirements are cited in the SOW, CDRL, tasks, agreements, special provisions, referenced Government standards, applicable FAR and DFARS clauses, and other documents referenced by the basic contract (such as a system specification generated before the writing of this specific contract was begun.)

Typical questions that might be asked to satisfy this criterion are as follows:

1. Are all processes required in the contract being followed?

2. Does each product conform to requirements regarding title page, formatting, figure placement, and other presentation items required by the applicable Data Item Description (DID)?

3. Does each paragraph contain the required content in the right order?

4. Is the product packaged in conformance with the stated delivery requirements and marked with the proper security classification?

5. Does the software code conform to the required programming language and coding standards?

6. Has software met the required execution criteria (including start-up, shut-down, recovery, performance, and other specified criteria)?

7. Have software code and documentation changes been made in accordance with procedures required by the applicable standard(s)?

8. Does the product comply with the required data right provisions, such as proprietary ownership rights, warranties, and escrow account provisions?

b. **Adherence to software plans.** Software plans include all of the contractor's plans and procedures for software development such as a software development plan, software test plan, software configuration management plan, or other documents used for software development planning. To adhere to software plans means to follow the intent and direction of the currently agreed to version of those plans.

--> Note that the first version of the software plans represent the contractor's best guess at how the software development will proceed. It is quite typical that as the software development proceeds and the contractor gets smarter about the development, these plans change. Therefore, software plans are considered "living documents" that are updated as necessary throughout the course of the development to reflect the reality of the project.

A sample of typical questions that might be asked to satisfy this criterion are as follows:

1. Is software management implementing the software development plans?

2. Are software engineers using the design methodology stated in the software development plan?

3. Have software tools been developed and tested as planned?

4. Is configuration control being implemented as planned?

5. Are software problems being tracked and corrected as planned?

6. Are planned procedures for internal distribution of software documentation and media being followed?

7. Are documents and software media stored, handled, packaged, shipped, and delivered according to planned procedures?

8. Are schedules being updated to reflect the actual status of the development?

c. Other criteria. In addition to the two evaluation criteria listed above, specific paragraphs of DOD-STD-2168 contain other criteria. For example, the criteria in 5.5.a for evaluation of non-developmental software requires the contractor to evaluate each item of non-developmental software to be incorporated in deliverable software to assure that it was placed under internal configuration control prior to its incorporation.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent reference herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standard (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

MIL-Q-9858 - Quality Program Requirements

STANDARDS

MILITARY

MIL-STD-1521 - Technical Reviews and Audits for Systems, Equipments, and Computer Software

DOD-STD-2167 - Defense System Software Development

DOD-STD-2168 - Defense System Software Quality Program

DOD-STD-7935 - DOD Automated Information (AIS) Documentation Standard

HANDBOOKS

MILITARY

MIL-HDBK-287 A Tailoring Guide for DOD-STD-2167A, Defense System Software Development

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent reference herein. Unless otherwise specified, the issues are those cited in the solicitation.

DODD 5000.43 Acquisition Streamlining

FAR Federal Acquisition Regulations

(Copies of the DOD Federal Acquisition Regulations are available from the Superintendent of Documents, US Government Printing Office, Washington, DC 20402-0001. Copies of DODD 5000.43, Acquisition Streamlining, are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless specific exemption has been obtained.

3. DEFINITIONS

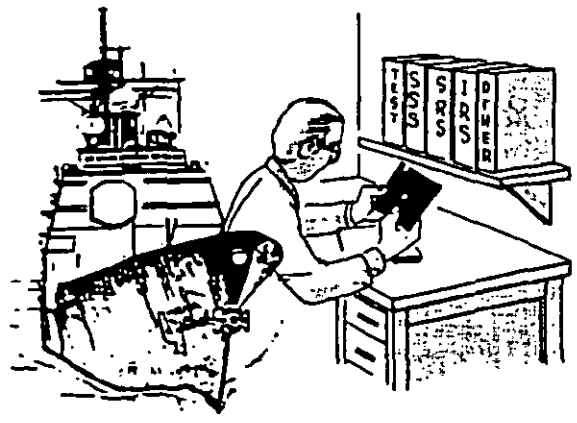
3.1 **Acronyms used in this handbook.** The acronyms used in this handbook are defined as follows:

CDRL	Contract Data Requirements List
DAB	Defense Acquisition Board
DFARS	DOD Federal Acquisition Regulations Supplement
DID	Data Item Description
DOD	Department of Defense
DODD	Department of Defense Directive
FAR	Federal Acquisition Regulations
NDS	Non-Developmental Software
SQPP	Software Quality Program Plan
SOW	Statement of Work

3.2 **Technical terms used in this handbook.** All technical terms used in this handbook are defined in DOD-STD-2168, Defense System Software Quality Program, and DOD-STD-2167, Defense System Software Development.

4. GENERAL REQUIREMENTS

4.1 <u>Objective of the software quality program.</u> *The objective of the contractor's software quality program shall be to assure the quality of (a) deliverable software and its documentation, (b) the processes used to produce deliverable software, and (c) non-deliverable software, as specified in paragraph 5.6 of this standard.*



Interpretation and intent:

a. This paragraph imposes no requirements on the contractor. It is a general statement intended to direct the contractor toward a specific set of objectives for his software quality program.

b. Simply stated, the Government wants the contractor to have a software quality program that will assure the quality of the software products, processes, and environments in which the development takes place.

4.2 <u>**Responsibility for the software quality program.**</u> *Contractor personnel responsible for ensuring compliance with the software quality program requirements shall have the resources, responsibility, authority, and organizational freedom to permit objective evaluations and to initiate and verify corrective actions. The persons conducting the evaluation of a product or activity shall not be the persons who developed the product, performed the activity, or are responsible for the product or activity. This does not preclude members of the development team from participating in these evaluations. The contractor shall assign responsibility for the fulfillment of, and for ensuring compliance with, the software quality program requirements.*

Interpretation and Intent:

a. The paragraph distinguishes three types of contractor personnel:

- Those responsible for ensuring compliance with the software quality program
- Those who conduct evaluations
- Those who participate in evaluations.

b. Those responsible for ensuring compliance with the software quality program are those who are accountable for ensuring that the software quality program requirements are met, whether or not they themselves conduct or participate in the evaluation.

- The intent of this requirement is to assure that those responsible for ensuring compliance with the software quality program within the company have what they need to get the job done. This includes having:

  - o Resources (money, personnel, equipment, time to carry out the evaluations)

  - o Responsibility and authority (to permit objective evaluations and initiate and verify corrective actions)

  - o Organizational freedom (so that evaluations will not be squelched or ignored).

    --> Note that this paragraph does place a limited organizational restriction on the contractor: those responsible for ensuring compliance with the software quality program (that is, those whose job it is to see that the requirements of the software quality program are carried out) must not be part of the software development and test team(s).

c. Those who conduct the evaluations have only one restriction placed upon them: they cannot be those who developed the product, performed the activity, or are responsible for the product or activity.

- The intent of this requirement is to assure objectivity. The conductor of an evaluation of software code could be a software engineer from a project with similar code or other similar characteristics, or a member of a separate organization such as Software Quality Assurance; the conductor cannot be the person who wrote or is responsible for the software code being evaluated.

d. Those who participate in evaluations may include those who developed the product or performed the activity. This permits non-objective personnel (such as the one who wrote the code) to take part in walk-throughs and other types of evaluations, recognizing that they can be valuable contributors who can answer questions, provide rationale, and discuss trade-offs, but should not be the ones charged with conducting the evaluation.

e. The last sentence of the paragraph requires that these roles and responsibilities be sorted out and assigned by the contractor. Even when the software quality program represents "business as usual" for the contractor, the assignment of responsibilities for the software quality program must be specifically identified for the contracting office.

4.3 <u>Documentation for the software quality program.</u> *The software quality program, including procedures, processes, and products, shall be documented in contractor format and shall provide implementing instructions for each of the requirements in sections 4 and 5 of this standard. The software quality program is subject to review by the contracting agency and may be disapproved by the contracting agency whenever the program does not meet the requirements of the contract.*

Interpretation and Intent:

a. This paragraph requires the contractor to have a documented software quality program that explicitly describes the contractor's plans for ensuring compliance with each requirement in DOD-STD-2168 as tailored for the contract. Key points are:

- The program can be documented in the contractor's own format

- The program is to include detailed instruction for implementing the requirements in Sections 4 and 5 of DOD-STD-2168 that are on contract.

b. This paragraph also states the Government's rights:

- To review the documented software quality program. The intent is that the program will be reviewed before or at the start of the contract, so that the

contractor can make any adjustments based on Government comments, then implement the program with assurance of Government concurrence.

- To disapprove the software quality program for the project whenever the program fails to meet the requirements of the contract. The term "whenever" implies an on-going right to determine that the program, as implemented, does not comply with the contract or is resulting in software development products or process that do not comply with the contract.

4.4 <u>Software quality program planning.</u> *The contractor shall conduct a complete review of the contract to identify and make timely provision for acquiring or developing the resources and skills required for implementing the software quality program. The contractor shall prepare the plans for applying the documented software quality program to the contract. These plans shall be documented in a Software Quality Program Plan (SQPP). The contractor shall place the SQPP under configuration control prior to implementation.*

Interpretation and intent:

a. The intent of 4.4 is to assure that the contractor adequately plans the software quality program for a given project.

b. The first sentence requires the contractor to:

- Analyze the contractual requirements

- Determine what is necessary for implementing a software quality program for the project. The intent is to assure timely planning with enough time to acquire or developed needed resources and skills.

c. The second and third sentences require the contractor to document the plans for applying the software quality program referred to in 4.3 to the project in a Software Quality Program Plan (SQPP).

--> Note that the third sentence requires the contractor to write an SQPP even if the contract does not require these plans to be delivered.

d. The last sentence requires the contractor to place the SQPP under the contractor's internal configuration control prior to implementing the plan. The intent of this requirement is to assure that:

- All participants know what the agreed to plan is

- All participants have access to the agreed to plan

- A record of changes to the plan is available for Government review.

4.5 **Software quality program implementation.** *The contractor shall implement the software quality program in accordance with the SQPP and shall adhere to the program for the duration of the contract. The software quality program shall be fully integrated with the activities required by the contract.*

Interpretation and Intent:

a. This paragraph requires the contractor to abide by the SQPP developed for the contract. This paragraph requires the contractor to implement the software quality program in accordance with his plan and adhere to his plan for the duration of the contract. The intent of this requirement is that the contractor:

- Carries out the plans in the SQPP (as opposed to writing a plan, then doing something different)

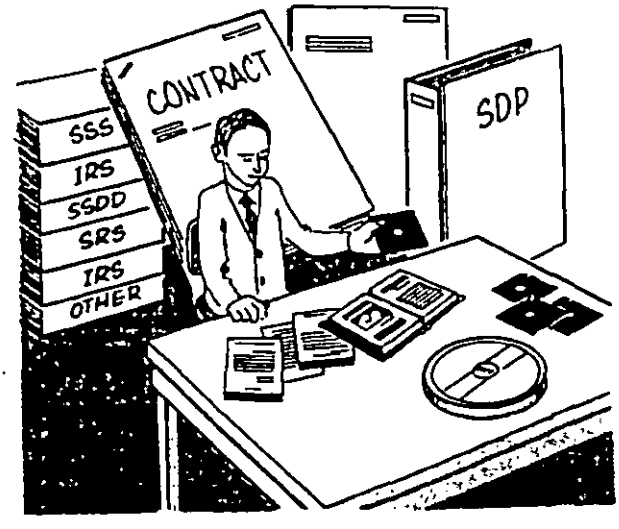
- Adheres to the SQPP for the duration of the contract (as opposed to writing a plan, then putting it aside and doing nothing or adhering to it for awhile, then putting it aside).

b. The last sentence requires the contractor to integrate his software quality program activities into the software development process. The intent of this requirement is to assure that evaluations are not:

- Going on on the side and being ignored

- Lagging behind and happening too late to have any impact on the project.

4.6 <u>Software quality evaluations.</u> *The contractor shall conduct on-going evaluations of the processes used in software development and the resulting software and associated documentation as specified in Section 5. These evaluations shall include a final evaluation of all software and associated documentation to assure that all contract requirements have been met and that internal coordination has been conducted in accordance with the software plans.*



Interpretation and Intent:

a. This paragraph requires the contractor to conduct the evaluations in Section 5 of the standard. These are the core of the software quality program.

b. The first sentence requires the evaluations in Section 5 to be on-going. This is a subjective term, but carries the intent that:

- Products will be evaluated as they are emerging, perhaps in the form of walk-throughs or other evaluations of one or more drafts preceding the final version of each product.

- Processes will be evaluated as they occur, perhaps periodically.

  --> Note that the intent is that the applicable evaluations are to be performed in parallel with the software development, and fully integrated (see 4.5) with the other activities of the contract, so that problems are detected early and can be corrected early.

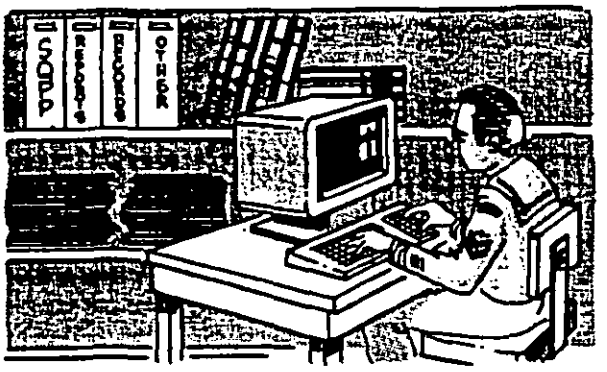
c. The contractor's planned implementation of "on-going" will be described in the documented software quality program or in the SQPP for the contract.

d. The second sentence requires the contractor to conduct a final evaluation of all software and associated documentation before delivery. Consequently, each product identified in Section 5 must undergo a final evaluation to assure that all contract requirements have been satisfied.

--> Note that during the product's final evaluation, it is not the standard's intent to force evaluators to repeat the evaluations that have already occurred. Those conducting the final evaluation may use the results and reports from prior evaluations to verify compliance with the contract.

e. Final evaluations should be the contractor's last "on-going" check prior to delivery to the Government for acceptance. This final evaluation includes a check to see that all products have gone through and satisfied the contractor's internal coordination process.

4.7 <u>Software quality records.</u> *The contractor shall prepare and maintain records of software quality program activities required by the contract. The software quality records and software problem reports shall be made available for contracting agency review and shall be maintained for the life of the contract.*



Interpretation and Intent:

a. This paragraph requires the contractor to maintain the records that have been prepared of all software quality program activities.

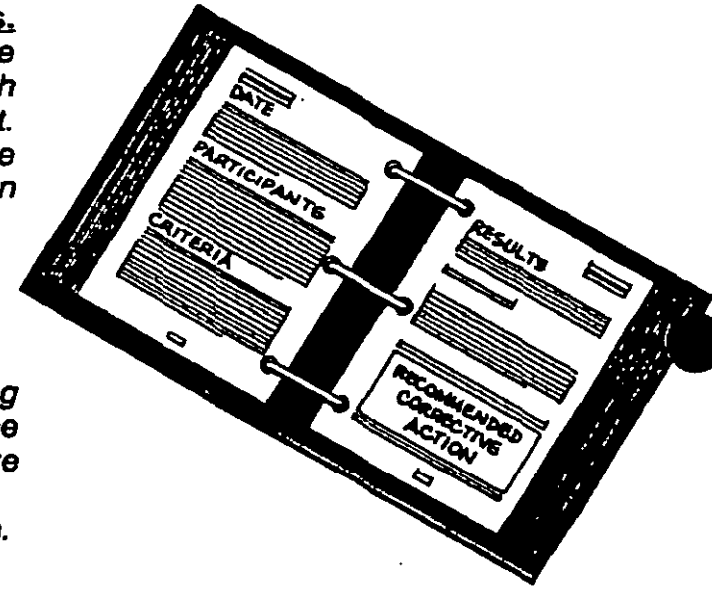
--> Note that the standard does not require the contractor to deliver these records to the Government for review nor does it specify the media for these records.

b. The contractor is required to keep the software quality program records for the life of the contract and to make these records available to the Government for review at any time upon request.

--> Note that this review is intended to take place at the contractor's site, and to require no reproduction, publication, or other expenses associated with deliverables.

4.7.1 <u>Software quality evaluation records.</u> *The contractor shall prepare a software quality evaluation record for each evaluation required by the contract. These records shall be in the contractor's format and shall contain the following items as a minimum:*

a. *Evaluation date.*
b. *Evaluation participants.*
c. *Evaluation criteria.*
d. *Evaluation results including detected problems, with reference to the appropriate software problem reports, as applicable.*
e. *Recommended corrective action.*



4.7.2 <u>Other software quality records.</u> *All other software quality records shall be prepared in the contractor's format.*

Interpretation and intent:

a. The intent of 4.7.1 is to provide records of all required software quality evaluations.
   - The format of these records is up to the contractor. The standard requires a certain minimum content (4.7.1.a-e). Additional content is left to the discretion of the contractor.

- Item (d) references software problem reports. Preparation of these reports is required by 4.8.

b. Preparation of records for any other required activity is required by 4.7.2. For example, DOD-STD-2168 requires participation in formal reviews and audits. This paragraph requires that records be prepared of these activities.

4.8 <u>Software corrective action.</u> *When problems or nonconformances with contract requirements have been detected, they shall be documented and shall serve as input for the contractor's software corrective actions. The contractor shall:*

a. *Assure that action is initiated to correct the defect and the cause of the defect, and that adverse trends are identified and reversed.*

b. *Monitor the software corrective actions, as specified in paragraph 5.3.5, to assure timely and positive corrective action.*

c. *Track the status of all problems detected in carrying out the requirements of this standard.*

Interpretation and intent:

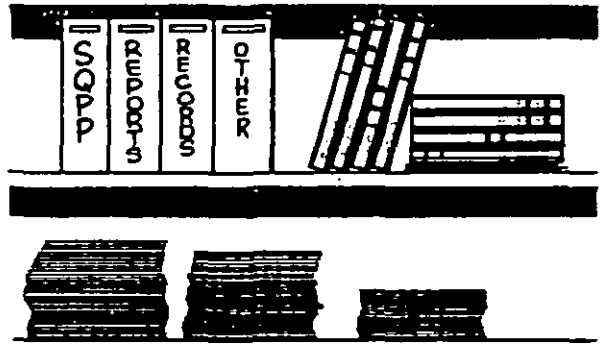
a. Without defining for the contractor a corrective action process or assigning roles or responsibilities to any organization, DOD-STD-2168 requires the contractor to document all problems or nonconformances with contract requirements, assure that actions are initiated to correct each problem, track the progress of corrective

action, and identify and reverse adverse trends. The contractor is required to monitor the corrective actions to assure timely and positive corrective action.

--> Note that it is not the intent of DOD-STD-2168 to task the evaluators to make the corrections themselves.

b. This paragraph uses the terms problems, nonconformances, and defects without definition. While useful distinctions among the terms exist, they are synonyms in this context.

4.9 <u>Certification.</u> *The contractor shall maintain and make available to the contracting agency documented, objective evidence that the software and associated documentation and activities required by the contract meet contractual requirements.*



Interpretation and Intent:

a. Certification is defined in 3.1 of DOD-STD-2168 as, "A process, which may be incremental, by which a contractor provides objective evidence to the contracting agency that an item satisfies its specified requirements."

--> Note that certification, as defined and specified in DOD-STD-2168, implies no warranty, guarantee, or other related meaning.

b. When on-going and final evaluations of software development activities and products are performed, the records of those evaluations can provide this certification.

4.10 <u>Management review of the software quality program.</u> *The contractor's management shall review the software quality program at intervals as specified in the SQPP to assure that the program complies with the contract and adheres to the SQPP.*

Interpretation and intent:

a. This requirement is an expansion of 4.2 to assure that the software quality program is being conducted in accordance with the contract and SQPP for the project. The intent of this requirement is that the contractor perform internal reviews of the software quality program itself.

b. The management level that this review takes place is contract/program specific and is left up to the contractor to identify. However, the intent of this requirement is to ensure that the software quality program is evaluated by someone in the contractor's management chain with more authority than the project's software quality manager and the software development manager.

4.11 <u>Access for contracting agency review.</u> *The contractor shall provide the contracting agency with access to contractor facilities for review of all software products and activities required by the contract to determine compliance with the contract. Contracting agency review shall not constitute acceptance, nor shall it in any way replace evaluation by the contractor or otherwise relieve the contractor of his responsibility to furnish acceptable software and associated documentation.*

Interpretation and Intent:

a. This paragraph requires the contractor to provide the contracting agency with access to contractor facilities. The intent of this requirement is to make it clear that the Government always has a right to review the software products and activities required by the contract, but that this right to review is limited to the products and processes required by the contract.

b. The second sentence of this requirement is included to negate potential false over-interpretation of such reviews by either the development contractor or Government personnel. It warns the contractor that these reviews:

- Do not constitute product or process acceptance

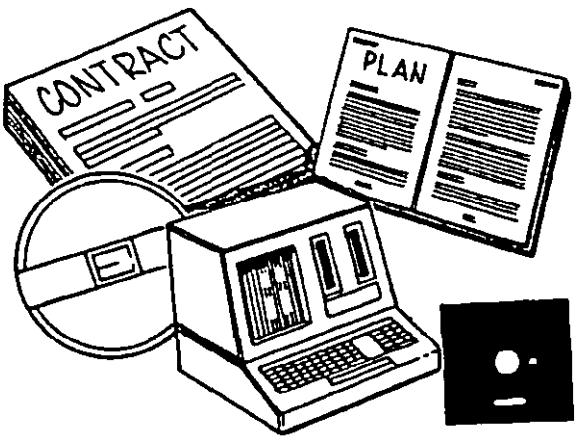
- Do not replace or relieve the contractor of the contractual obligation to conduct their own product and process evaluations and deliver acceptable products.

5. DETAILED REQUIREMENTS

5.1 <u>**Evaluation of software.**</u> *The contractor shall conduct on-going evaluations of all software to assure that:*

a. *The software complies with the contract.*

b. *The software adheres to the software plans.*



Interpretation and Intent:

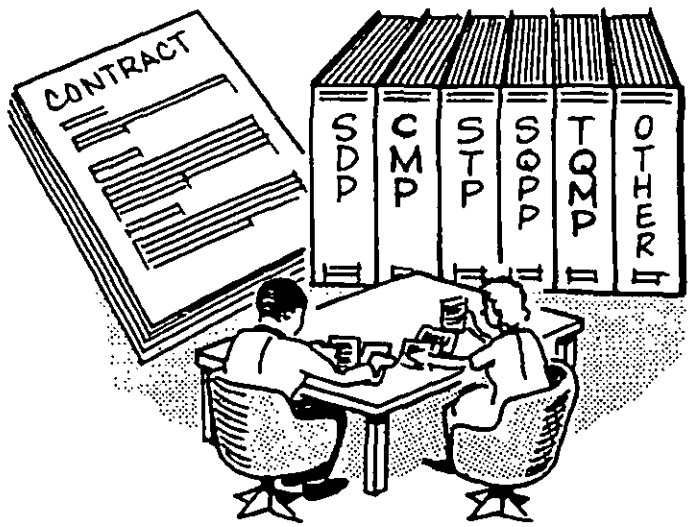
a. This paragraph requires on-going evaluations of all software (deliverable software developed under the contract, non-developmental software to be delivered under the contract, and non-deliverable software as specified in 5.6). On-going evaluations of the software may include activities such as:

- Design and code walk-throughs and inspections
- Formal and informal reviews
- Static and dynamic testing.

b. The criteria to be applied are:

- Compliance with the contract (see 1.6.6 of this handbook)
- Adherence to software plans (see 1.6.6 of this handbook)

5.2 <u>Evaluation of software documentation.</u> *The contractor shall conduct on-going evaluations of the following software documentation:*



5.2.1 <u>Evaluation of software plans.</u> *The contractor shall evaluate the software plans to be used for the contract. The contractor shall assure that:*

a. *All software plans required by the contract have been documented.*

b. *The software plans comply with the contract.*

c. *Each software plan is consistent with other software plans and with system-level plans.*

5.2.2 <u>Evaluation of other software documentation.</u> *The contractor shall evaluate deliverable software documentation not covered in the preceding paragraph to assure that:*

a. *Each document adheres to the required format.*

b. *Each document complies with the contract.*

Interpretation and Intent:

a. 5.2 serves two purposes:

1) To group and introduce 5.2.1 and 5.2.2.

2) To reiterate the requirement for on-going evaluations invoked in 4.6.

b. 5.2.1 specifically deals with software plans. Software plans are defined in 3.4 of DOD-STD-2168 as, "A collective term used to describe the contractor's plans, procedures, and standards for software management, software engineering,

software qualification, software product evaluation, and software configuration management."

- This generic term was selected in keeping with the goal that DOD-STD-2168 could be used with any software development standard.

- This requirement is not limited to deliverable software plans. A much broader phrase is used: software plans to be used for the contract.

c. The first two criteria in 5.2.1 are concerned with contract compliance. See 1.6.6 of this handbook.

d. The third criteria in 5.2.1 is that software plans be consistent with other software plans and with system-level plans. This means that:

- No two statements contradict one another
- A given term, acronym, or abbreviation means the same thing in all the plans
- A given item or concept is referred to by the same name or description in all the plans.

e. 5.2.2 specifically refers to deliverable software documentation not covered in the *preceding* paragraph, that is, the deliverable documentation for the deliverable software other than software plans.

--> Note that this paragraph does not require evaluations of other documents required under the contract such as:

- Financial reports
- Minutes of meetings
- Other management reports

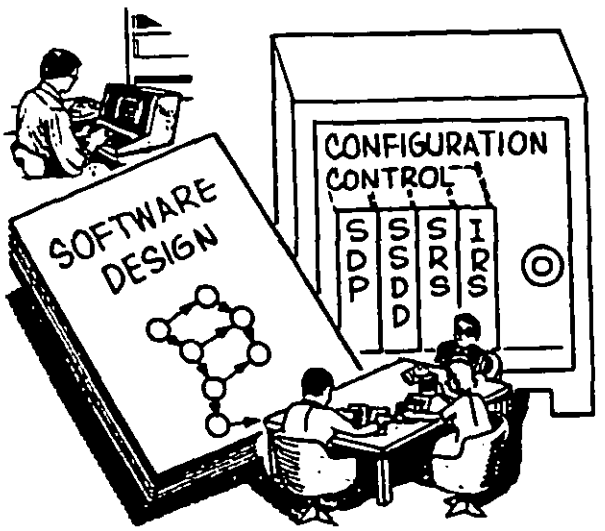
- The wording in this paragraph was chosen so that DOD-STD-2168 evaluations would not be tied to specifically named documents and could be used with any software development standard.

f. In 5.2.1 and 5.2.2, the criteria for each evaluation are twofold:

- Adherence to required format. This format will usually be specified on the CDRL in the form of a required Data Item Description (DID) or other format instruction.

- Compliance with the contract.

5.3 **Evaluation of the processes used in the software development.** *The contractor shall conduct on-going evaluations of the following processes used in software development:*



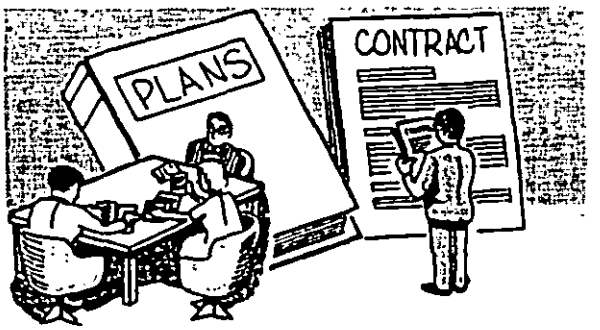
Interpretation and Intent:

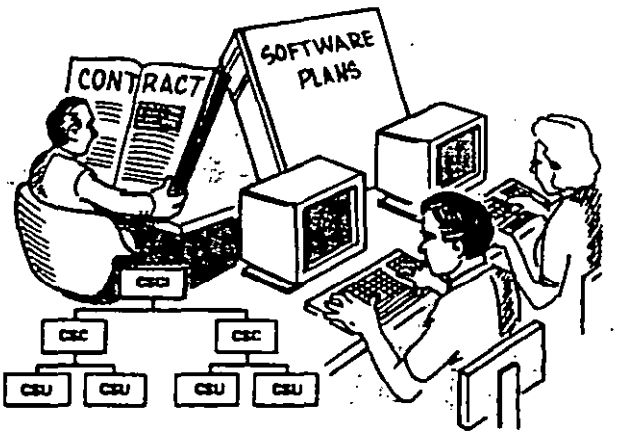
This paragraph serves two purposes:

1) To group and introduce 5.3.1 through 5.3.8.

2) To impose the condition "on-going" on the evaluations required by these paragraphs.

5.3.1 **Evaluation of software management.** *The contractor shall evaluate the software management practices to assure compliance with the contract and adherence to the software plans.*





5.3.2 **Evaluation of software engineering.** *The contractor shall evaluate the software engineering practices to assure compliance with the contract and adherence to the software plans.*

Interpretation and intent:

a. In 5.3.1 and 5.3.2, the contractor is required to evaluate software practices being imposed by the contract and described in software plans. This is not a requirement to evaluate individuals performing those roles.

--> Note that evaluations of practices are limited in scope to those related to the software development of the specific project.

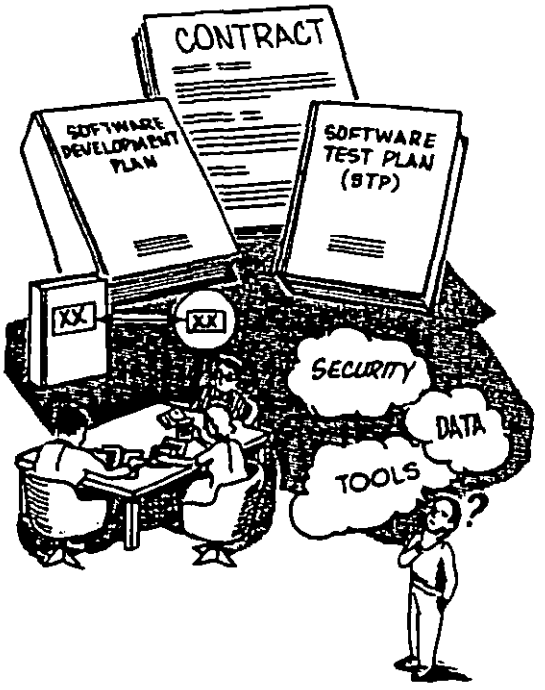
b. In DOD-STD-2167 software development management practices are found in 4.1.x and 5.x.1. For contracts not using DOD-STD-2167, examples of software development management practices that may be on contract are:

- Planning the overall software development process
- Conducting formal reviews and audits
- Performing risk analysis.

c. In DOD-STD-2167, software engineering practices are found in 4.2.x and 5.x.2. For contracts not using DOD-STD-2167, examples of software engineering practices that may be on contract are:

- Using systematic and well documented software development methods
- Performing safety analysis
- Decomposing and partitioning requirements.

5.3.3 <u>Evaluation of software qualification.</u> *The contractor shall evaluate the software qualification planning and conduct required by the contract to assure that:*



a. *The qualification plans and procedures include provisions for all software requirements.*

b. *Software qualification is conducted as required by the contract and as specified in the software plans.*

c. *The version number of each item being qualified and each item used in the qualification is documented.*

d. *The results of required qualifications are accurately recorded and analyzed to determine whether the software meets its specified requirements.*

e. *All software, hardware, firmware, and facilities required for qualification are available.*

Interpretation and intent:

a. Software qualification, while not defined in DOD-STD-2168, means formal qualification testing as defined in DOD-STD-2167 or an equivalent process on non-2167 projects.

b. In DOD-STD-2167 software qualification practices are found in 4.3.x and 5.x.3. For contracts not using DOD-STD-2167, examples of software qualification practices that may be on contract are:

- Developing plans for conducting formal qualification tests

- Establishing a software test environment

- Documenting the traceability of software requirements to test cases.

c. This evaluation is concerned with the planning and conduct of software qualification activities. The standard lists five criteria for this evaluation. The purpose of these evaluations are to assure that:

- Every software requirement is tested

- Testing is conducted in accordance with the contracts and plans

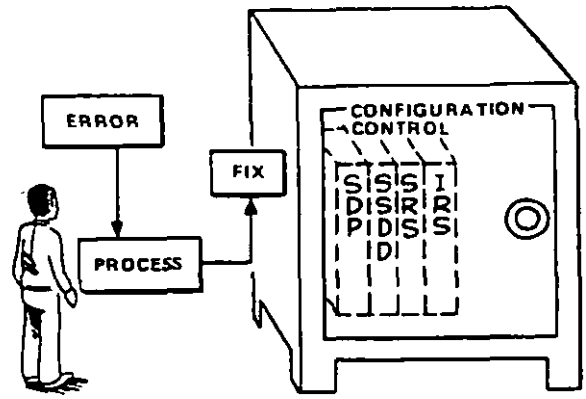
- Test items are accurately controlled and tracked

  --> Note that while DOD-STD-2168 uses the term "version number" the contractor may refer to the software version by other terms such as "release" or "build." The intent of this requirement is to assure identification of the tested software and the items used to perform the evaluation, not to require specific terms.

- Recorded test results are complete and accurate

- Everything that is necessary for performing the qualification is ready and available when required, including Government furnished equipment. The intent of this requirement is to prevent wasted time and effort for all parties by assuring that the required products will be ready and the necessary equipment and facilities will be available.

5.3.4 <u>Evaluation of software configuration management.</u> *The contractor shall evaluate the software configuration management practices to assure compliance with the contract and adherence to the software plans.*



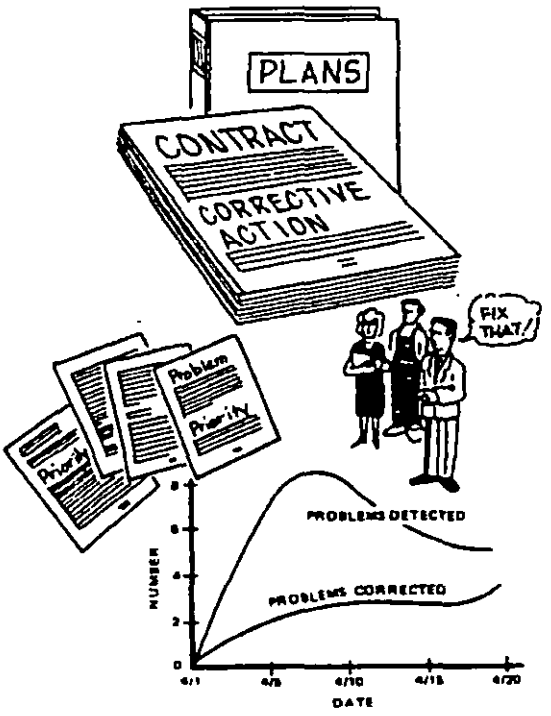
Interpretation and intent:

a. This paragraph requires the contractor to evaluate the software configuration management practices specified by the contract and described in software plans. The software plans referred to might be software development plans or configuration management plans.

b. In DOD-STD-2167 software configuration management practices are found in 4.5.x and 5.x.5. For contracts not using DOD-STD-2167, examples of configuration management practices include:

- Configuration identification
- Configuration control
- Configuration status accounting.

5.3.5 <u>Evaluation of software corrective actions.</u> *The contractor shall evaluate the software corrective actions to assure that they comply with the software plans and that:*



a. *All problems detected in processes and in products that are under internal or contracting agency control are promptly reported and entered into software corrective actions.*

b. *Each problem is classified, as required by the contract, and analysis is performed to identify trends in the problems reported.*

c. *Action is initiated on the problems and adverse trends, resolution is achieved, status is tracked and reported, and records are maintained for the life of the contract.*

d. *Corrective actions are evaluated to: (1) verify that problems have been resolved, (2) verify that adverse trends have been reversed, (3) verify that changes have been correctly implemented in the appropriate processes and products, and (4) determine whether additional problems have been introduced.*

Interpretation and Intent:

a. This paragraph is an extension of 4.8.b of the standard. 5.3.5 elaborates on the requirement in 4.8.b to monitor the corrective actions and assure timely and positive corrective actions.

b. This paragraph refers to evaluation of software corrective actions for all problems detected in the software processes and in the products that are under internal or contracting agency control. The intent of this requirement is to insure that problems are promptly reported, tracked, and corrected no matter who found the problem or where the problem originated.

--> Note that 4.8 of DOD-STD-2168 contains the minimum requirements for a corrective action process. When DOD-STD-2167 or MIL-Q-9858 is not on the contract, Government program managers imposing DOD-STD-2168 may want to provide additional tasking in the contract for the corrective action process.

c. The standard states specific evaluation criteria for corrective actions to assure that:

- Corrective actions comply with the software plans.

- Problems are promptly reported and entered into corrective actions. This is a procedural check.

  --> Note that "promptly" is subjective and will need to be defined either in the contract or in the SQPP.

- Problems are classified and analysis is performed to identify trends. DOD-STD-2167 contains a problem classification scheme that might be used.

  --> Note that the required activity is to assure that the classification and trend identification are occurring, not necessarily to do them.

- Action is initiated on problems and adverse trends, resolution is achieved, status is tracked and reported, and records are maintained. These checks are procedural in nature, assuring that the process is in action and the required activities are occurring.

- 5.3.5.d (4) requires that the contractor assure that additional evaluations have been performed following the corrective action to determine whether additional problems have been introduced as a result of correcting the detected problems.

- The corrective actions referred to in 5.3.5.d are simply a reiteration of those that are listed in 4.8.a of the standard and are not intended to require the contractor to perform the task twice.

  --> Note that the DOD-STD-2168 evaluations may be first-hand evaluations of the corrected products and processes, or confirmation that such evaluations have been performed by others.

5.3.6 <u>Evaluation of documentation and media distribution.</u> *The contractor shall evaluate the controls exercised on the internal distribution of deliverable media and documentation. The contractor shall assure compliance with the contract and adherence to the software plans.*

Interpretation and Intent:

a. The intent of this requirement is to assure that internal distribution practices do not jeopardize the integrity of delivered products.

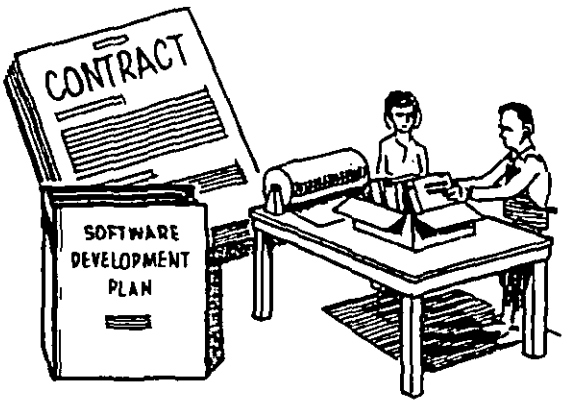
b. Deciding what controls fall into this category is left to the contractor unless specified in the contract or clarified in software plans or in the SQPP, but may include such activities as:

- Sending a build to the test group for test purposes

- Physically transferring hardcopy or electronic copies of documents from software engineering to the testing activity

- Delivering documentation to Data Management.

5.3.7 <u>Evaluation of storage, handling, and delivery.</u> *The contractor shall evaluate the storage, handling, packaging, shipping, and external distribution of deliverable software and associated documentation. The contractor shall assure compliance with the contract and adherence to the software plans.*



Interpretation and intent:

a. The associated documentation in the first sentence means associated deliverable documentation.

b. The intent is to assure that these activities are conducted in a way that does not jeopardize the integrity of delivered products. This requirement assures that software and documentation are not:

- Stored at temperatures that could damage electronic components

- Mismarked or left unmarked.

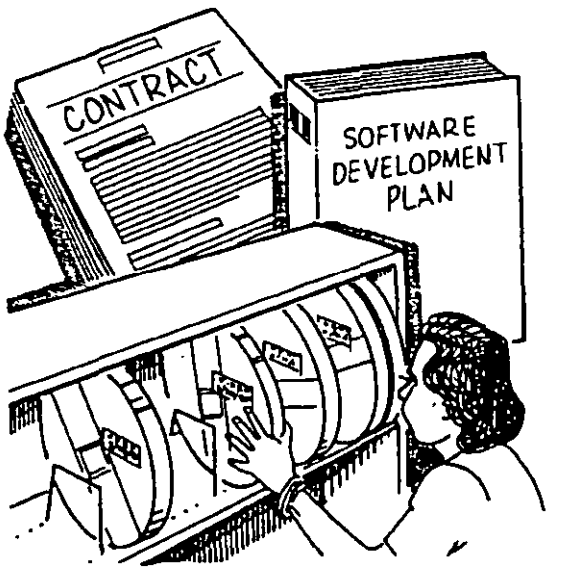
5.3.8 <u>Evaluation of other processes used in software development.</u> *The contractor shall evaluate all other processes used in software development that are required by the contract to assure compliance with the contract and adherence to the software plans.*

Interpretation and Intent:

a. This is a catch-all paragraph, covering all software development processes not already mentioned in DOD-STD-2168 but that may be imposed by the contract or described in the software plans.

b. One such additional requirement may be to interface with an Independent Verification and Validation contractor. On many projects, there may be no other processes to be evaluated.

5.4 <u>Evaluation of the software development library.</u> *The contractor shall evaluate the software development library to assure that:*



a. The library and its operation comply with the contract and adhere to the software plans.

b. The most recent authorized version of materials under configuration control are clearly identified and are the ones routinely available from the library.

c. Previous versions of materials under configuration control are clearly identified and controlled to provide an audit trail that permits reconstruction of all changes made to each configuration item.

Interpretation and Intent:

a. This paragraph specifies a set of evaluations to be applied to the contractor's software development library. It does not require the contractor to have a software development library, but does place requirements (b and c) on a software development library that does exist.

b. Criterion (a) is DOD-STD-2168's standard compliance with the contract and adherence to plans. Note that the physical library and its operation are both called out for evaluation.

c. Criterion (b) requires evaluation of the library's support of version control. For example:

- Are members of the software development team able to access and clearly recognize the latest authorized version of the code and associated documentation?

- Is the latest authorized version of the code and associated documentation the one that is on-line or distributed to the software development team?

- Does the library clearly mark and internally identify the software and associated documentation?

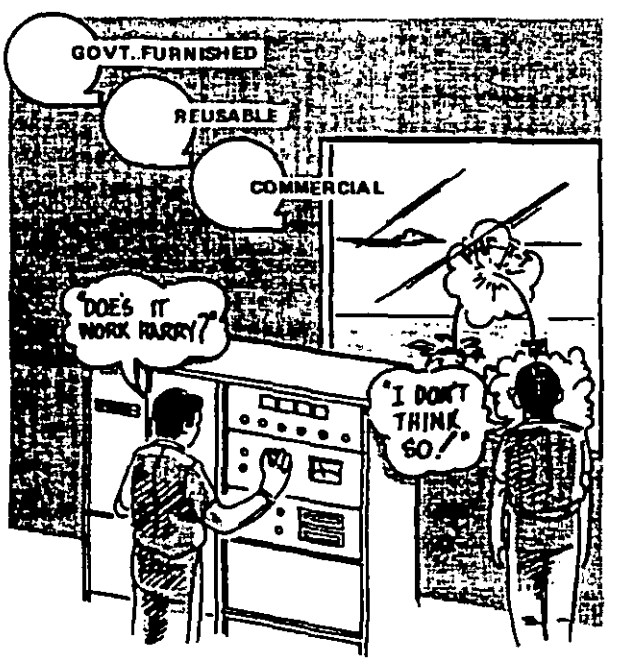
d. Criterion (c) requires evaluation of the library's archiving, recovery, and backup capabilities.

5.5 **Evaluation of non-developmental software.** *The contractor shall evaluate each item of non-developmental software to be incorporated into deliverable software to assure that:*

a. *Objective evidence exists, prior to its incorporation, that it performs required functions.*

b. *It was placed under internal configuration control prior to its incorporation.*

c. *The data rights provisions are consistent with the contract.*



Interpretation and intent:

a. Non-developmental software (NDS) is defined in DOD-STD-2167 as "Deliverable software that is not developed under the contract but is provided by the contractor, the Government, or a third party. NDS may be referred to as reusable software, Government furnished software, or commercially available software depending on its source."

b. This paragraph requires a different set of evaluations for non-developmental software than for software developed under the contract. This difference recognizes the pre-existing state of non-developmental software.

c. Criterion (a) is intended to assure that the contractor has selected appropriate and correctly functioning non-developmental software. The objective evidence may take the form of commercial, Government, or internal manuals or specifications, demonstrated results, test reports, or other performance data from actual use in similar types of systems.

d. Criterion (b) is intended to assure that the version of the NDS is formally managed so that upgrades or changes that could alter software or system operation are properly qualified.

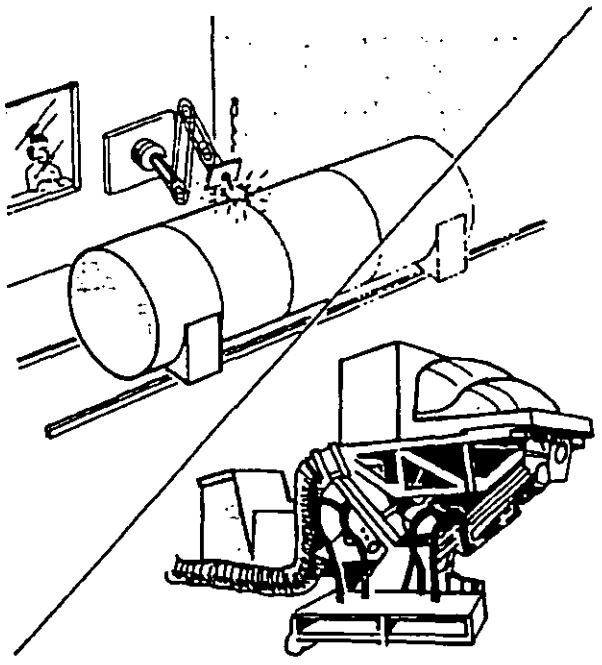
--> Note that if the development contractor modifies the NDS at all for incorporation into the deliverable software, the result is no longer NDS.

e. Criterion (c) concerns the often difficult issue of data rights. Most contracts will specify data rights for software developed under the contract. This evaluation is to assure that any data rights for NDS are, by extension, the same as those required for the developed software unless otherwise specified in the contract. This is a problem area that is frequently overlooked when commercial-off-the-shelf products are used.

5.6 <u>Evaluation of non-deliverable software.</u> *The contractor shall evaluate each non-deliverable software item used in the automated manufacturing of deliverable hardware or in the qualification or acceptance of deliverable software or hardware to assure that:*

a. *Objective evidence exists, prior to its intended use, that it performs required functions.*

b. *It was placed under internal configuration control prior to its use.*



Interpretation and Intent:

a. Non-deliverable software is software that is developed or used on a contract, but is not designated as deliverable under the contract. Examples may include compilers, document generators, and test tools.

b. This paragraph covers only certain non-deliverable software, namely, non-deliverable software used in the automated manufacturing of deliverable hardware or in the formal qualification testing or acceptance of deliverable software or hardware.

–> Note that no other non-deliverable software is subject to DOD-STD-2168 evaluations. This includes software used solely in the software design process (such as data flow diagram generators), configuration control software, databases, and project management software.

c. The reason for including non-deliverable software in DOD-STD-2168 at all is that the software singled out in the standard for evaluations can affect the test results and manufacturing results for deliverable products.

d. This paragraph is silent on whether the non-deliverable software was or was not developed under the contract. Its use, not its development status, is what matters.

e. Comments on evaluation criteria are as follows:

- The objective evidence cited in this criterion may take the form of manuals or specifications, demonstrated results, test reports, or other performance data from actual use in similar types of systems.

- Criterion (b) is meant to assure that the item will not be changed without going through a change control process. Change to such products could nullify the objective evidence of its performance and result in invalid test results or manufacturing of defective products.

  --> Note that for some software, such as that found in automated test equipment, this change control system may be different from the one used for the software development project.

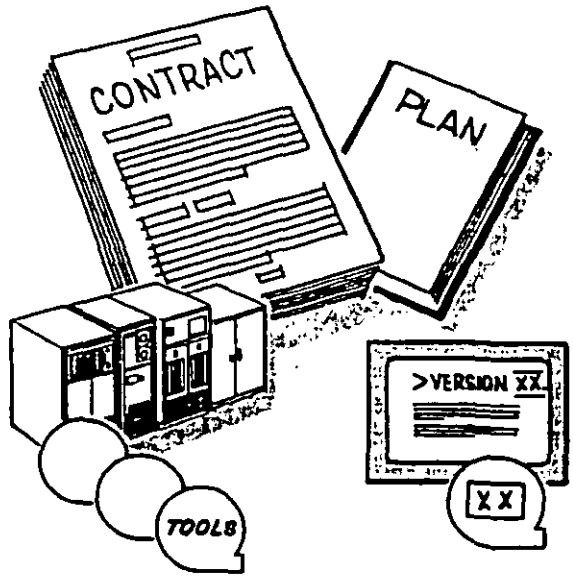
5.7 <u>Evaluation of deliverable elements of the software engineering and test environments.</u> *The contractor shall evaluate each deliverable element of the software engineering and test environments to assure that:*

a. *It complies with the contract and adheres to the software plans.*

b. *Objective evidence exists, prior to its use, that it performs required functions.*

c. *It was placed under internal configuration control prior to its use.*

d. *The data rights provisions are consistent with the contract.*



Interpretation and intent:

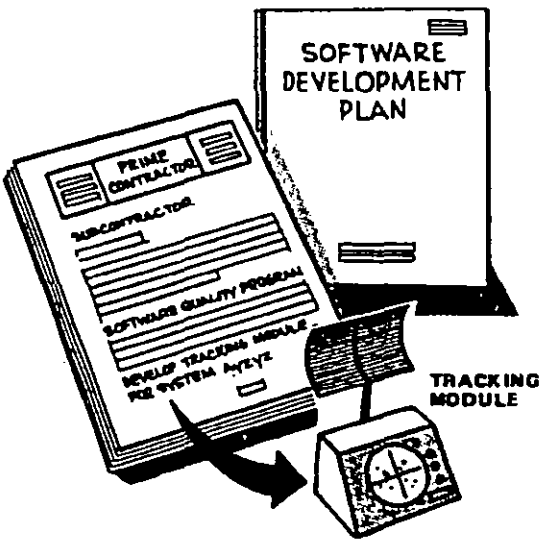
a. DOD-STD-2167 defines a software engineering environment as "The set of automated tools, firmware devices, and hardware necessary to perform the software engineering effort." A software test environment is defined similarly. Software development projects have such environments regardless of whether they are required by standards, contract requirements, or described in plans.

b. The Government may require that part or all of these environments be deliverable. Such a requirement stems from the Government's need to support (correct or enhance) the software after delivery. This paragraph of DOD-STD-2168 requires evaluation of the deliverable elements of the software engineering and test environments.

--> Note that this requirement includes the hardware, firmware, simulators, emulators, and other miscellaneous equipment used in these environments. It is not limited to the software alone.

c. The other evaluation criteria mentioned in this paragraph are discussed in the previous paragraph.

5.8 <u>Evaluation of subcontractor management.</u> *The contractor shall evaluate all subcontractor activity to assure that:*



a. *All subcontractor developed software and related documentation deliverable to the contracting agency satisfies the prime contract requirements.*

b. *A set of baselined requirements is established and maintained for the software to be developed by the subcontractor.*

c. *Applicable software quality program requirements are included or referenced in the subcontract or purchase documents for the subcontractor.*

d. *Access is available for contractor reviews at subcontractor and vendor facilities.*

e. *The contracting agency has the right to review all software products and activities required by the subcontract, at subcontractor facilities, to determine compliance with the subcontract. Contracting agency review shall not constitute acceptance, nor shall it in any way replace evaluation by the contractor or otherwise relieve the contractor of his responsibility to furnish acceptable software and associated documentation.*

Interpretation and intent:

a. This paragraph is based on the principle that a prime contractor is responsible for the work of its subcontractors.

b. While this paragraph requires the contractor to evaluate all subcontractor activity, the intended meaning is, all subcontractor activity relevant to the subcontracted effort.

c. Criterion (a) may involve either first-hand evaluation of the subcontractor products or confirming that such evaluations have been made, for example, as part of DOD-STD-2167 product evaluations.

d. Criterion (b) is intended to assure that both the contractor and subcontractor are in agreement as to the software to be delivered by the subcontractor.

e. Criterion (c) is concerned with passing down to the subcontractor applicable requirements in DOD-STD-2168. The particular requirements to be passed down are at the discretion of the prime contractor.

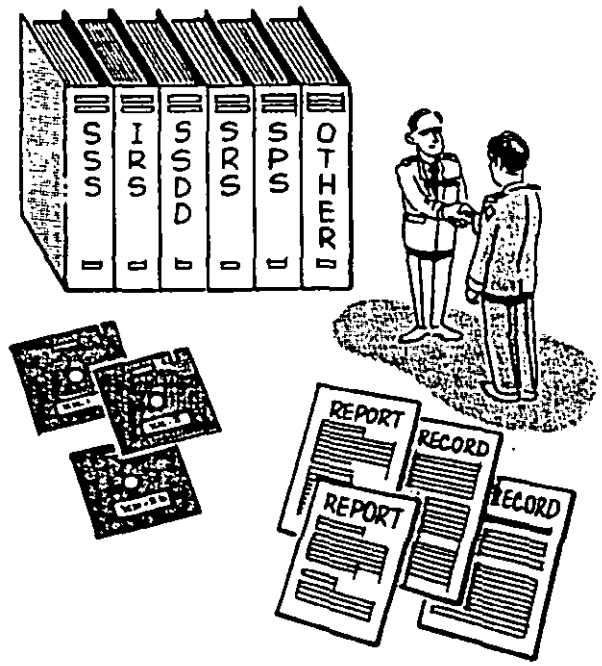
f. Criterion (d) assures the prime contractor's access to subcontractor facilities. This is in support of the prime contractor's ultimate responsibility for the products developed by the subcontractor.

g. Criterion (e) is intended to provide the Government independent access to subcontractors. As in 4.11, the contractor is warned that these reviews:

- Do not constitute product or process acceptance

- Do not replace or relieve the contractor of the contractual obligation to conduct their own product and process evaluations and deliver acceptable products.

5.9 <u>Evaluations associated with acceptance inspection and preparation for delivery.</u> *In support of software acceptance inspection and preparation for delivery, the contractor shall assure that:*



a. *All required software products are available and ready for contracting agency inspection.*

b. *All required procedures have been performed and evidence of satisfactory completion of these procedures is available for contracting agency inspection.*

c. *All deliverable software and documentation has been updated to reflect all changes approved by the contracting agency and scheduled for inclusion.*

Interpretation and Intent:

a. Acceptance and inspection are defined separately in 46.101 of the FAR:

- Acceptance -- the act of an authorized representative of the Government by which the Government assumes ownership of products or approves specific services rendered as partial or complete performance of the contract.

- Inspection -- examining and testing products or services to determine whether they conform to contract requirements.

  --> Note that acceptance inspection, as used in DOD-STD-2168, means the final inspection performed to determine whether to accept the product.

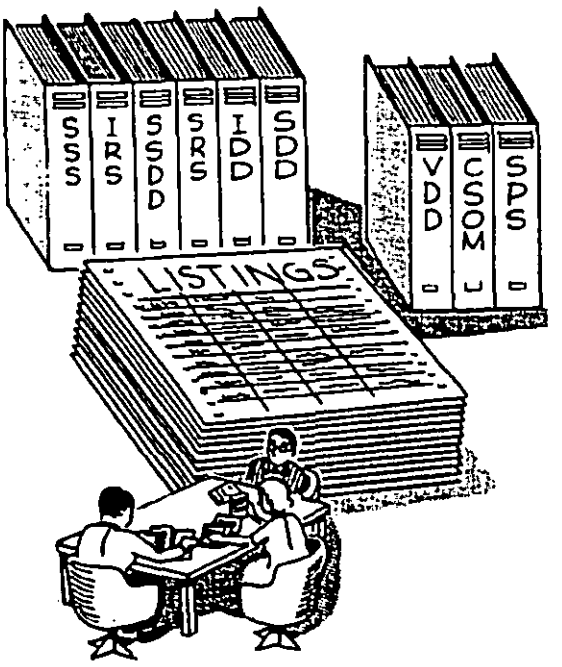
b. This requirement elaborates the requirements in 4.6 and 4.9 of the standard by specifying the criteria for this evaluation. The intent of these evaluations is to assure that:

- All required software products are available and ready, thereby preventing wasted time and effort for all parties.

- All required procedures have been performed and evidence of satisfactory completion is available. This evidence may take the form of software quality records, meeting minutes, letters, memos, and other documentation showing that all required procedures have been performed.

- Deliverable software and documentation contain all contracting agency approved changes. This is really a subelement of the first item, part of ensuring that deliverable products are ready for inspection.

5.10 <u>Participation in formal reviews and audits.</u>



a. *Prior to each formal review and audit, the contractor shall assure that:*

   (1) All required products will be available and ready for contracting agency review.

   (2) All required preparations have been made.

b. *At each formal review and audit, the contractor shall present an evaluation of the status and quality of each of the development products reviewed.*

c. *Following each formal review and audit, the contractor shall assure that all software-related action items assigned to the contractor have been performed.*

Interpretation and Intent:

a. DOD-STD-2168 defines three distinct roles with respect to formal reviews and audits: activities before, during, and after the review or audit.

   - Before the review or audit, assure that all products are ready and all preparations made. These requirements are meant to prevent wasted time and effort.

   - At the review or audit, present an evaluation of the status and quality of each development product reviewed. This will be a summary of the software

quality program activities related to the products reviewed that focuses on their current status and adherence to the criteria set forth in DOD-STD-2168.

--> Note that this requirement is not mentioned in MIL-STD-1521, Technical Reviews and Audits for Systems, Equipments, and Computer Software, and that DOD-STD-2168 is silent on who prepares and presents this report. In some instances these evaluations may be routinely included in the contractor's program management summary reports.

- After the review or audit, assure that software-related action items assigned to the contractor are performed.

b. By placing this requirement explicitly on contract via DOD-STD-2168, the contracting agency is assured that some person or organization within the software development contractor's company will have this specific responsibility.

6. NOTES

6.1 Intended use. This handbook is intended for guidance in applying DOD-STD-2168 dated 29 April 1988.

6.2 Issue of DODISS. Note that the documents referenced herein are those current at the date of initial publication of DOD-STD-2168: MIL-Q-9858A, Amendment 2, 8 March 1985; MIL-STD-1521B, 4 June 1985; DOD-STD-2167A, 29 February 1988; and DOD-STD-7935A, 31 October 1988. The applicability of guidance contained herein to later revisions of these documents should be determined by the user of this handbook.

6.3 Subject term (key word) listing.

Contract
Contract Administration Services
Contract Data Requirements List (CDRL)
Data Item Description (DID)
Defense Acquisition Board (DAB)
Defense System Software Development
DOD-STD-2167
Government program managers
Independent Validation and Verification
Quality program, software, evaluations
Software development, products, processes
Software plans
Software quality, plans, evaluations
Software Quality Program Plan (SQPP)
Software support, agency
Tailoring guidance

CONCLUDING MATERIAL

Custodians:

Army - AR
Navy - EC
Air Force - 10, 26

Review activities:

Army - SC, CR, MI, AV
Navy - MC, TD, OM, SH, AS
Air Force - 02, 17
DLA - DH

Preparing activity:

Army - AR

(Project QCIC-0059)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-HDBK-286	14 December 1990

3. DOCUMENT TITLE

A GUIDE FOR DOD-STD-2168 DEFENSE SYSTEM SOFTWARE QUALITY PROGRAM

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code) (1) Commercial	(2) AUTOVON
US Army ARDEC Standardization & Specification Office	(201) 724-6674	880-6674
c. ADDRESS (Include Zip Code) ATTN: SMCAR-BAC-S Picatinny Arsenal, NJ 07806-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	