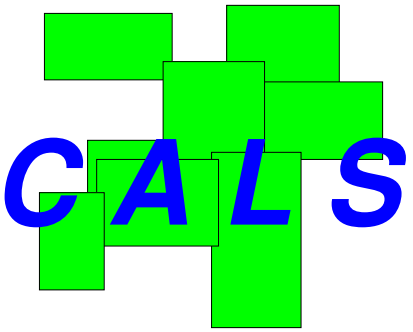


**DRAFT**

# Technical Report

# SGML-2167A Document Analysis

# for ASCC / CALS

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# TABLE OF CONTENTS

**Section** **Page**

TABLE OF CONTENTS . . . . . ii
FOREWORD . . . . . iv

**1 Introduction . . . . . 1**
1.1 Scope . . . . . 1
1.2 Design Philosophy . . . . . 1
1.2.1 Top-Down Approach . . . . . 1
1.2.2 Bottom-Up Approach . . . . . 1
1.2.3 Global Approach . . . . . 1
1.3 System of Notation . . . . . 1

**2 Input From CALS / ISG-SPC . . . . . 1**
2.1 Near-term Recommendations . . . . . 1

**3 Top Down Analysis . . . . . 2**
3.1 Documentation Suite . . . . . 2
3.2 Top Level Structure . . . . . 4
3.2.1 Document Structure for the SSS . . . . . 4
3.2.2 Document Structure for the SDD . . . . . 4
3.2.3 Document Structure for the VDD . . . . . 5
3.2.4 Document Structure for the STP . . . . . 5
3.2.5 Document Structure for the STD . . . . . 5
3.2.6 Document Structure for the STR . . . . . 6
3.2.7 Document Structure for the CSOM . . . . . 6
3.2.8 Document Structure for the SUM . . . . . 6
3.2.9 Document Structure for the SPM . . . . . 7
3.2.10 Document Structure for the FSM . . . . . 7
3.2.11 Document Structure for the CRISD . . . . . 7
3.2.12 Document Structure for the SRS . . . . . 7
3.2.13 Document Structure for the IRS . . . . . 8
3.2.14 Document Structure for the IDD . . . . . 8
3.2.15 Document Structure for the SPS . . . . . 8
3.2.16 Document Structure for the SDP . . . . . 9
3.2.17 Document Structure for the SSDD . . . . . 9
3.2.18 Reduction to SGML . . . . . 9
3.2.19 Analysis of Top Level Body Elements . . . . . 11
3.3 Detailed Structural Analysis and Reduction to SGML . . . . . 13
3.3.1 Detailed Structural Analysis of the SSS . . . . . 13
3.3.2 Reduction of the SSS to SGML . . . . . 16
3.3.3 Detailed Structural Analysis of the SSDD . . . . . 19
3.3.4 Reduction of the SSDD to SGML . . . . . 22
3.3.5 Detailed Structural Analysis of the SRS . . . . . 27
3.3.6 Reduction of the SRS to SGML . . . . . 29
3.3.7 Detailed Structural Analysis of the IRS . . . . . 35
3.3.8 Reduction of the IRS to SGML . . . . . 35
3.3.9 Detailed Structural Analysis of the STP . . . . . 35
3.3.10 Reduction of the STP to SGML . . . . . 35

3.3.11 Detailed Structural Analysis of the STD . . . 35
3.3.12 Reduction of the STD to SGML . . . 35
3.3.13 Detailed Structural Analysis of the STR . . . 35
3.3.14 Reduction of the STR to SGML . . . 35
3.3.15 Detailed Structural Analysis of the SDD . . . 35
3.3.16 Reduction of the SDD to SGML . . . 35
3.3.17 Detailed Structural Analysis of the IDD . . . 35
3.3.18 Reduction of the IDD to SGML . . . 35
3.3.19 Detailed Structural Analysis of the SPS . . . 35
3.3.20 Reduction of the SPS to SGML . . . 36
3.3.21 Detailed Structural Analysis of the SUM . . . 36
3.3.22 Reduction of the SUM to SGML . . . 36
3.3.23 Detailed Structural Analysis of the VDD . . . 36
3.3.24 Reduction of the VDD to SGML . . . 36
3.3.25 Detailed Structural Analysis of the SDP . . . 36
3.3.26 Reduction of the SDP to SGML . . . 36
3.3.27 Detailed Structural Analysis of the CSOM . . . 36
3.3.28 Reduction of the CSOM to SGML . . . 36
3.3.29 Detailed Structural Analysis of the FSM . . . 36
3.3.30 Reduction of the FSM to SGML . . . 36
3.3.31 Detailed Structural Analysis of the SPM . . . 36
3.3.32 Reduction of the SPM to SGML . . . 36
3.3.33 Detailed Structural Analysis of the CRISD . . . 36
3.3.34 Reduction of the CRISD to SGML . . . 36
3.3.35 Detailed Analysis of the Front Element . . . 36
3.3.36 Reduction of the Front Element to SGML . . . 37
3.3.37 Detailed Analysis of the Rear Element . . . 37

**4 Bottom Up Analysis . . . 37**
4.1 Design Considerations . . . 37
4.2 Lower Level Objects . . . 37
4.2.1 Paragraph Types . . . 37
4.2.2 Identifying low-level objects . . . 38
4.2.3 DTD Elements . . . 38
4.2.4 FOSI EIC's . . . 38
4.3 Process Model . . . 38

**5 DTD Requirements . . . 42**
5.1 Purpose . . . 42

**6 FOSI Requirements . . . 42**
6.1 Purpose . . . 42

**Bibliography . . . Bibliography-1**
GLOSSARY . . . Glossary-1

# FOREWORD

## Background

For several years the military software community has been defining the need for a software equivalent of the Computer-Aided Acquisition Logistics System (CALS) hardware oriented standards reflected in Mil-Std-28001 and Mil-Std-38784. The lack of a software oriented Standard Generalized Markup Language (SGML) Document Type Description (DTD) and Formatting Output Specification Instance (FOSI) prevented the implementation of CALS compliance as specified in the statement of work for the Automated Software Configuration Center (ASCC) and so this effort was deemed necessary in order to move forward with the ASCC implementation. This effort is aimed specifically for use at the ASCC sites although it is anticipated that it may find application to software projects with CALS / SGML requirements on deliverables.

## CALS Software Product Committee

In 1989, the DoD CAL Policy Office requested that the Industry Steering Group (ISG) address the application of CALS strategy to the development, delivery, and maintenance of software products and software product data associated with DOD-STD 2167A and 7935A. The Software Products Committee (SPC) was formed as a result of that request. In November of 1991, the CALS / ISG-SPC published a report delineating their recommendations for the near-term task of implementing a CALS software strategy. The draft report of the committee was provided to us as input to the formulation of this ASCC task. That report and continuing communications with key members of that committee form the basis for many of the decisions that were made in the design and implementation of the 2167A DTDs.

# 1 Introduction

## 1.1 Scope

This report describes the results of the *Document Analysis* phase of the SGML-2167A project. The goal of the overall project is to develop a working SGML[1] representation of the DoD-Std-2167A documentation set, suitable for electronic delivery in the CALS[2] environment. The document analysis phase of this effort is being conducted in order to determine the requirements for these SGML representations. These requirements will constitute the input to the next phase of the effort, the design phase.

## 1.2 Design Philosophy

Design approaches have been categorized as being either *top-down* or *bottom-up*. These are, of course, vague generalizations but they give us a useful frame of reference in which to discuss design philosophy. Because of our schedule and funding constraints, we have adopted the *global* approach described below. This approach will allow us to achieve a working CALS compliant implementation in the shortest possible time. The top down aspect of this approach will provide for *step-wise refinement* of the implementation in the future.

### 1.2.1 Top-Down Approach

The top-down approach starts with requirements and proceeds to decompose these requirements until they can be mapped into specifications for realizable entities. The top-down approach is characterized by a high level of abstraction with little or no concern for implementation details. If correctly executed, the top-down approach can result in a flexible and extensible design.

### 1.2.2 Bottom-Up Approach

The bottom-up approach starts with a notion of a specific implementation and a set of constraints and proceeds to work backwards in order to map the conceived solution into a statement of the problem to be solved. This approach is also referred to as *Inside-Out*. The bottom-up approach tends to be a point solution, and can be hard to change, understand, and maintain.

### 1.2.3 Global Approach

We have long thought that the ideal compromise between the top-down and the bottom-up approach is what we call the *Global* or *Top-Down / Bottom-Up / Sideways* approach. In addition, the global method encourages, and is conducive to, the use of *Object-Oriented Design*. The major difficulty with the global approach is that it is difficult to learn and to teach to others and requires significant expertise in many areas.

## 1.3 System of Notation

Because of our desire to proceed to a working design and implementation as quickly as possible, we wish to express our analysis in a language which is very similar to our implementation language, namely SGML. We will try to express the results of our analysis in psuedo-SGML or SGML where possible. This will save an extra translation step from the design meta-language (e.g. Bachus-Naur Form ) to SGML.

# 2 Input From CALS / ISG-SPC

## 2.1 Near-term Recommendations

In summary, the committee made the following recommendations concerning DTDs:

- DTDs should support post-processing of data by tools
- DTDs should support keywords and parameters for information retrieval
- DTDs should support relationships within and between products
- DTDs should support Configuration Management
- DTDs should support Validation
- DTDs should support Annotation
- DTDs should support Tailoring
- DTDs should support Change Data

1 Standard Generalized Markup Language

2 Computer-Aided Acquisition Logistics Standard

- DTDs should support Case Tools
- DTDs should support Hypermedia
- DTDs should support product Data bases
- DTD tags should be content labels
- The development of DTDs should be prioritized according to table 2-1.

**Table 2-1 Prioritized 2167A DTD Categories**

| Data Item | Category | Priority |
|---|---|---|
| SSS | Ia | 1 |
| SSSD | Ia | 1 |
| SRS | Ia | 1 |
| IRS | Ia | 1 |
| STP | Ia | 1 |
| STD | Ia | 1 |
| STR | Ia | 1 |
| SDD | Ia | 1 |
| IDD | Ia | 1 |
| SPS | Ia | 1 |
| SUM | IIa | 2 |
| VDD | IIa | 2 |
| SDP | IIIa | 3 |
| CSOM | IIIa | 3 |
| FSM | IIIa | 3 |
| SPM | IIIa | 3 |
| CRISD | IIIa | 3 |

In addition the committee recommended that the DTDs not just model the structure of each Data Item (DI) but also model the process of how the DIs interact throughout the software life-cycle.

# 3 Top Down Analysis

## 3.1 Documentation Suite

Though not generally understood, DoD-Std-2167A is a specification of a *software development process* with requisite documentation. The standard allows for *tailoring* which is the process of selecting that subset of the complete 2167A documentation suite which is appropriate for that program. The data items are highly dependent upon each other and upon the software development process which is selected for the program. Because of these complex interactions, it is the responsibility of the system implementors to provide a software development plan which integrates the tailored items into a coherent process. This process is specified by the Software Development Plan (SDP) data item. Although we are mainly concerned with the interaction of the various elements of the documentation suite, we should also, as recommended by the CALS ISG, be mindful of the underlying software development process . We distinguish, therefore, between the *DoD-Std-2167A Documentation Suite* and the *DoD-Std-2167A Software Life*

*Cycle.* The modeling of the 2167A Life Cycle and its interaction with the 2167A documentation suite is addressed in another section.

There are 17 *Data Item Descriptions* (DID's) called out in DoD-Std-2167A. Each of these DID's refer to an implicit *Data Item* ( DI). These 17 DID's are displayed in table 3-1 along with their abbreviated title or acronym, their full titles, and their DID identification number. Note that we have equated the three or four letter acronym for the data item with the data item. This abstraction allows us to refer to an instance of the data item object by its acronym.

## Table 3-1 DIDs Specified in 2167A

| No. | DI | DID | Title |
|---|---|---|---|
| 1 | SSS | 80008A | System / Segment Specification |
| 2 | SDD | 80012A | Software Design Document |
| 3 | VDD | 80013A | Version Description Document |
| 4 | STP | 80014A | Software Test Plan |
| 5 | STD | 80015A | Software Test Description |
| 6 | STR | 80017A | Software Test Report |
| 7 | CSOM | 80018A | Computer System Operator's Manual |
| 8 | SUM | 80019A | Software User's Manual |
| 9 | SPM | 80021A | Software Programmer's Manual |
| 10 | FSM | 80022A | Firmware Support Manual |
| 11 | CRISD | 80024A | Computer Resources Integrated Support Document |
| 12 | SRS | 80025A | Software Requirements Specification |
| 13 | IRS | 80026A | Interface Requirements Specification |
| 14 | IDD | 80027A | Interface Design Document |
| 15 | SPS | 80029A | Software Product Specification |
| 16 | SDP | 80030A | Software Development Plan |
| 17 | SSDD | 80534 | System / Segment Design Document |

Because each DI is considered a complete document, we expect that only one DI will appear in the context of any one DTD; however, the same DTD might possibly be used for more than one DI. Assuming that this is so, then we would never need to express the relationship between the individual DI's and the documentation set in SGML; however, we shall do so as a means of introduction to SGML.

```
<!ELEMENT DocSet – – (SSS? & SDD? & VDD? & STP? & STD? & STR? &
                      CSOM? & SUM? & SPM? &FSM? & CRISD? &
                      SRS? & IRS? & IDD? & SPS? & SDP? & SSDD?)>
```

In this expression we have stated that all data items are optional, that is they may all be tailored out. In SGML a comma separated list in an element group implies that each and every member of the list must appear once and only once, in the same order that they appear in the list. Although one may interpret that the standard permits any and all of the documents to be tailored out, it would not be practical to do so as some documents depend on others. As an example, if we tailored out the SSS and SSDD, then there would be nothing to tie requirements to in the design and test documents. This would not be workable since requirements traceability is mandated by the standard.

## 3.2 Top Level Structure

Mil-Std–28001 successfully separates *structure or content* of a document from the *appearance or format* of the document. The *Document Type Description* (DTD) is a SGML document which describes the structure of a document. The *outspec* described in Appendix B of Mil-Std-28001B provides a SGML description of a formatting specification language. This SGML description serves the same function for the formatting engine as the DTD performs for an SGML document which conforms to the DTD. In other words, the outspec defines the set of all allowable sentences in the formatting language and thus defines the language.

Just as an SGML document is considered to be an *instance* of the DTD, a *Formatting Output Specification Instance* (FOSI) is an instance of the Mil-Std-28001B outspec. The FOSI determines the appearance of a document. A particular document will generally have only one DTD while there may be a plethora of FOSI's, each producing a document potentially quite different in appearance. The instructions for preparing DID's seldom preserve this orthogonality between structure and appearance, so that we will have to be careful not to mix them together. We shall formulate requirements for appearance or style as FOSI requirements and requirements for structure or content as DTD requirements.

At the highest level of organization, the instructions for the preparation of each DID has a paragraph entitled *structure.* We have extracted these paragraphs for each of the seventeen DID's in table 3-1. These paragraphs appear in the following seventeen subsections.

### 3.2.1 Document Structure for the SSS

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Applicable documents
6. System requirements
7. Quality assurance provisions
8. Preparation for delivery
9. Notes
10. Appendixes

### 3.2.2 Document Structure for the SDD

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Preliminary design
7. Detailed design
8. CSCI data
9. CSCI data files

10. Requirements traceability
11. Notes
12. Appendixes

### 3.2.3 Document Structure for the VDD

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Version description
7. Notes
8. Appendixes

### 3.2.4 Document Structure for the STP

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Software test environment
7. Formal qualification test identification
8. Data recording, reduction, and analysis
9. Notes
10. Appendixes

### 3.2.5 Document Structure for the STD

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Formal qualification test preparations
7. formal qualification test descriptions
8. Notes

9. Appendixes

### 3.2.6 Document Structure for the STR

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Test overview
7. Test results
8. CSCI evaluations and recommendations
9. Notes
10. Appendixes

### 3.2.7 Document Structure for the CSOM

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Computer system operation
7. Diagnostic features
8. Notes
9. Appendixes

### 3.2.8 Document Structure for the SUM

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Execution procedures
7. Error messages
8. Notes
9. Appendixes

### 3.2.9 Document Structure for the SPM

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Software compilation
7. Programming information
8. Notes
9. Appendixes

### 3.2.10 Document Structure for the FSM

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Firmware device information
7. Programming equipment and procedures
8. Vendor information
9. Notes
10. Appendixes

### 3.2.11 Document Structure for the CRISD

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Support information
7. Transition planning
8. Notes
9. Appendixes

### 3.2.12 Document Structure for the SRS

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Applicable documents
6. Engineering requirements
7. Qualification requirements
8. Preparation for Delivery
9. Notes
10. Appendixes

### 3.2.13 Document Structure for the IRS

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Applicable documents
6. Interface specification
7. Notes
8. Appendixes

### 3.2.14 Document Structure for the IDD

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Interface design
7. Notes
8. Appendixes

### 3.2.15 Document Structure for the SPS

1. Cover
2. Title Page
3. Table of contents

4. Scope
5. Applicable documents
6. Requirements
7. Notes
8. Appendixes

3.2.16 Document Structure for the SDP

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Software development management
7. Software engineering
8. Formal qualification testing
9. Software product evaluations
10. Software configuration management
11. Other software development functions
12. Notes
13. Appendixes

3.2.17 Document Structure for the SSDD

1. Cover
2. Title Page
3. Table of contents
4. Scope
5. Referenced documents
6. Operational concepts
7. System design
8. Processing resources
9. Quality factor compliance
10. Requirements traceability
11. Notes
12. Appendixes

3.2.18 Reduction to SGML We first note that the first four items in each DI are identical and that the fifth item appears in one of two forms. Thus we can write:

```
<!ELEMENT front – – (cover , titlepg , contents , scope ,
                     (refdocs | appdocs))>
```

Also, since the last two items in each DI are the same, we can write:

```
<!ELEMENT rear – – (notes* , appendix*)>
```

Using these two elements, for any document in the documentation set, we may write:

```
<!ELEMENT document – – (front , body , rear)>
```

where the element *body* will, in general, be different for each type of DI. Since each DI will have its own DTD, this means that the *front* and *rear* section of each DTD can be reused. This cuts down the total amount of DTD development significantly.

#### 3.2.18.1 Body Element for SSS

```
<!ELEMENT body – – ( System-Requirements , QA-Provisions,
                     Delivery-Preparation )>
```

#### 3.2.18.2 Body Element for SDD

```
<!ELEMENT body – – ( Preliminary-Design, Detailed-Design ,
                     CSCI-Data , CSCI-Data-Files ,
                     Requirements-Traceability )>
```

#### 3.2.18.3 Body Element for VDD

```
<!ELEMENT body – – ( Version-Description )>
```

#### 3.2.18.4 Body Element for STP

```
<!ELEMENT body – – ( Software-Test-Environment ,
                     Formal-Qual-Test-ID ,
                     Data-Recording-Reduction-Analysis )>
```

#### 3.2.18.5 Body Element for STD

```
<!ELEMENT body – – ( Formal-Qualification-Test-Preparation ,
                     Formal-Qualification-Test-Descriptions )>
```

#### 3.2.18.6 Body Element for STR

```
<!ELEMENT body – – ( Test-Overview , Test-Results , CSCI-Evaluation )>
```

#### 3.2.18.7 Body Element for CSOM

```
<!ELEMENT body – – ( Computer-System-Operation , Diagnostic-Features )>
```

#### 3.2.18.8 Body Element for SUM

```
<!ELEMENT body – – ( Execution-Procedures , Error-Messages )>
```

#### 3.2.18.9 Body Element for SPM

```
<!ELEMENT body – – ( Software-Compilation , Programming-Information )>
```

3.2.18.10 Body Element for FSM

```
<!ELEMENT body - - ( Firmware-Device-Information ,
                     Programming-Equipment ,
                     Vendor-Information )>
```

3.2.18.11 Body Element for CRISD

```
<!ELEMENT body - - ( Support-Information , Transition-Planning )>
```

3.2.18.12 Body Element for SRS

```
<!ELEMENT body - - ( Engineering-Requirements ,
                     Qualification-Requirements, Delivery-Preparation)>
```

3.2.18.13 Body Element for IRS

```
<!ELEMENT body - - ( Interface-Specification )>
```

3.2.18.14 Body Element for IDD

```
<!ELEMENT body - - ( Interface-Design )>
```

3.2.18.15 Body Element for SPS

```
<!ELEMENT body - - ( Requirements )>
```

3.2.18.16 Body Element for SDP

```
<!ELEMENT body - - ( Software-Dev-Mgmnt , Software-Engineering ,
                     Formal-Qualification-Testing ,
                     Software-Product-Eval , Software-Config-Mgmnt ,
                     Other-Functions )>
```

3.2.18.17 Body Element for SSDD

```
<!ELEMENT body - - ( Operational-Concepts , System-Design ,
                     Processing-Resources , Quality-Factor-Compliance ,
                     Requirements-Traceability )>
```

3.2.19 Analysis of Top Level Body Elements In addition to generating the SGML for the top level document structure, we can also summarize this information in a table. We note that the *Front* element, which we defined, is the production of five distinct front end elements. Likewise, the *Rear* element is the production of two distinct rear elements. There are 17 distinct *body* elements, one for each DI. Because the values of these elements are all distinct, we can consider a composite *body* element consisting of 44 possible element values. This *Super-Body* element is a production of 44 distinct body elements. In order to trace these elements through our design, we devise a scheme of encoding the Data Item (DI) and the section of the DI from which the element is extracted. This element code consists of two small integers separated by a "-" and appears in the *Element Code* column of table 3-2. The first number, before the dash, is number of the Data Item from table 3-1 and appears in the *DI #* column of table 3-2. The second number is the item number from the lists in paragraphs 3.2.1 through 3.2.17 and appears in the *Item #* column of table 3-2.

## Table 3-2 Traceability of Body Elements

| Element Name | Data Item | DI No. | Section | Element Code |
|---|---|---|---|---|
| CSCI_Data | SDD | 2 | 8 | 2-8 |
| CSCI_Data_Files | SDD | 2 | 9 | 2-9 |
| CSCI_Evaluation | STR | 6 | 8 | 6-8 |
| Computer_System_Operation | CSOM | 7 | 6 | 7-6 |
| Data_Recording_Reduction_Analysis | STP | 4 | 8 | 4-8 |
| Detailed_Design | SDD | 2 | 6 | 2-6 |
| Diagnostic_Features | CSOM | 7 | 7 | 7-7 |
| Engineering_Requirements | SRS | 12 | 6 | 12-6 |
| Error_Messages | SUM | 8 | 7 | 8-7 |
| Execution_Procedures | SUM | 8 | 6 | 8-6 |
| Firmware_Device_Information | FSM | 10 | 6 | 10-6 |
| Formal_Qual_Test_ID | STP | 4 | 7 | 4-7 |
| Formal_Qualification_Test_Descriptions | STD | 5 | 7 | 5-7 |
| Formal_Qualification_Test_Preparation | STD | 5 | 6 | 5-6 |
| Formal_Qualification_Testing | SDP | 16 | 8 | 16-8 |
| Interface_Design | IDD | 14 | 6 | 14-6 |
| Interface_Specification | IRS | 13 | 6 | 13-6 |
| Operational_Concepts | SSDD | 17 | 6 | 17-6 |
| Other_Functions | SDP | 16 | 11 | 16-11 |
| Preliminary_Design | SDD | 2 | 6 | 2-6 |
| Prep_for_Delivery | SSS | 1 | 8 | 1-8 |
| Processing_Resources | SSDD | 17 | 8 | 17-8 |
| Programming_Equipment | FSM | 10 | 7 | 10-7 |
| Programming_Information | SPM | 9 | 7 | 9-7 |
| QA_Provisions | SSS | 1 | 7 | 1-7 |
| Qualification_Requirements | SRS | 12 | 7 | 12-7 |
| Quality_Factor_Compliance | SSDD | 17 | 9 | 17-9 |
| Requirements | SPS | 15 | 6 | 15-6 |
| Requirements_Traceability | SSDD | 17 | 10 | 17-10 |
| Software_Compilation | SPM | 9 | 6 | 9-6 |
| Software_Config_Mgmnt | SDP | 16 | 10 | 16-10 |
| Software_Dev_Mgmnt | SDP | 16 | 6 | 16-6 |
| Software_Engineering | SDP | 16 | 7 | 16-7 |

| | | | | |
|---|---|---|---|---|
| Software_Product_Eval | SDP | 16 | 9 | 16-9 |
| Software_Test_Environment | STP | 4 | 6 | 4-6 |
| Support_Info | CRISD | 11 | 6 | 11-6 |
| System_Design | SSDD | 17 | 7 | 17-7 |
| System_Requirement | SSS | 1 | 6 | 1-6 |
| Test_Overview | STR | 6 | 6 | 6-6 |
| Test_Results | STR | 6 | 7 | 6-7 |
| Transition_Planning | CRISD | 11 | 7 | 11-7 |
| Version_Description | VDD | 3 | 6 | 3-6 |

### 3.3 Detailed Structural Analysis and Reduction to SGML

As the CALS ISG noted, it is not sufficient to simply capture the structure of the DIDs in SGML but rather it is necessary to identify and content label the information items in the DIDs. This comment is heavily biased by the desire to do information processing on the data contained in the DIDs. On the other hand, the DIDs actually specify the structure that the software documentation must satisfy. We shall accomplish both of these goals by implementing the following strategy:

- ☞ First we decompose each DID in SGML down to the finest level specified by the DID, usually to three or four levels (e.g. 3.1.1 or 3.1.1.1), being careful to maintain content labeling for each SGML element. At this level of decomposition, we have a structure which is roughly isomorphic to the DI structure specified by the DID. This first decomposition is accomplished by outlining the DI in conventional outline form. This is done for each of the seventeen DIs in the following sections labeled *Detailed Structural Analysis of the XYZ* where "XYZ" stands for any of the seventeen DIs.
- ☞ In the second step, we translate the outline, generated in the first step, to SGML. For each SGML element defined in this process, there will be a corresponding paragraph in the DID which describes the element in detail. This description is then translated into SGML elements and attributes. This process is largely subjective and calls for many design decisions as how to best represent an object. This step is also the one in which the *bottom up* approach must be incorporated so that the life cycle aspects of tying the elements together are taken into account.

We now proceed to analyze the detailed structure for each DI. **This does not necessarily mean that our design will contain a different element for every paragraph, but is merely a way of capturing the structure of the document in SGML**. The design process will be responsible for factoring and simplifying the psuedo-SGML output of the analysis phase. We shall use long identifier names in this analysis so that the psuedo-SGML is self-documenting. These may need to be shortened, in the design, to 8 characters or so, depending on the DTD. In this decomposition, we shall only analyze the common elements *front* and *rear* once. The document specific analysis will identify any special requirements that a document places on the *front* or *rear* elements. Numbers enclosed in curly brackets, (e.g. {3.1.1} ) indicate special requirements that an element bear that paragraph number in the formatted document. [3]

For the purposes of this analysis, if an element is not further decomposed, then we shall consider that element to be atomic. The task of decomposing all items to character or binary data will thus be passed to the design task. In fact, the design phase is not bound to use the same decomposition, as that stated herein, at all. In addition, the analysis phase will ignore many details of the actual DTD such as security classification attributes, since these would make the analysis less transparent; however, **almost all DTD elements shall have a security attribute.**

#### 3.3.1 Detailed Structural Analysis of the SSS

Referring to paragraph 3.2.1 the document unique elements for the SSS are *System requirements*, *Quality assurance provisions*, and *Preparation for delivery*.

##### 3.3.1.1 System requirements {3}

The structure of this section is indicated by the following list:

[3] Square brackets containing the notation "[ProjID*n*]" is used to denote the special requirement for a project unique identifier. The *n* indicates the nth such identifier.

I. Definition {3.1}
   A. System Diagram

II. Characteristics {3.2}
   A. Performance Characteristics {3.2.1}
      1. State 1 Name {3.2.1.1}
         a. Mode I Name {3.2.1.1.1}
            i. Capability A {3.2.1.1.1.1}
            ii. Capability B {3.2.1.1.1.2}
            iii. Capability C {3.2.1.1.1.3}

                .
                .
                .

         d. Mode II Name {3.2.1.1.2}
            i. Capability A {3.2.1.1.2.1}
            ii. Capability B {3.2.1.1.2.2}
            iii. Capability C {3.2.1.1.2.3}

                .
                .
                .

         d. Mode III Name {3.2.1.1.3}
            i. Capability A {3.2.1.1.3.1}
            ii. Capability B {3.2.1.1.3.2}
            iii. Capability C {3.2.1.1.3.3}

                .
                .
                .

      4. State 2 Name {3.2.1.2}
         a. Mode I Name {3.2.1.2.1}
            i. Capability A {3.2.1.2.1.1}
            ii. Capability B {3.2.1.2.1.2}
            iii. Capability C {3.2.1.2.1.3}

                .
                .
                .

         d. Mode II Name {3.2.1.2.2}
            i. Capability A {3.2.1.2.2.1}
            ii. Capability B {3.2.1.2.2.2}
            iii. Capability C {3.2.1.2.2.3}

                .

.
.

d. Mode III Name {3.2.1.2.3}
   i. Capability A {3.2.1.2.3.1}
   ii. Capability B {3.2.1.2.3.2}
   iii. Capability C {3.2.1.2.3.3}

.
.
.

4. State 3 Name {3.2.1.3}

.
.
.

B. Capabilities Relationship {3.2.2}
C. External Interface Requirements {3.2.3}
   1. System 1 {3.2.3.1}
   2. System 2 {3.2.3.1}
   3. System 3 {3.2.3.1}

.
.
.

D. Physical Characteristics {3.2.4}
   1. Protective Coatings {3.2.4.1}
E. Quality Factors {3.2.5}
   1. Reliability {3.2.5.1}
   2. Maintainabilty {3.2.5.2}
   3. Availabilty {3.2.5.3}
   4. Additional Quality Factors {3.2.5.4}
F. Environmental {3.2.6}
G. Transportability {3.2.7}
H. Flexibility {3.2.8}
I. Portability {3.2.9}

III. Design and Construction {3.3}
   1. Materials {3.3.1}
      a. Toxic Product and Formulations {3.3.1.1}
   2. Electromagnetic Radiation {3.3.2}
   3. Nameplate and Product Marking {3.3.3}
   4. Workmanship {3.3.4}
   5. Interchangeability {3.3.5}
   6. Safety {3.3.6}

7. Human Engineering {3.3.7}
8. Nuclear Control {3.3.8}
9. System security {3.3.9}
10. Government Furnished Property Usage {3.3.10}
11. Computer resource reserve capacity {3.3.11}

IV. Documentation {3.4}

V. Logistics {3.5}

VI. Personnel and Training {3.6}
1. Personnel {3.6.1}
2. Training {3.6.2}

VII. Characteristics of Subordinate Elements {3.7}
1. Segment 1 [ProjID1] {3.7.1}
2. Segment 2 [ProjID2] {3.7.2}
3. Segment 3 [ProjID3] {3.7.3}

.
.

VIII. Precedence {3.8}

IX. Qualification {3.9}

X. Standard Sample {3.10}

XI. Preproduction Sample {3.11}

3.3.1.2 Quality assurance provisions {4} The structure is detailed in the following list:

I. Responsibility for Inspection {4.1}

II. Special Tests and Examination {4.2}

III. Requirements Cross Reference {4.3}

3.3.1.3 Preparation for delivery {5}

3.3.1.4 Special Requirements for Front Element None.

3.3.1.5 Special Requirements for Rear Element

3.3.1.5.1 Notes {6} This sections shall contain background information. **This section must contain a List of Acronyms.**. The structure of this section is detailed in the following list:

I. Intended Use {6.1}
A. Missions {6.1.1}
B. Threat {6.1.2}

3.3.2 Reduction of the SSS to SGML Referring to the decomposition of the SSS body in paragraph 3.2.18.1, we now proceed to decompose the three major elements System-Requirements , QA-Provisions , and Delivery-Preparation. By inspection of paragraph 3.3.1 we obtain:

```
<!-- Psuedo-DTD for the System Segment Design Document (SSS) -->
```

```
<!-- Derived from Data Item Description DI-CMAN-80008A -->

<!-- Note Bene -- This DTD reflects the logical structure and-->
<!-- context rules of the Data Item.  The printed format and -->
<!-- ''style'' is controlled by a separate SGML document called -->
<!-- a FOSI which must conform to the Outspec DTD in -->
<!-- Mil-Std-28001 Appendix B.>


<!-- Comments generally apply to the item(s) immediately following -->
<!-- the comment.  Comments of the form ''DI-CMAN-80008A'' Section -->
<!-- 10.x.y.z {u.v} indicate that the Element was derived from -->
<!-- section 10.x.y.z of the DID DI-CMAN-80008A and that the -->
<!-- corresponding paragraph is to be numbered u.v when printed.  -->

            <!-- PART III -- System Requirements-->

              <!-- DI-CMAN-80008A Section 10.1.5 {3} -->
<!ELEMENT System-Requirements - - (
          System-Definition, System-Characteristics,
          Design-and-Construction, Documentation, Logistics,
          Personel-and-Training,
          Characteristics-of-Subordinate-Systems,
          Precedence, Qualification,
          Standard-Sample, Preproduction-Sample )>
<!ELEMENT System-Definition - - ( Description, Diagram )>
<!ELEMENT System-Characteristics - - (
          Preformance-Characteristics, Capabilities-Relation,
          External-Interface-Req?, Physical-Char?,
          Quality-Factor?, Environmental-Cond?,
          Transportability-Req?, Flexibility-Req?,
          Portability-Req?  )>
<!ELEMENT Performance-Characteristics - - ( State+ )>
<!ELEMENT State - - ( Mode+ )>
<!ELEMENT Mode - - ( Capability+ )>
<!ELEMENT External-Interface-Reqmnt - - (
          External-Interface-Description+ )>
<!ELEMENT Physical-Char - - (
          Reqmnt-Spec+, Protective-Coating-Spec?  )>
<!ELEMENT Quality-Factor - - (
          Reliability?, Maintainibility?,
          Availibilty?, Additional-Factors?  )>
<!ELEMENT Reliability - - ( Reqmnt-Spec+ )>
<!ELEMENT Maintainibility - - ( Reqmnt-Spec+ )>
<!ELEMENT Availibilty - - ( Reqmnt-Spec+ )>
```

```
<!ELEMENT Additional-Factor - - ( Reqmnt-Spec+ )>
<!ELEMENT Design-and-Construction - - (
          Material-Reqmnt, Toxic-Products,
          EMI-Reqmnt, Marking-Reqmnt, Workmanship,
          Interchangeability, Safety, Human-Engineering,
          Nuclear-Control, Security,
          GFE-Usage, Computer-Resource-Reserve )>
<!ELEMENT Documentation - - ( Reqmnt-Spec+ )>
<!ELEMENT Logistics - - ( Reqmnt-Spec+ )>
<!ELEMENT Personell-and-Training - - ( Personnel, Training )>
<!ELEMENT Personell - - ( Reqmnt-Spec+ )>
<!ELEMENT Training - - ( Reqmnt-Spec+ )>
<!ELEMENT Subordinate-Systems - - (
          Segment-Relationships, Segment-Description+ )>
<!ELEMENT Segment-Relationships - - ( Description )>
<!ELEMENT Segment-Description - - ( Purpose, Description, Capability )>
<!ATTLIST Segment-Description
          Segment-Name CDATA #REQUIRED
          ID ID #REQUIRED>
<!ELEMENT Precedence - - ( List )>
<!ATTLIST Precedence Level NUMBER ''1''>
<!-- Qualification Testing (V&V) -->
<!ELEMENT Qualification - - ( Test-Reqmnt-Spec+ )>
<!-- Test Requirement Specification (TRS) -->
<!ELEMENT Test-Reqmnt-Spec - - ( Reqmnt-Spec )>
<!ATTLIST Test-Reqmnt-Spec
          Test-Name CDATA #REQUIRED
          ID ID #REQUIRED
<!ELEMENT Standard-Sample - - ( Reqmnt-Spec+ )>
<!ELEMENT Preporduction-Sample - - ( Reqmnt-Spec+ )>

            <!-- PART IV -- QA-Provisions -->

<!ELEMENT QA-Provisions - - (
          Inspection-Responsibility, Special-Test-Spec,
          QA-Requirement-XREF )>
<!ELEMENT Inspection-Responsibility - - ( Assignment )+>
<!ELEMENT Assignment - - ( Text )>
<!ATTLIST Assignment
          Asigned-to (Contracting-Agency, Contracting-Agency-Designee,
          Contractor, SubContractor, Vendor) ''Contractor''>
<!ELEMENT QA-Requirement-XREF - - ( Description )>
```

```
<!-- PART V -- Delivery-Preparation -->

<!ELEMENT Delivery-Preparation - - ( Reqmnt-Spec+ )>
<!-- The following elements are actually part of the ''Rear'' element in
  Section 6.1 ->
<!ELEMENT Intended-Use - - (Missions, Threat)>
<!ELEMENT Missions - - (Description)>
<!ELEMENT Threat - - (Description)>
```

3.3.3 Detailed Structural Analysis of the SSDD Referring to paragraph 3.3.3 the document unique elements for the SSDD are *Operational-Concepts*, *System-Design*, *Processing-Resources*, *Quality-Factor-Compliance*, and *Requirements-Traceability*.

3.3.3.1 Operational Concepts {3} The structure of this section is indicated by the following list:

I. Mission {3.1}
   A. User Needs {3.1.1}
   B. Primary Mission {3.1.2}
   C. Secondary Mission {3.1.3}

II. Operational Environment {3.2}

III. Support Environment {3.3}
   1. Support Concept {3.3.1}
      a. Use of Multi-purpose or Automated Test Equipment {3.3.1.a}
      b. Repair or Replace Criteria {3.3.1.a}
      c. Maintenance Levels {3.3.1.b}
      d. Maintenance and Repair Cycles {3.3.1.c}
      e. Government and Contractor Support {3.3.1.d}
      f. Accessibility {3.3.1.e}
      g. Other {3.3.1.f}
   2. Support Facilities {3.3.2}
   3. Supply {3.3.3}
      a. Introduction of New Items {3.3.3.a}
      b. Re-supply {3.3.3.b}
      c. Stock Distribution and Loaction {3.3.3.c}
   4. Government Agencies {3.3.4}

IV. System Architecture {3.4}

V. Operational Scenarios {3.5}

3.3.3.2 System Design {4} The structure of this section is:

I. HWCI Identification {4.1}
   A. HWCI [ProjID1] {4.1.1}
   B. HWCI [ProjID2] {4.1.2}
   C. HWCI [ProjID3] {4.1.3}

.
.
.

II. CSCI Identification {4.2}
  A. CSCI [ProjID1] {4.1.1}
  B. CSCI [ProjID2] {4.1.2}
  C. CSCI [ProjID3] {4.1.3}

.
.
.

III. Manual Operations Identification {4.3}
  A. Manual Operation [ProjID1] {4.1.1}
  B. Manual Operation [ProjID2] {4.1.2}
  C. Manual Operation [ProjID3] {4.1.3}

.
.
.

IV. Internal Interfaces {4.4}
  A. HWCI to HWCI Interfaces {4.4.1}
    1. HWCI to HWCI Interface [ProjID1] {4.4.1.1}
    2. HWCI to HWCI Interface [ProjID2] {4.4.1.2}
    3. HWCI to HWCI Interface [ProjID3] {4.4.1.3}

.
.
.

  B. HWCI to CSCI Interfaces {4.4.2}
    1. HWCI to CSCI Interface [ProjID1] {4.4.2.1}
    2. HWCI to CSCI Interface [ProjID2] {4.4.2.2}
    3. HWCI to CSCI Interface [ProjID3] {4.4.2.3}

.
.
.

  C. CSCI to CSCI Interfaces {4.4.3}
    1. CSCI to CSCI Interface [ProjID1] {4.4.3.1}
    2. CSCI to CSCI Interface [ProjID2] {4.4.3.2}
    3. CSCI to CSCI Interface [ProjID3] {4.4.3.3}

.
.

.

### 3.3.3.3 Processing Resources {5}

I. Processing Resource [ProjID1] {5.1}
   1. Memory Size {5.1.a}
   2. Word Size {5.1.b}
   3. Processing Speed {5.1.c}
   4. Character Set {5.1.d}
   5. Instruction Set Architecture {5.1.e}
   6. Interrupt Capabilities {5.1.f}
   7. Direct Memory Access {5.1.g}
   8. Channel requirements {5.1.h}
   9. Auxiliary Storage {5.1.i}
   10. Growth Capabilities {5.1.j}
   11. Diagnostic Capabilities {5.1.k}
   12. Additional Computer Hardware Capabilities {5.1.l}
   13. Processing Resource Allocation {5.1.m}

II. Processing Resource [ProjID2] {5.2}
   1. Memory Size {5.2.a}
   2. Word Size {5.2.b}
   3. Processing Speed {5.2.c}
   4. Character Set {5.2.d}
   5. Instruction Set Archeticture {5.2.e}
   6. Interrupt Capabilities {5.2.f}
   7. Direct Memory Access {5.2.g}
   8. Channel requirements {5.2.h}
   9. Auxiliary Storage {5.2.i}
   10. Growth Capabilities {5.2.j}
   11. Diagnostic Capabilities {5.2.k}
   12. Additional Computer Hardware Capabilities {5.2.l}
   13. Processing Resource Allocation {5.2.m}

III. Processing Resource [ProjID3] {5.3}
   1. Memory Size {5.3.a}
   2. Word Size {5.3.b}
   3. Processing Speed {5.3.c}
   4. Character Set {5.3.d}
   5. Instruction Set Archeticture {5.3.e}
   6. Interrupt Capabilities {5.3.f}
   7. Direct Memory Access {5.3.g}
   8. Channel requirements {5.3.h}
   9. Auxiliary Storage {5.3.i}
   10. Growth Capabilities {5.3.j}

11. Diagnostic Capabilities {5.3.k}
12. Additional Computer Hardware Capabilities {5.3.l}
13. Processing Resource Allocation {5.3.m}

IV.

.
.
.

3.3.3.4 Quality Factor Compliance {6}

3.3.3.5 Requirements Traceability {7}

3.3.3.6 Special Requirements for Front Element None.

3.3.3.7 Special Requirements for Rear Element The following rear element differences are unique to the SSDD.

3.3.3.7.1 Notes {8} This sections shall contain background information. **This section must contain a List of Acronyms and abbreviations.**.

3.3.4 Reduction of the SSDD to SGML Referring to the decomposition of the SSDD body in paragraph 3.2.18.17, we now proceed to decompose the five major elements Operational-Concepts , System-Design, Processing-Resources , Quality-Factor-Compliance , and Requirements-Traceability. By inspection of paragraph 3.3.1 we obtain:

```
<!-- Psuedo-DTD for the System Segment Design Document (SSDD) -->
<!-- Derived from Data Item Description DI-CMAN-80534 -->

<!-- Note Bene -- This DTD reflects the logical structure and-->
<!-- context rules of the Data Item.  The printed format and -->
<!-- ''style'' is controlled by a separate SGML document called -->
<!-- a FOSI which must conform to the Outspec DTD in -->
<!-- Mil-Std-28001 Appendix B.>


<!-- Comments generally apply to the item(s) immediately following -->
<!-- the comment.  Comments of the form ''DI-CMAN-80534'' Section -->
<!-- 10.x.y.z {u.v} indicate that the Element was derived from -->
<!-- section 10.x.y.z of the DID DI-CMAN-80534 and that the -->
<!-- corresponding paragraph is to be numbered u.v when printed.  -->

            <!-- PART III -- Operational Concepts Elements -->

            <!-- DI-CMAN-80534 Section 10.1.5 {3} -->
<!ELEMENT Operational-Concepts - - (
          Mission, Operational-Environment, Support-Environment,
          System-Architecture, Operational-Scenarios)>
            <!-- DI-CMAN-80534 Section 10.1.5.1 {3.1} -->
<!ELEMENT Mission - - (
```

```
          User-Needs, Primary-Mission, Secondary-Mission)>
            <!-- DI-CMAN-80534 Section 10.1.5.1.1 {3.1.1} -->
<!ELEMENT User-Needs - - (User-Need+)>
<!ELEMENT User-Need - - (Statement-of-Need & Requirement-Reference)>
<!ELEMENT Requirement-Reference - - EMPTY>
<!ATTLIST Requirement-Reference
          Reference-Name CDATA #REQUIRED
          Reference-ID IDREF #REQUIRED
          Reference-Paragraph NMTOKEN #IMPLIED
<!ELEMENT Primary-Mission - - (Description)>
<!ELEMENT Secondary-Mission - - (Description)>
            <!-- DI-CMAN-80534 Section 10.1.5.2 {3.2} -->
<!ELEMENT Operational-Environment - - (
            <!-- DI-CMAN-80534 Section 10.1.5.3 {3.3} -->
<!ELEMENT Support-Environment - - (
          Support-Concept, Support-Facilities, Supply)>
            <!-- DI-CMAN-80534 Section 10.1.5.3.1 {3.3.1} -->
<!ELEMENT Support-Concept - - (
          Description?, ATE-Usage, Repair-Replace,
          Maint-Levels, Maint-Repair-Cycles,
          Govt-Contr-Support, Accessibility, Other)>
<!ELEMENT ATE-Usage - - (Description)>
<!ELEMENT Repair-Replace - - (Description)>
<!ELEMENT Maint-Levels- - (Description)>
<!ELEMENT Maint-Repair-Cycles - - (Description)>
<!ELEMENT Govt-Contr-Support- - (Description)>
<!ELEMENT Accessibility - - (Description)>
<!ELEMENT Other - - (Description)>
            <!-- DI-CMAN-80534 Section 10.1.5.3.2 {3.3.2} -->
<!ELEMENT Support-Facilities - - (Description)>
            <!-- DI-CMAN-80534 Section 10.1.5.3.3 {3.3.3} -->
<!ELEMENT Supply - - (
          Item-Introduction, Resupply, Stock)>
<!ELEMENT Item-Introduction - - (Description)>
<!ELEMENT Resupply - - (Description)>
<!ELEMENT Stock - - (Description)>
            <!-- DI-CMAN-80534 Section 10.1.5.3.4 {3.3.4} -->
<!ELEMENT Government-Agencies - - (Description)>
            <!-- System Architecture Diagram Optional Here -->
            <!-- DI-CMAN-80534 Section 10.1.5.4 {3.4} -->
<!ELEMENT System-Architecture - - (
            <!-- DI-CMAN-80534 Section 10.1.5.5 {3.5} -->
<!ELEMENT Operational-Scenarios - - (
            <!-- State / Mode Table Optional Here ->
```

```
            <!-- Data Flow Diagrams Optional Here ->
            <!-- Control Flow Diagrams Optional Here ->

            <!-- PART IV -- System Design Elements -->

            <!-- DI-CMAN-80534 Section 10.1.6 {4} -->
<!ELEMENT System-Design - - (
          Spec-Tree-Diagram+, HWCI-Identification*,)>
          CSCI-Identification*, Manual-Op-Identification*
          Internal-Interface-Relationships)>
            <!-- Specification Tree Diagram(s) Required Here ->
            <!-- DI-CMAN-80534 Section 10.1.6.1 {4.1} -->
<!ELEMENT HWCI-Identification - - (
          Purpose, Requirements-Allocation+, Capability*,
          External-Interface-Description*, Design-Constraint*)>
<!ATTLIST HWCI-Description
          HWCI-Name CDATA #REQUIRED
          Segment-ID NMTOKEN #REQUIRED>
          Item-Type (Prime, Critical, Other) #REQUIRED
            <!-- DI-CMAN-80534 Section 10.1.6.2 {4.2} -->
<!ELEMENT CSCI-Identification - - (
          Purpose, Requirements-Allocation+, Capability*,
          External-Interface-Description*,
          Internal-Interface-Description*,
          Design-Constraint*)>
<!ATTLIST CSCI-Description CSCI-Name CDATA #REQUIRED
          HWCI-Name CDATA #REQUIRED
          ID ID #REQUIRED>
            <!-- DI-CMAN-80534 Section 10.1.6.3 {4.3} -->
<!ELEMENT Manual-Op-Identification - - (
          Purpose, Capability+,
          External-Interface-Description*, Design-Constraint*)>
<!ATTLIST Manual-Op-Description
          Manual-Op-Name CDATA #REQUIRED
          ID ID #REQUIRED>
<!ELEMENT Internal-Interfaces - - (
          Description?, Internal-Interface-Description+)
          +(Internal-Interface-Diagram-Reference)>
<!ELEMENT Internal-Interface-Description - - (
          HWCI-HWCI-Interface | HWCI-CSCI-Interface |
          CSCI-CSCI-Interface)>
<!ELEMENT HWCI-HWCI-Interface - - (
          Description?  & HWCI-Signal-List & Description?)>
```

```
<!ATTLIST HWCI-HWCI-Interface
          HWCI-HWCI-Interface-Name CDATA #REQUIRED
          ID ID #REQUIRED>
<!ELEMENT HWCI-CSCI-Interface - - (
          Description?  & Signal-List & Description?)>
<!ATTLIST HWCI-CSCI-Interface
          HWCI-CSCI-Interface-Name CDATA #REQUIRED
          ID ID #REQUIRED>
<!ELEMENT CSCI-CSCI-Interface - - (
          Description?  & Object-Flow-List & Description?)>
<!ATTLIST CSCI-CSCI-Interface
          CSCI-CSCI-Interface-Name CDATA #REQUIRED
          ID ID #REQUIRED>
<!ELEMENT HWCI-Signal-List - - (HWCI-Signals+)>
<!ELEMENT HWCI-Signal - - (Origintating-HWCI, Recipient-HWCI)>
<!ATTLIST HWCI-Signal
          HWCI-Signal-Name CDATA ''
          ID ID #REQUIRED>
<!ELEMENT Signal-List - - (Signals+)>
<!ELEMENT Signal - - (
          (Origintating-HWCI, Recipient-CSCI) |
          (Origintating-CSCI, Recipient-HWCI) )>
<!ATTLIST Signal
          Signal-Name CDATA ''
          ID ID #REQUIRED>
<!ELEMENT Object-Flow-List - - (Object-Flow+)>
<!ELEMENT Object-Flow - - (
          Origintating-CSCI, Recipient-CSCI)>
<!ATTLIST Object-Flow Object-Flow-Name CDATA #REQUIRED
<!-- Use of the mixed ''Data-Control'' type is strongly discouraged -->
          Object-Flow-Type (Data | Control | Data-Control) #REQUIRED>
<!ELEMENT Origintating-HWCI EMPTY>
<!ATTLIST Origintating-HWCI
          Origintating-HWCI-Name CDATA ''
          ID ID #REQUIRED>
<!ELEMENT Recipient-HWCI EMPTY>
<!ATTLIST Recipient-HWCI
          Origintating-HWCI-Name CDATA ''
          ID ID #REQUIRED>
<!ELEMENT Origintating-CSCI EMPTY>
<!ATTLIST Origintating-CSCI
          Origintating-CSCI-Name CDATA ''
          ID ID #REQUIRED>
<!ELEMENT Recipient-CSCI EMPTY>
```

```
<!ATTLIST Recipient-CSCI
          Origintating-HWCI-Name CDATA ''
          ID ID #REQUIRED>

            <!-- PART V Processing Resources Elements -->

            <!-- DI-CMAN-80534 Section 10.1.7.1 {5} -->
<!ELEMENT Processing-Resources - - (Resource+)>
<!ELEMENT Resource - - (
          Channel-Capacity*, Auxliary-Storage*, Growth-Capability,
                     Diagnostic-Capability?,
          Other-HW-Capability?, CSCI-Allocation+)>
<!ATTLIST Resource
          Resource-Name CDATA ''
          ID ID #REQUIRED
<!-- Use ''0'' in a resource parameter for ''Not Applicable'' -->
<!-- Word-Size is always in bits -->
          Word-Size NUMBER ''0''
          Total-Memory-Size NUMBER ''0''
          Spare-Memory-Size NUMBER ''0''
          Memory-Size-Units (Bytes | Kbytes | Mbytes | Words) ''Mbytes''
          Instruction-Set-Architecture NMTOKEN ''
          Processing-Speed NUMBER ''0''
          Processing-Speed-Units NMTOKEN ''0''
          Processing-Speed-Reserve-Precentage NUMBER ''0''
          Character-Set NMTOKEN ''ISO-646--1983''
<!ELEMENT Channel-Capacity - - (Description)>
<!ELEMENT Auxliary-Storage - - (Description)>
<!ELEMENT Growth-Capability - - (Description)>
<!ELEMENT Diagnostic-Capability - - (Description)>

<!ELEMENT DMA-Capability - - (Description)>
<!ELEMENT CSCI-Utilization - - (Description)>
<!ATTLIST CSCI-Utilization
          CSCI-ID ID #REQUIRED
          Percent-Utilization NUMBER ''0''>

            <!-- PART VI Quality-Factor-Compliance Elements -->

<!ELEMENT Quality-Factor-Compliance - - (Specification+)>

            <!-- PART VII Requirements-Traceability Elements -->

            <!-- DI-CMAN-80534 Section 10.1.8 {7} -->
<!ELEMENT Requirements-Traceability - - (Requirement-Allocation+)>
<!ELEMENT Requirement-Allocation - - (
```

```
          HWCI-Allocation | CSCI-Allocation | Manual-OP-Allocation)>
<!ATTLIST HWCI-Allocation
          SSS-Capability-ID IDREF #REQUIRED
          HWCI-ID IDREF #REQUIRED>
<!ELEMENT CSCI-Allocation - - (Description?)>
<!ATTLIST CSCI-Allocation
          SSS-Capability-ID IDREF #REQUIRED
          CSCI-ID IDREF #REQUIRED>
<!ELEMENT Manual-Op-Allocation - - (Description?)>
<!ATTLIST Manual-Op-Allocation
          SSS-Capability-ID IDREF #REQUIRED
          Manual-Op-ID IDREF #REQUIRED>
```

### 3.3.5 Detailed Structural Analysis of the SRS

3.3.5.1 Engineering Requirements {3} The structure of this section is indicated by the following list:

I. CSCI External Interface Requirements {3.1}
   A. External Interface Diagram

II. CSCI Capability Requirements {3.2}
   A. Capability Name 1 [ProjID1] {3.2.1}
      1. Sub-Capability Name 1A [ProjID1A] (Optional) {3.2.1.1}
      2. Sub-Capability Name 1B [ProjID1B] (Optional) {3.2.1.2}

      .
      .

   B. Capability Name 2 [ProjID2] {3.2.2}
      1. Sub-Capability Name 2A [ProjID2A] (Optional) {3.2.2.1}
      2. Sub-Capability Name 2B [ProjID2B] (Optional) {3.2.1.2}

      .
      .

   C. Capability Name 3 [ProjID3] {3.2.3}

      .
      .

III. CSCI Internal Interfaces {3.3}

- ❑ Internal Interface Diagram (Optional)
- ❑ Architecture Flow Diagram (Optional)
- ❑ Architecture Interconnect Diagram (Optional)
- ❑ Data Flow Diagram (Optional)
- ❑ Control Flow Diagram (Optional)

IV. CSCI Data Element Requirements {3.4}

A. Internal Data Element 1

1. [ProjID1]
2. Description
3. Units
4. Limits
5. Accuracy
6. Precision

B. Internal Data Element 2

1. [ProjID2]
2. Description
3. Units
4. Limits
5. Accuracy
6. Precision

.
.

C. Internal Interface Data Element 1

- ❍ [ProjID1]
- ❍ Source Capability
- ❍ Destination Capability

D. Internal Interface Data Element 2

- ❍ [ProjID2]
- ❍ Source Capability
- ❍ Destination Capability

.
.

E. External Interface Data Element 1

- ❍ [ProjID1]
- ❍ Source Capability
- ❍ Destination Capability
- ❍ IRS Reference

F. External Interface Data Element 2

- ❍ [ProjID2]
- ❍ Source Capability

- ❍ Destination Capability
- ❍ IRS Reference

.
.

V. Adaptation Requirements{3.5}
   A. Installation Dependent Data {3.5.1}
   B. Operational Parameters {3.5.2}

VI. Sizing and timing Requirements {3.6}

VII. Safety Requirements {3.7}

VIII. Security Requirements {3.8}

IX. Design Constraints {3.9}

X. Software Quality Factors {3.10}

XI. Human Performance / Human Engineering Requirements {3.11}

- ❍ Human information processing capabilities & limitations
- ❍ Forseeable human errors
- ❍ System Environmental

XII. Requirements Traceability {3.12}

3.3.5.2 Qualification Requirements {4}

I. Qualification Methods {4.1}

II. Special Qualification Requirements{4.2}

3.3.5.3 Preparation for Delivery {5}

3.3.5.4 Special Requirements for Front Element Section 1.2 is to be titled “CSCI Overview”. It describes the role which the CSCI, to which this SRS applies, plays in the system.

3.3.5.5 Special Requirements for Rear Element

3.3.5.5.1 Notes {6} This sections shall contain background information, formula derivation, etc.. **This section must contain a List of Acronyms and abbreviations.**.

3.3.6 Reduction of the SRS to SGML Referring to the decomposition of the SRS body in paragraph 3.2.18.12, we now proceed to decompose the three major elements Engineering Requirements, Qualification Requirements, Preparations for Delivery. By inspection of paragraph 3.3.5 we obtain

```
<!-- Psuedo-DTD for the Software Requirements Specification (SRS) -->
<!-- Derived from Data Item Description DI-MCCR-80025A -->

<!-- Note Bene -- This DTD reflects the logical structure and-->
<!-- context rules of the Data Item.  The printed format and -->
```

```
<!-- ''style'' is controlled by a separate SGML document called -->
<!-- a FOSI which must conform to the Outspec DTD in -->
<!-- Mil-Std-28001 Appendix B.>


<!-- Comments generally apply to the item(s) immediately following -->
<!-- the comment.  Comments of the form ''DI-MCCR-80025A'' Section -->
<!-- 10.x.y.z {u.v} indicate that the Element was derived from -->
<!-- section 10.x.y.z of the DID DI-MCCR-80025A and that the -->
<!-- corresponding paragraph is to be numbered u.v when printed.  -->

            <!-- PART III -- Engineering Requirements Elements -->

              <!-- DI-MCCR-80025A Section 10.1.5 {3} -->
<!ELEMENT Engineering-Requirements - - (
          CSCI-External-Interface-Requirements,
          CSCI-Capability-Requirements,
          CSCI-Internal-Interface-Requirements,
          CSCI-Data-Element-Requirements, Adaptation-Requirements,
          Sizing-Timing-Requirements, Safety-Requirements,
          Security-Requirements, Design-Constraints,
          Software-Quality-Factors, Human-Requirements )>
            <!-- DI-MCCR-80025A Section 10.1.5.1 {3.1} -->
<!ELEMENT CSCI-External-Interface-Requirements - - (
          Description?, External-Interface-Description+)
          +(External-Interface-Diagram-Reference)>
<!ELEMENT External-Interface-Description - - (
          Description) +(External-Interface-Document-Reference)>
<!ATTLIST External-Interface-Description
          External-Interface-Name CDATA #REQUIRED
          ID NMTOKEN #REQUIRED>
<!ELEMENT External-Interface-Document-Reference - - (
          External-ICD-Reference | External-IDD-Reference |
          External-IRS-Reference | External-Doc-Reference)>
            <!-- DI-MCCR-80025A Section 10.1.5.2 {3.2} -->
<!ELEMENT CSCI-Capability-Requirements - - (
          (CSCI-Capability-Requirement | CSCI-Sub-Capability-Requirement)+
          +(State-Mode-Correlation-Table)>
            <!-- DI-MCCR-80025A Section 10.1.5.2.1 {3.2.x} -->
<!ELEMENT CSCI-Capability-Requirement - - (
          Purpose, IO-List, Requirement-Satisfaction+) >
<!ATTLIST CSCI-Capability-Requirement
          CSCI-Capability-Requirement-Name CDATA #REQUIRED
          ID ID #REQUIRED>
<!ELEMENT CSCI-Sub-Capability-Requirement - - (
```

```
          Purpose, IO-List, Requirement-Satisfaction+) >
<!ATTLIST CSCI-Sub-Capability-Requirement
          CSCI-Sub-Capability-Requirement-Name CDATA #REQUIRED
          ID ID #REQUIRED>
                    Parent-Capability-Name IDREF #REQUIRED>
<!ELEMENT Requirement-Satisfaction - - (Description*)>
<!ATTLIST Requirement-Satisfaction
          Requirement-Satisfied-Name CDATA #REQUIRED
          ID IDREF #REQUIRED
          Requirement-Type (Derived | Stated) #REQUIRED>
<!ATTLIST CSCI-Capability-Requirement
          CSCI-Capability-Requirement-Name CDATA #REQUIRED
          ID ID #REQUIRED>
<!ELEMENT IO-List - - (Input-Description | Output-Description)+>
<!ELEMENT Input-Description - - (Purpose)>
<!ATTLIST Input-Description
          Input-Description-Name CDATA #REQUIRED
          ID ID #REQUIRED>
<!ELEMENT Output-Description - - (Purpose)>
<!ATTLIST Output-Description
          Output-Description-Name CDATA #REQUIRED
          ID ID #REQUIRED>
            <!-- DI-MCCR-80025A Section 10.1.5.3 {3.3} -->
<!ELEMENT CSCI-Internal-Interface-Requirements - - (
          CSCI-Internal-Interface-Requirement+)>
<!ELEMENT CSCI-Internal-Interface-Requirement - - (
          Description, Source-CSCI-Capability,
          Destination-CSCI-Capability, Information-Summary)
          +(Internal-Interface-Diagram |
          Architecture-Flow-Diagram |
          Architecture-Interconnect-Diagram |
          Data-Flow-Diagram |
          Control-Flow-Diagram )>
<!ATTLIST CSCI-Internal-Interface-Requirement
          CSCI-Internal-Interface-Requirement-Name CDATA #REQUIRED
          ID IDREF #REQUIRED>
<!ELEMENT CSCI-Capability (Source-CSCI-Capability |
          Destination-CSCI-Capability)>
<!ELEMENT Source-CSCI-Capability EMPTY>
<!ATTLIST Source-CSCI-Capability
          Source-CSCI-Capability-Name CDATA ''
          ID IDREF #REQUIRED>
<!ELEMENT Destination-CSCI-Capability EMPTY>
<!ATTLIST Destination-CSCI-Capability
```

```
          Destination-CSCI-Capability-Name CDATA ''
          ID IDREF #REQUIRED>
            <!-- DI-MCCR-80025A Section 10.1.5.4 {3.4} -->
<!ELEMENT CSCI-Data-Element-Requirements - - (
          Internal_Data_Element+, Internal_Interface_Data_Element*,
          External_Interface_Data_Element*)>
<!ELEMENT Internal-Data-Element - - (Description)>
<!ATTLIST Internal-Data-Element
          Internal-Data-Element-Name CDATA #REQUIRED
          ID ID #REQUIRED
          Units NAME #IMPLIED
          Limits NUTOKENS #IMPLIED
          Accuracy NUTOKEN #IMPLIED
          Precision NUTOKEN #IMPLIED
<!ELEMENT Internal-Interface-Data-Element - - (
          Description, Source-CSCI-Capability,
          Destination-CSCI-Capability)>
<!ATTLIST Internal-Interface-Data-Element
          Internal-Interface-Data-Element-Name CDATA #REQUIRED
          ID IDREF #REQUIRED>
<!ELEMENT External-Interface-Data-Element - - (
          Description, Source-CSCI-Capability,
          Destination-CSCI-Capability, External-IRS-Reference)>
<!ATTLIST External-Interface-Data-Element
          External-Interface-Data-Element-Name CDATA #REQUIRED
          ID NMTOKEN #REQUIRED>
            <!-- DI-MCCR-80025A Section 10.1.5.5 {3.5} -->
<!ELEMENT Adaptation-Requirements - - (
          Installation-Dependent-Data, Operational-Parameters)>
            <!-- DI-MCCR-80025A Section 10.1.5.5.1 {3.5.1} -->
<!ELEMENT - - Installation-Dependent-Data (Installation-Dependent-Datum+)>
<!ELEMENT - - Installation-Dependent-Datum (
          Description, CSCI-Capability+)>
            <!-- DI-MCCR-80025A Section 10.1.5.5.2 {3.5.2} -->
<!ELEMENT - - Operational-Parameters (Operational-Parameter+)>
<!ELEMENT - - Operational-Parameter(
          Description, CSCI-Capability+)>
            <!-- DI-MCCR-80025A Section 10.1.5.6 {3.6} -->
<!ELEMENT Sizing-Timing-Requirements - - (
          Internal-Memory-Allocation+, Auxiliary-Memory-Allocation+,
          CPU-Utilization+)>
<!ELEMENT - - CPU-Utilization (Description)>
<!ATTLIST CPU-Utilization
          CPU-Name CDATA #IMPLIED
```

```
          Percent-Utilization NUMBER ''0''>
<!ELEMENT - - Internal-Memory-Allocation (Memory-Allocation)>
<!ELEMENT - - External-Memory-Allocation (Memory-Allocation)>
<!ELEMENT - - Memory-Allocation (Description)>
<!ATTLIST Memory-Allocation
          Units NAME #REQUIRED
          Memory-Amount NUMBER ''0''
          Memory-Location NUTOKENS #IMPLIED>
            <!-- DI-MCCR-80025A Section 10.1.5.7 {3.7} -->
<!ELEMENT Safety-Requirements - - (Safety-Requirement+)>
<!ELEMENT Safety-Requirement - - (Description)>
            <!-- DI-MCCR-80025A Section 10.1.5.8 {3.8} -->
<!ELEMENT Security-Requirements - - (Security-Requirement+)>
<!ELEMENT Security-Requirement - - (Description)>
            <!-- DI-MCCR-80025A Section 10.1.5.9 {3.9} -->
<!ELEMENT Design-Constraints - - (Design-Constraint+)>
<!ELEMENT Design-Constraint - - (Description)>
            <!-- DI-MCCR-80025A Section 10.1.5.10 {3.10} -->
<!ELEMENT Software-Quality-Factors - - (Software-Quality-Factor+)>
<!ELEMENT Software-Quality-Factor - - (Description)>
            <!-- DI-MCCR-80025A Section 10.1.5.11 {3.11} -->
<!ELEMENT Human-Requirements - - (Human-Requirement+)>
<!ELEMENT Human-Requirement - - (Description)>
            <!-- DI-MCCR-80025A Section 10.1.5.12 {3.12} -->
<!ELEMENT Requirement-Traceability - - (
          Requirement-Mapping+, Allocation-Mapping+)
          +(Requirements-Traceability-Table)>
<!ELEMENT Requirement-Mapping - - (
          External-Requirement-Reference,
          Section3-Reference, Description?)>
<!ATTLIST Requirement-Mapping
          Requirement-Name NMTOKEN #REQUIRED
          Requirement-ID IDREF #REQUIRED>
<!ELEMENT Allocation-Mapping - - (
          External-Requirement-Reference,
          Section3-Reference, Description | SSDD-Reference)>
<!ATTLIST Allocation-Mapping
          Requirement-Name NMTOKEN #REQUIRED
          Requirement-ID IDREF #REQUIRED>


            <!-- PART IV -- Qualification Requirements Elements -->


            <!-- DI-MCCR-80025A Section 10.1.6 {4} -->
```

```
<!ELEMENT Qualification-Requirements - - (
          Qualification-Methods, Special-Qualification-Requirements)>
            <!-- DI-MCCR-80025A Section 10.1.6.1 {4.1} -->
<!ELEMENT Qualification-Methods - - (
          (Qualification-Method+),
          +(Qualification-Xref-Table)>
<!ELEMENT Qualification-Method - - (
          Description?,
          Section3-Reference)>
<!ATTLIST Qualification-Method
          Requirement-Name NMTOKEN #REQUIRED
          Unit-Name ID #REQUIRED
          Unit-Level (CSCI | CSC | CSU | SEGMENT | SYSTEM) CSCI
          Requirement-NAME NMTOKEN #REQUIRED
          Requirement-ID IDREF #REQUIRED
          Method (ANALYSIS | DEMONSTRATION | INSPECTION | TEST |
          SIMULATION | OTHER) DEMONSTRATION>
<!ELEMENT Section3-Reference - - (Internal-Requirement-Reference)>
            <!-- DI-MCCR-80025A Section 10.1.6.2 {4.2} -->
<!ELEMENT Special-Qualification-Requirements - - (
          Special-Qualification-Requirement+)>
<!ELEMENT Special-Qualification-Requirement - - (
          Description, Internal-Requirement-Reference)>
<!ATTLIST Special-Qualification-Requirement
          Special-Test-ID ID #REQUIRED
          Unit-Name ID #REQUIRED
          Unit-Level (CSCI | CSC | CSU | SEGMENT | SYSTEM) CSCI
          Requirement-NAME NMTOKEN #REQUIRED
          Requirement-ID ID #REQUIRED
          Method (ANALYSIS | DEMONSTRATION | INSPECTION | TEST |
          SIMULATION | OTHER) DEMONSTRATION>
<!ELEMENT Requirement-Reference - - (
          Internal-Requirement-Reference |
          External-Requirement-Reference)>
<!ELEMENT Internal-Requirement-Reference - - EMPTY>
<!ATTLIST Internal-Requirement-Reference
          Reference-Name CDATA #REQUIRED
          Reference-ID IDREF #REQUIRED
          Referenced-Paragraph NUTOKEN #REQUIRED
<!ELEMENT External-Requirement-Reference - - EMPTY>
<!ATTLIST External-Requirement-Reference
          Reference-Name CDATA #REQUIRED
          Reference-ID NMTOKEN #REQUIRED
          Reference-Document NMTOKEN #REQUIRED
```

```
            Reference-Document-Type (SSS | SSDD | PIDS | CIDS | SOW |
            PROPOSAL) SSDD>
<!ELEMENT Section3-Reference - - (Internal-Requirement-Reference)>
              <!-- DI-MCCR-80025A Section 10.1.6.2 {4.2} -->
<!ELEMENT Special-Qualification-Requirements - - (
            Special-Qualification-Requirement+)>

              <!-- PART V Preparation for Delivery-->

              <!-- DI-MCCR-80025A Section 10.1.7 {5} -->
<!ELEMENT Delivery-Preparation - - (Description)>
```

3.3.7 Detailed Structural Analysis of the IRS

3.3.7.1 Special Requirements for Front Element None.

3.3.7.2 Special Requirements for Rear Element None.

3.3.8 Reduction of the IRS to SGML

3.3.9 Detailed Structural Analysis of the STP

3.3.9.1 Special Requirements for Front Element None.

3.3.9.2 Special Requirements for Rear Element None.

3.3.10 Reduction of the STP to SGML

3.3.11 Detailed Structural Analysis of the STD

3.3.11.1 Special Requirements for Front Element None.

3.3.11.2 Special Requirements for Rear Element None.

3.3.12 Reduction of the STD to SGML

3.3.13 Detailed Structural Analysis of the STR

3.3.13.1 Special Requirements for Front Element None.

3.3.13.2 Special Requirements for Rear Element None.

3.3.14 Reduction of the STR to SGML

3.3.15 Detailed Structural Analysis of the SDD

3.3.15.1 Special Requirements for Front Element None.

3.3.15.2 Special Requirements for Rear Element None.

3.3.16 Reduction of the SDD to SGML

3.3.17 Detailed Structural Analysis of the IDD

3.3.17.1 Special Requirements for Front Element None.

3.3.17.2 Special Requirements for Rear Element None.

3.3.18 Reduction of the IDD to SGML

3.3.19 Detailed Structural Analysis of the SPS

3.3.19.1 Special Requirements for Front Element None.

3.3.19.2 Special Requirements for Rear Element None.

3.3.20 Reduction of the SPS to SGML

3.3.21 Detailed Structural Analysis of the SUM

3.3.21.1 Special Requirements for Front Element None.

3.3.21.2 Special Requirements for Rear Element None.

3.3.22 Reduction of the SUM to SGML

3.3.23 Detailed Structural Analysis of the VDD

3.3.23.1 Special Requirements for Front Element None.

3.3.23.2 Special Requirements for Rear Element None.

3.3.24 Reduction of the VDD to SGML

3.3.25 Detailed Structural Analysis of the SDP

3.3.25.1 Special Requirements for Front Element None.

3.3.25.2 Special Requirements for Rear Element None.

3.3.26 Reduction of the SDP to SGML

3.3.27 Detailed Structural Analysis of the CSOM

3.3.27.1 Special Requirements for Front Element None.

3.3.27.2 Special Requirements for Rear Element None.

3.3.28 Reduction of the CSOM to SGML

3.3.29 Detailed Structural Analysis of the FSM

3.3.29.1 Special Requirements for Front Element None.

3.3.29.2 Special Requirements for Rear Element None.

3.3.30 Reduction of the FSM to SGML

3.3.31 Detailed Structural Analysis of the SPM

3.3.31.1 Special Requirements for Front Element None.

3.3.31.2 Special Requirements for Rear Element None.

3.3.32 Reduction of the SPM to SGML

3.3.33 Detailed Structural Analysis of the CRISD

3.3.33.1 Special Requirements for Front Element None.

3.3.33.2 Special Requirements for Rear Element None.

3.3.34 Reduction of the CRISD to SGML

3.3.35 Detailed Analysis of the Front Element The common front section consists of *cover*, *titlepg*, *contents*, *scope* , and *refdocs* | *appdocs*.

3.3.35.1 Cover

3.3.35.2 Title Page Upon examination of the 17 DIDs we find that they are all very similar. The minor differences are summarized as follows:

- ☞ Five of the documents have a signature block on the title page. These five documents are the SSS, SRS, IRS, IDD, and the SPS. This variation afects both the DTDs and FOSIs.

☞ In all five of the documents with a signature block, the contractors signature is labeled “Approved by” and all signatures have a separate line for the date of the signature. This variation only affects the relevant FOSI.

☞ All of the signature blocks except one have the contracting agencies signature labeled “Authenticated by”. The one exception is the IDD in which the contracting agency signature is labeled “Accepted by”. This variation only affects the relevant FOSI.

☞ .Both the SSS and SSDD may be specifications for a system or for a segment of a system. This variation affects both the DTDs and FOSIs.

☞ The SRS , STD, STR, SDD, SPS, and VDD apply to a specific CSCI and the CSCI name appears on the title page. This variation afects both the DTDs and FOSIs.

3.3.35.3 Table of Contents

3.3.35.4 Scope {1} The structure of scope is defined by the list:

I. Identification {1.1}

II. System-Overview {1.2}

III. Document-Overview {1.3}

3.3.35.5 Referenced Documents[4] {2}

3.3.35.6 Applicable Documents[5] {2}

3.3.36 Reduction of the Front Element to SGML

```
<!ELEMENT front - - (cover , titlepg , contents , scope ,
          (refdocs | appdocs))>
<!ELEMENT scope - - (Identification, System-Overview, Document-Overview)>
```

3.3.37 Detailed Analysis of the Rear Element

# 4 Bottom Up Analysis

## 4.1 Design Considerations

## 4.2 Lower Level Objects

Resorting to a bottoms up approach, we expect to see some familiar objects on the second or third lowest level. Examples of such objects are paragraphs, figures, lists, graphics, etc. This conjecture is based on experience with other document structures and on familiarity with the 2167A DIDs. Of most interest to us here are paragraphs and subparagraphs

4.2.1 Paragraph Types 2167A documentation consists largely of paragraphs and subparagraphs. In the following discussion, we shall drop the distinction between paragraphs and subparagraphs. There are several prevalent kinds of these paragraphs

1. Requirements Paragraphs
2. Specification Paragraphs
3. Informative Paragraphs
4. Warning Paragraphs
5. Caution Paragraphs

4 See next footnote.

5 Only one of either Referenced Documents or Applicable Documents is included depending on which was called out in the Data Items’s DID.

6. Descriptive Paragraphs
7. Test Result Paragraphs
8. General Paragraphs

4.2.2 Identifying low-level objects In the SGML spirit of separating the content of a document form its printed form, we recognize that *paragraph* and *subparagraph* are not the objects themselves but reflect the organization of the presentation of the objects. We contend therefore that a *Requirement* is the object which underlies the *Requirements Paragraph.* and that the concept of a *paragraph* be relegated to the FOSI where style issues are handled. Thus our list of objects which corresponds to the list of paragraphs previously elaborated is:

1. Requirement
2. Specification
3. Information
4. Warning
5. Caution
6. Description
7. Test Result
8. General Paragraph

On the other hand, the DIDs for the 2167A DI's often specify that a particular item, such as a description, occupy a single numbered paragraph. In our approach, that aspect is considered a style or formatting requirement and is passed along to the FOSI requirement for that particular object in a particular context.

4.2.3 DTD Elements We had originally considered defining a subparagraph as the fundamental object which would correspond to a SGML tag. This tag would then have an attribute list which would further qualify the subparagraph as a requirements subparagraph, specification subparagraph, etc. This approach has problems in that a requirement is complicated entity which itself has attributes such as *derived, stated*, etc. We also have a goal of being able to construct the requirements traceability matrix from the SGML tagged documents. These considerations favor making *Requirement* a SGML tag rather than an attribute.

4.2.4 FOSI EIC's The preparation instructions for 2167A data items, specify that certain data items bear certain paragraph numbers. This is related closely to the style of the underlying Mil-Std-490A which 2167A references. The straight forward and obvious approach, is to define an Element and an Element in Context (E-I-C) for each subparagraph which must bear a specific number. This approach has many advantages; in particular, it provides strong syntactic and semantic checks on the form of the document. The principal disadvantage is that there are exponentially many of these subparagraphs!

#### 4.2.4.1 Trade-offs

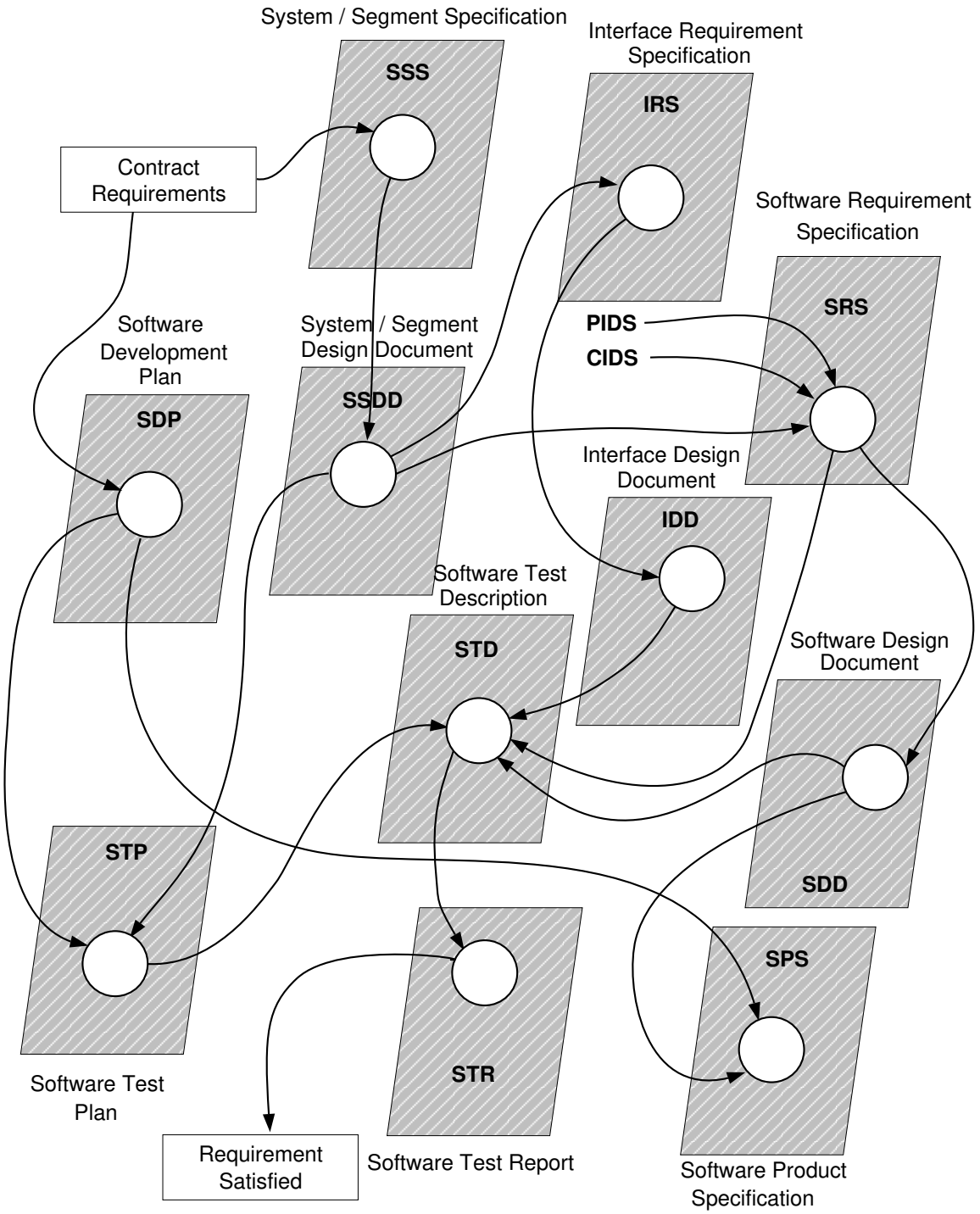
4.2.4.2 To date, we have identified 17 data item types which contain 42 major body elements. These are second level constructs. E-I-C's exist on levels 3,4,5 and possibly lower with the majority existing on level 4. While we have not explicitly elaborated these, we expect that there are many hundreds of these potential E-I-C's. This is the logical outcome of a top-down decomposition. The other approach is to proceed bottoms up, starting with subparagraphs as the obvious lower level object and to work one's way up. In this approach, there will be far fewer elements and E-I-C's than in the first approach. This approach is consistent with separating the form from the content of the target document; unfortunately, it offers the author of a SGML based 2167A data item (DI), far greater flexibility than the DID (Data Item Description) preparation instructions mandate. This approach places much of the responsibility for conformance on the author. Given the sheer time and budget constraints of the current project, however, the second approach (bottoms up) is the one that must be taken. There will be ample opportunity to refine these specs in the future however and they will be written in an object oriented and modular manner which will be conducive to further refinement.

### 4.3 Process Model

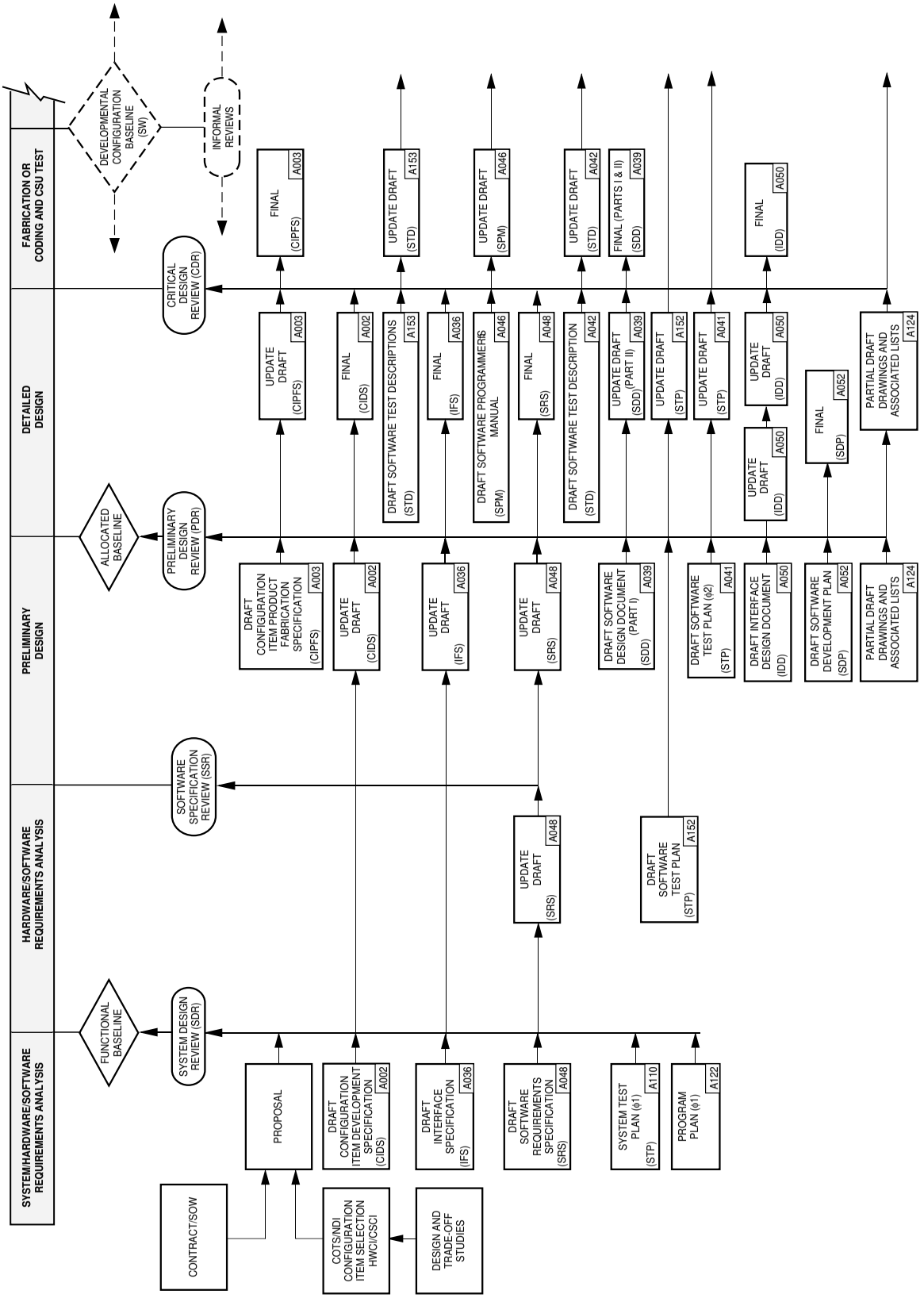
The CALS / ISG recommendations stress that a DTD which simply reflects the structure of the DID is of little use. They furthermore call for a software life cycle process model which adequately models the interaction between

DIDS. The principal impact of this recommendation is to realize that objects defined in one DTD must interact with objects defined in another. This is better illustrated in figure 4-1. This figure depicts a simplified interaction between tagged objects in several DTD's.

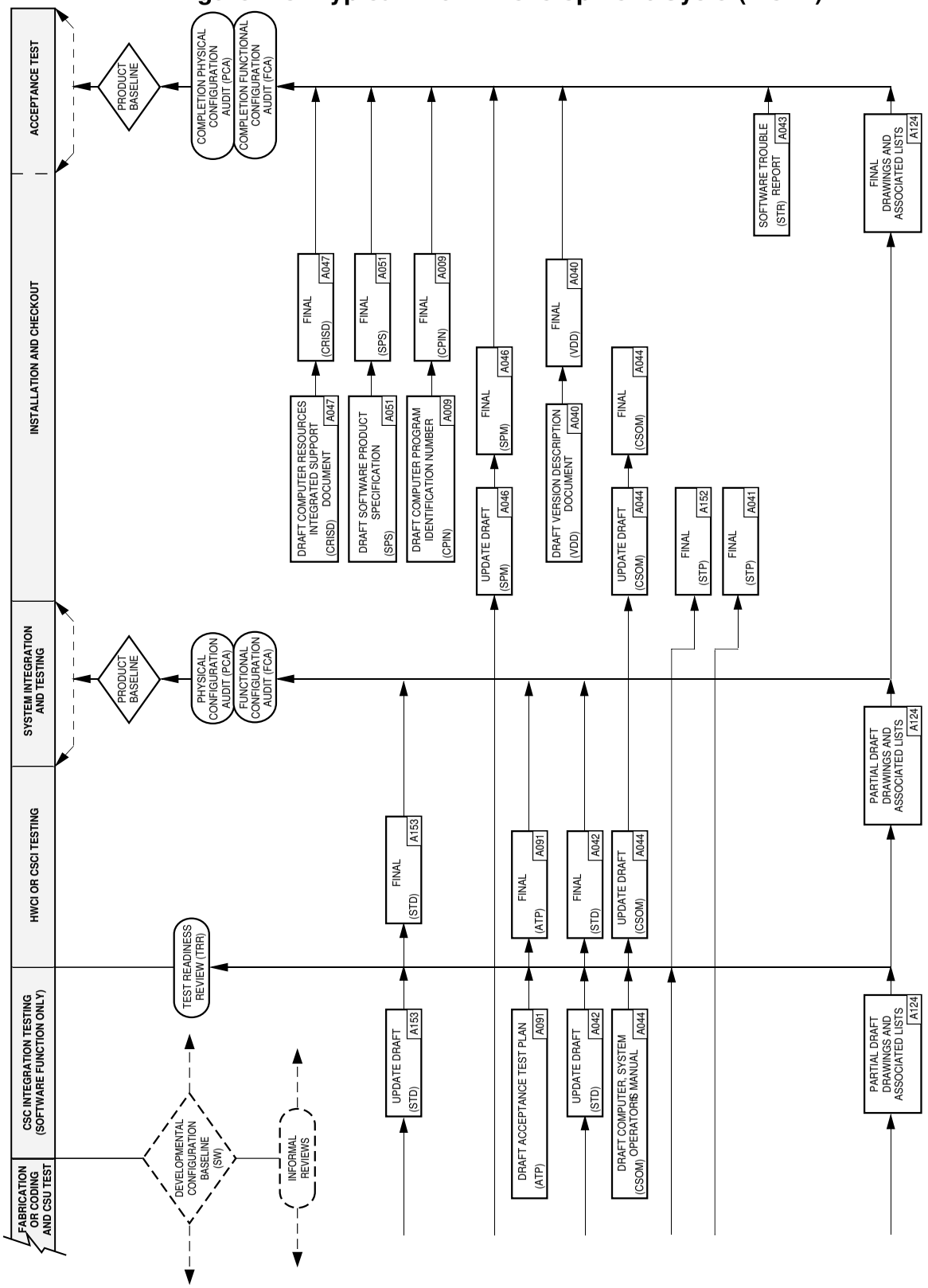
**Figure 4-1 Interaction Between Data Items**



## Figure 4-2 Typical 2167A Development Cycle (1 of 2)



## Figure 4-3 Typical 2167A Development Cycle (2 of 2)



# 5 DTD Requirements

## 5.1 Purpose

This section summarizes the DTD requirements which resulted from the document analysis and, together with the recommendations of the CALS / ISG, constitutes the entire input to the DTD design phase.

# 6 FOSI Requirements

## 6.1 Purpose

This section summarizes the requirements which resulted from the document analysis and, together with the recommendations of the CALS / ISG, constitutes the entire input to the FOSI design phase.

# Bibliography

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[5] Charles F. Goldfarb, *SGML Handbook*, Oxford University Press, 1990.

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# GLOSSARY

| | |
|---|---|
| **CALS** | *Computer-Aided Acquisition Logistics Standard* |
| **DTD** | *Document Type Definition* |
| **FOSI** | *Format Output Specification Instance* |
| **ISG** | *Industry Steering Group* |
| **SPC** | *Software Product Committee* |
| **SGML** | *Standard Generalized Markup Language*. |
| **DI** | *Data Item.* An abstraction meant to indicate the data which a DID describes. |
| **DID** | *Data Item Description*. A document which specifies how contract deliverable data is to be prepared and describes what items of information must be provided. |
| **Outspec** | *Output Specification* An SGML description, appearing in Appendix B of Mil-Std-28001B which defines a Formatting language for SGML documents. |