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Technical Report

PROCEDURES FOR THE ACQUISITION AND DEVELOPMENT OF NAVSEA TMs/IETMs IN ACCORDANCE WITH INTERNATIONAL SPECIFICATION S1000D

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This guide, Procedures for the Acquisition and Development of NAVSEA TMs/IETMs in Accordance with the International Specification S1000D, establishes uniform guidelines and practices for NAVSEA activities and programs with regard to the implementation of S1000D. This guide is a companion document to the TMMP. The guidance, actions, and processes described herein augment the TMMP requirements which continue to apply for any NAVSEA S1000D TM/IETM development.

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Administrative Information

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1 INTRODUCTION

1.1 Introduction

S1000D™, International Specification for Technical Publications utilizing a Common Source Database, hereafter referred to as S1000D, is a well-established and widely used specification for the procurement and production of technical manuals (TMs) worldwide. It defines a new approach and methodology for TM acquisition and development. S1000D is published and maintained by an international organization with participation from the U.S. Department of Defense and was adopted for use by NAVSEA in February 2010.

The Naval Sea Systems Command (NAVSEA) Technical Manual Management Program (TMMP) (NAVSEAINST 4160.3) and the Operations and Life Cycle Support Procedures manual, S0005-AA-PRO-010/TMMP, identify the policy and responsibilities and describe the processes and procedures to be followed during the entire life cycle of NAVSEA Technical Manuals. It describes processes starting with the initial planning and budgeting and continuing through the four principal phases of the TM life cycle, namely definition, development, distribution, and disposal. While the TMMP is written for traditional TM definition and development processes, its guidance applies to all TM specifications including S1000D.

This guide, *Procedures for the Acquisition and Development of NAVSEA TMs/IETMs in Accordance with the International Specification S1000D*, establishes uniform guidelines and practices for NAVSEA activities and programs with regard to the implementation of S1000D. This guide is a companion document to the TMMP. The guidance, actions, and processes described herein augment the TMMP requirements which continue to apply for any NAVSEA S1000D TM/IETM development.

1.2 Organization and Content

This guide is organized to reflect the four phases of a TM's life cycle: definition, development, distribution, and disposal, as addressed by the TMMP. The actions and processes described in this document are guidelines for the acquisition and development of S1000D IETMs that augment, and do not replace, the operations and procedures described in the NAVSEA TMMP Operations and Life Cycle Support Procedures manual. Section 2 of this guide presents thumbnail overviews of each chapter of the S1000D specification, discusses basic concepts of S1000D, guides the user in applying the specification for NAVSEA applications, and identifies key resources supporting NAVSEA users of the specification. Sections 3 and 4 present an S1000D IETM acquisition and development process model that expands upon the definition and development processes addressed by the TMMP and establishes a common NAVSEA approach to buying and developing S1000D IETMs. Sections 5 and 6 state that the TMMP requirements for distribution and disposal apply to S1000D TMs with no

additional requirements. Three appendices present the list of acronyms and abbreviations (Appendix A), definition of terms (Appendix B), and the complete S1000D Acquisition Process Model (Appendix C).

1.3 Scope

This document provides NAVSEA Acquiring Activities specific direction on TM management operations and life cycle procedures that are particular to IETMs developed in accordance with the S1000D specification. These operations and procedures do not supersede existing TMMP requirements but, rather, complement them and expand them as needed to relate to S1000D. They address the definition, development, distribution, and disposal operations and procedures for S1000D IETMs that are not covered by the TMMP Operations and Life Cycle Procedures manual, S0005-AA-PRO-010/TMMP.

1.4 References

The following documents provide additional information for S1000D implementers and developers. Updated information and URLs can be obtained by contacting the Navy S1000D Information Center at Naval Surface Warfare Center (NSWC) Carderock Division through an email at Code20web.nswccd.fct@navy.mil.

a. Naval Sea Systems Command Letter, "Use of S1000D Specification for Technical Manual Development and Management" 17 Feb 2010, available from www.navsea.navy.mil/nswc/carderock/tecinfsys/s1000d/acq_proc.html

b. NAVSEAINST 4160.3, Technical Manual Management Program, available from https://nsdsa.nmci.navy.mil under Reference Docs

c. NAVSEA Technical Manual, Technical Manual Management Program Operations and Life Cycle Procedures, S0005-AA-PRO-010/TMMP, available from https://nsdsa.nmci.navy.mil under Reference Docs

d. S1000D ™, the International Specification for Technical Publications utilizing a Common Source Database, available from www.s1000d.org

e. MIL-DTL-24784, Detail Specification: Manuals, Technical: General Acquisition and Development Requirements, General Specification for, available from https://assist.daps.dla.mil/quicksearch/

f. DON S1000D Change Proposal Form (CPF) Approval Process, available from www.navsea.navy.mil/nswc/carderock/tecinfsys/s1000d/acq_proc.html

g. DON S1000D Technical Manual Quality Assurance Guidance, available from www.navsea.navy.mil/nswc/carderock/tecinfsys/s1000d/acq_proc.html

h. DON Policy on Digital Product/Technical Data, available from www.navsea.navy.mil/nswc/carderock/tecinfsys/gui-acq-con/index.html

i. Guidance on Acquisition and Conversion of Product/Technical Data to Digital Form, available at www.navsea.navy.mil/nswc/carderock/tecinfsys/gui-acq-con/index.html

1.5 Resources

The following are additional resources for understanding and implementing S1000D TMs. Updated information and URLs can be obtained by contacting the Navy S1000D Information Center at Naval Surface Warfare Center (NSWC) Carderock Division through an email at Code20web.nswccd.fct@navy.mil.

a. Navy S1000D Information Center at Naval Surface Warfare Center (NSWC) Carderock Division, www.navsea.navy.mil/nswc/carderock/tecinfsys/s1000d/index.html

- NAVSEA S1000D assistance
- US S1000D Sea Working Group
- NAVSEA S1000D Configuration Control Board

b. NAVSEA S1000D Tools Repository managed by NSWC Carderock, www.navsea.navy.mil/nswc/carderock/tecinfsys/s1000d/tools_repos.html

- S1000D Joint Service (JS), DON, NAVSEA Business Rules
- NAVSEA Information Sets
- Information Codes
- Registered NAVSEA Model Identifiers
- S1000D DTD/Schemas
- NAVSEA S1000D Functionality Matrix

c. Navy XML/SGML Repository managed by NSWC Carderock, www.navsea.navy.mil/nswc/carderock/tecinfsys/xml-sgm-rep/index.html

d. Naval Systems Data Support Activity (NSDSA) web site, https://nsdsa.nmci.navy.mil

- NAVSEA Technical Manual Management Program (TMMP) assistance
- Streamlined Modular Acquisition Requirements Tailoring Tool (SMART-T)

e. Model Identifier Registry maintained by the NATO Maintenance and Supply Agency (NAMSA) web site, www.namsa.nato.int

f. Data Item Descriptions (DIDs) available from www.assistdocs.com

- DI-TMSS-81805 Data Module Requirements List S1000D

- DI-TMSS-81810 Technical Manual Organization Plan (TMOP)
- DI-TMSS-81817 Technical Manual Quality Assurance (TMQA) Program Plan
- DI-TMSS-81818 Technical Manual Validation Plan
- DI-TMSS-81819 Technical Manual Validation Certificate
- DI-TMSS-81820 Technical Manual Verification Discrepancy/Disposition Records
- DI-TMSS-81821 Verification Incorporation Certificate

1.6 Feedback Reporting

Recommendations and suggestions for improving this document are welcome and should be addressed to:

Commander
Carderock Division, Naval Surface Warfare Center
Attn: Code 221 Technical Information Systems
9500 MacArthur Blvd
Bethesda, MD 20817-5700

2 FUNDAMENTALS FOR NAVSEA IMPLEMENTATION OF S1000D

The use of S1000D within the Department of Defense (DoD) has been approved for some time. The Under Secretary of Defense for Acquisition and Technology (USD(A&T)) memo of 23 Sep 2004, "Product Support Boundaries (NOTAL)" endorses the use of the S1000D specification for IETMs. The Department of Navy (DON) Policy on Digital Product/ Technical Data, issued in October 2004, included S1000D as a recommended specification for IETMs. The DoD Technical Manual Specifications and Standards program adopted S1000D for use by the DoD on 24 January 2005 (Project TMSS-0341). S1000D is being used by various activities and programs within the DoD, and the U. S. Navy, Army, and Air Force have collaborated to establish common DoD-wide business rules for S1000D applications (see Business Rule discussion in Section 2.3.2.1).

2.1 Department of Navy (DON) Policy on Digital Product/Technical Data

The Assistant Secretary of the Navy for Research Development and Acquisition issued the DON Policy on Digital Product/Technical Data with attachment, Guidance on Acquisition and Conversion of Product/Technical Data to Digital Form, Revision 1, in October 2004. The policy states the Department's "goals for an interoperable digital logistics product/technical data environment to improve warfighter support and reduce the life cycle system management cost of DON systems." The policy calls for program executives and managers and system command commanders to establish integrated digital data environments for their organizations. It calls for the acquisition of product and technical data in specific standard digital formats. New TMs are to be acquired,

authored, and developed in digital form in the Extensible Markup Language (XML). Programs with existing TMs in the Standard Generalized Markup Language (SGML), where it is not cost-effective to migrate to XML, may continue developing TMs in SGML using the existing legacy process. For IETMs, the Navy policy recommends the NAVSEA specification, MIL-DTL-24784C and the international specification, S1000D.

2.2 NAVSEA Technical Manual Policy for use of S1000D

NAVSEA policy for technical manuals, set forth in NAVSEAINST 4160.3 Technical Manual Management Program (TMMP), calls for new and revised TMs to be acquired, produced, delivered and maintained compliant with DON Policy on Digital Product/Technical Data and employing the operations and procedures defined in NAVSEA S0005-AA-PRO-010/TMMP, Operations and Life Cycle Support Procedures.

The Naval Sea Systems Command letter (4160 Ser 04L/002) issued 17 February 2010 on "Use of S1000D Specification for Technical Manual Development and Management" authorizes, but does not require, NAVSEA activities and programs to use the S1000D specification for the acquisition and development of TMs provided they possess necessary expertise, assume any added risks and costs, coordinate with NAVSEA 04L and the S1000D Sea Working Group, follow the TMMP requirements and use a NAVSEA 04L-approved Technical Manual Contract Requirement (TMCR) or Technical Manual SEATASK Requirement (TMSR). The letter instructs implementers to adopt and apply DON, NAVSEA and appropriate program S1000D business rules for implementation, develop necessary project-defined S1000D decision point choices as business rules and employ appropriate NAVSEA S1000D resources. S1000D implementers should ensure that NAVSEA technical manual content requirements (currently specified in MIL-DTL-24784) are satisfied by employing the appropriate information codes and information sets developed for NAVSEA TM types.

The NAVSEA S1000D Tools Repository and the Navy XML/SGML Repository (see Section 1.5) provide tools and information to assist Acquiring and Preparing Activities in the development of NAVSEA S1000D TMs. The NAVSEA S1000D Tools Repository contains NAVSEA approved rules, information sets, and other information for NAVSEA S1000D TM development. The XML/SGML Repository contains official Navy Document Type Definitions (DTDs), XML schemas, and related style sheets for use in development of Navy TMs.

The Navy maintains a standard hardware and software infrastructure to support data development and use. Currently, the Standard NAVSEA Integrated Publishing Process (SNIPP) defines and provides the approved infrastructure and process for acquisition, development, management, publication, and distribution of NAVSEA TMs/IETMs. This infrastructure includes the common source database software necessary to support S1000D development, and the publishing software to produce S1000D publication module products. Using approved infrastructure software and components ensures Acquisition Activities of expeditious and successful deployment of publication products.

2.3 S1000D Basic Concepts

The International Specification for Technical Publications utilizing a Common Source Database, Specification S1000D, is widely used for defense land, sea, and air technical publications, as well as, commercial aviation and other industries. The specification was originally developed by the AeroSpace and Defence Industries Association of Europe (ASD). The latest issue of the specification was jointly produced by the ASD, Aerospace Industries Association of America (AIA), and the Air Transport Association of America (ATA). The specification is formally managed and maintained by the S1000D Steering Committee, consisting of representatives of military and industry from various countries.

The United States participation in S1000D is coordinated through the U. S. S1000D Management Group (USSMG), composed of representation from industry and the DoD. The USSMG has established Land, Air, and Sea S1000D Working Groups to coordinate management of S1000D issues for publications in these areas. The charter for the S1000D Sea Working Group includes all U.S. maritime S1000D interests and concerns. The Naval Surface Warfare Center Carderock Division (NSWC Carderock) chairs the S1000D Sea Working Group.

NSWC Carderock, by direction of NAVSEA 04, also serves as the chair of the NAVSEA S1000D Configuration Control Board for S1000D application requirements and coordinates assignments of certain S1000D data items (e.g. model identifiers and NAVSEA business rules), as well as specification change proposals from NAVSEA activities.

The S1000D specification provides a standardized process for authoring, managing, and using publications and publication data while maximizing their functionality and interoperability. The creation of publications using S1000D differs from the traditional chapter and section authoring approach. S1000D publications are developed in the form of publication modules constructed from modular pieces of information called data modules. S1000D uses the concept of information sets to define the content requirements for the data modules. The data modules are generated, stored, and managed in a Common Source Database (CSDB). The CSDB supports the authoring, review, approval, and quality assurance of the data modules and ultimately the publications generated from them. The European origin of the S1000D specification sometimes manifests itself in the use of terms that may be unfamiliar to U. S. implementers. In addition, the initial popularity of the specification in the Aerospace industry resulted in the occurrence of aeronautical terms for nautical terms, such as the use of “air crew” for “crew”. These language nuances are readily understood by most implementers and do not deter successful implementation of the specification.

S1000D provides a standard approach and format for specifying the functional requirements, or performance characteristics, of the desired IETM(s). NAVSEA programs should use the functionality matrix available from the NAVSEA S1000D Tools

Repository (see Section 1.5) rather than the functionality matrix provided in the S1000D specification. This NAVSEA functionality matrix can serve as both a planning tool to examine functionality options in the TM planning stage and also as a tool to specify TM requirements. It provides a standard format for specifying NAVSEA functionality requirements and also provides a standard definition for each functionality term so that it may be clearly stated and understood by both acquisition and preparing activities. Some functionalities address the degree of desired interactivity and some address typical navigational capabilities of viewers and data delivery devices.

2.3.1 Overview of the S1000D Specification

The S1000D specification is a very large document and can seem overwhelming at first look. The table below summarizes the subject matter contained in each chapter of the specification to assist users in understanding the layout of the specification. The NAVSEA Guidance column identifies high level NAVSEA policy and guidance per reference (a), Section 1.4, relating to the subject matter of the particular S1000D specification chapter.

Chapter	Summary	NAVSEA Guidance
1	**Introduction:** provides general information about the specification, how to use it, how to tailor it for a specific project or organization, and how to request changes. It contains useful summary information for program managers.	NAVSEA programs shall use the DON Change Proposal Approval Process (ref. (a) Section 1.4) to request changes to the specification
2	**Documentation process:** identifies the standards referenced in the S1000D specification and how S1000D relates to some principal standards. It also discusses the need for business rules to tailor the specification, and the categories and layers of business rules.	NAVSEA programs shall use established Joint Service (JS), DON, NAVSEA and appropriate program S1000D business rules and develop necessary project-defined business rules.
3	**Information generation:** provides details to authors and illustrators on how information is to be generated and structured, as well as how quality assurance is to be addressed in the S1000D modular data development process. It is a detailed chapter providing authoring and illustration rules for all schemas and details about every S1000D element and attribute.	NAVSEA programs must use established JS, DON, NAVSEA and appropriate program S1000D business rules and develop necessary project-defined business rules as related to information generation.

Chapter	Summary	NAVSEA Guidance
4	**Information management:** deals with data modules, data module codes, other numbering systems used by S1000D, the data module requirements list, and the common source database used by S1000D applications to manage the data modules and project development. This chapter also addresses optimizing and reusing data to reduce redundancy and support consistency.	NAVSEA programs must use established JS, DON, NAVSEA and appropriate program S1000D business rules and develop necessary project-defined business rules as related to information management.
5	**Information sets and publications:** describes the concepts of information sets and publications and provides rules for their creation.	NAVSEA programs shall not use the common information sets identified in the S1000D specification. **NAVSEA programs must use information sets developed by NAVSEA. These information sets are available from the NAVSEA S1000D Tools Repository to ensure acceptable depth and breadth of content for NAVSEA applications.**
6	**Information use/presentation:** describes the look and feel requirements for both page-oriented and interactive electronic TMs (IETMs). Note: the S1000D specification uses the term IETP instead of IETM.	Although this chapter contains an S1000D functionality matrix and associated functionality definitions, **NAVSEA programs must not use the functionality matrix contained within this chapter**. **To ensure NAVSEA standardization, NAVSEA programs must use the functionality matrix available from the NAVSEA S1000D Tools Repository.**
7	**Information processing:** presents general information, directives, and advice on creation and maintenance of common source database objects, generation of publications, interchange of information, and technical requirements for display systems.	NAVSEA programs must use established JS, DON, NAVSEA and appropriate program S1000D business rules and develop necessary project-defined business rules as related to information processing.

Chapter	Summary	NAVSEA Guidance
8	**Standard numbering systems, information codes, and learn codes:** provides descriptions of common standard numbering systems (SNS) and information codes used in the data module code. The learn codes may be useful for projects producing training data.	**NAVSEA business rules provide guidance for the SNS to be used by NAVSEA programs.**
9	**Terms and data dictionary:** contains the glossary and list of acronyms for S1000D.	

2.3.1.1 Versions of the S1000D Specification

S1000D has a comprehensive change management process. Changes to the specification are documented in Change Proposal Forms (CPFs) which are closely vetted and reviewed through a well-defined multinational process. Major changes and updates to the specification are published as Issues. New Issues of the specification generally include increased functionality and do not necessitate re-authoring of data unless that additional functionality is desired. NAVSEA programs newly adopting S1000D should review guidance from the NSWC Carderock website on which Issue of the specification to use to develop TMs.

Implementers of S1000D have been, and may still, use several different issues of the specification. Issue 2.0, released in 2003, introduced the Process Data Module which facilitated the development of interactive electronic TMs (IETMs). Issue 2.3, released in 2007, introduced multimedia (3-D, audio, etc) to the specification. Issue 3.0, released later in July 2007, addressed specific requirements of the Air Transport Association, and added a new applicability model and other changes requested by defense communities of various nations. Issue 4.0, released in 2008, addressed forty-two CPFs submitted by the U.S. Army, introduced SCORM (Sharable Content Object Reference Model) compliant training modules, improved the S1000D schema, and addressed other changes requested by aerospace and defense users.

2.3.1.2 NAVSEA Rights to the S1000D Specification

S1000D under "Special Usage Rights" gives "The Department of Defense of the USA", thus NAVSEA, the "Irrevocable permission to use, sell, or manufacture from the information contained in this document or any subsequent modification or revision thereof, and the right to reproduce or publish this document or any subsequent modification or revision thereof, in whole or in part, free of charge."

2.3.2 Key Components of S1000D Implementations

S1000D relies on a collection of small, potentially reusable, data modules assembled to address requirements of information sets conceived to fulfill the requirements and purpose of the technical publication. S1000D defines several components necessary for the successful authoring, identification, management, and control of data modules to produce the desired publications. These components are described below.

2.3.2.1 Business Rules

The S1000D specification is designed to accommodate alternatives and diversified needs for technical publications. This flexibility is achieved by the incorporation of "decision points" within the specification. It is incumbent upon the acquiring and preparing activities to resolve these decisions before TM development. The resolutions of these decision points are called business rules. The decision points allow similar organizations and activities, or communities of interest, to tailor the S1000D specification for their particular use and business practices.

To promote consistency in the development of S1000D data, DoD, DON, and NAVSEA have coordinated the resolution of some of the S1000D decision points by establishing and adopting a structured set of Business Rules (BRs). BRs cannot supersede BRs established at a higher level. The BR order of precedence is Joint Service (JS), DON, NAVSEA, Community, Project. JS, DON, and NAVSEA business rules are mandatory for all NAVSEA programs and S1000D projects. Certain NAVSEA Communities of Practice have established their own Community BRs based on common business processes within their own areas. The remaining decision points are left to be resolved as the Project BRs.

Project BRs must be established prior to technical data development. The S1000D specification decision points requiring project level business rules are listed in the NAVSEA S1000D Tools Repository resident on the NSWC Carderock Division website (see Section 1.5). Some project business rules may be decided by the Acquiring Activity prior to contract solicitation, such as decisions affecting functionality, depth and breadth of content, deliverables, or project cost. Other project business rules, such as those dealing with implementation methods, optional functionality, and those requiring collaboration with venders, are best decided in collaboration with the Preparing Activity at the start of execution of work.

The Acquiring Activity should coordinate project business rules with NSWC Carderock Division. The final set of project BRs should be identified as a deliverable on the contract and a copy of the final project BRs should be delivered to NSWC Carderock Division for posting in the NAVSEA S1000D Tools Repository. All BRs may be obtained from the NAVSEA S1000D Tools Repository (see Section 1.5). The Acquiring Activity should review all appropriate business rules and ensure that they are included with the S1000D specification in contract documents.

2.3.2.2 Data Module

The S1000D specification defines a data module as "the smallest self-contained information unit within a technical publication." Each data module must have enough information to convey meaning and make sense on its own, without any supporting information, so that it may be integrated as a whole into a larger publication. A data module can refer to a wide variety of technical data including: a discrete task composed of one to many steps, a description of how to operate equipment, parts information for a system, fault isolation information, etc. The data module approach in S1000D aims to encourage and facilitate reuse of the data modules and streamline publication development.

Data modules have a basic structure consisting of two sections, an identification and status section and a content section. The identification and status section contains the information required to address and manage the data module, i.e., the metadata required for the S1000D technical manual. The identification and status section is described in detail in the S1000D specification. The content section of the data module contains the data and information which is used to create the publication modules and the TMs. The specification requires the content section of a data module to be structured in accordance with one of the following information types:

- Descriptive information
- Procedural information
- Fault isolation information
- Maintenance planning information
- Crew/operator information
- IPD (illustrated parts data) information
- Battle damage assessment and repair information
- Wiring data
- Process data module
- Technical information repository data module
- Container data module
- Learning data module
- Maintenance checklists and inspections.

Each of the information types is defined by an XML schema which may be downloaded from the S1000D website.

2.3.2.3 Data Module Codes

Every data module is uniquely identified by a data module code (DMC) contained within the identification and status section of the data module. The DMC is a structured code that uniquely identifies the data module, ties the data module to components and subcomponents of the product being documented, and provides descriptive information about the contents of the data module and how it may relate to other data modules. The DMC consists of a model identifier, standard numbering system, disassembly code,

information code, and item location code. S1000D is very specific about the DMC coding scheme and provides detailed schemas and explanations to guide the determination of the DMC. The DMC guards against duplication of data and facilitates database control and management of the collection of data modules.

2.3.2.3.1 Model Identifier

The model identifier (MI), or model identification code, is a descriptive name that identifies the product to which the S1000D data applies and is also intended to assist in uniquely identifying the TM or associated project. The model identification code is used as a prefix to all data module codes, thereby providing part of the unique identifier for each data module. An S1000D data Acquiring Activity must determine whether an existing or new MI will be required for a particular acquisition. Ideally, the MI should be easily associated with the project. Existing MIs can be reviewed at the Model Identifier Registry maintained by the NATO Maintenance and Supply Agency (NAMSA) (see Section 1.5). To establish a new model identifier, projects should apply to NAMSA for allocation of the MI. This central registry and database ensures global uniqueness of the model identification codes. NAVSEA Acquiring Activities should notify NSWC Carderock Division, the Chair of the NAVSEA S1000D CCB, of the selected MI. Acquiring Activities may delay the selection of the MI until after contract award so that the decisions of what it should be and how it is to be used may be made in collaboration with the Preparing Activity. In this case, the Acquiring Activity must specify in the TMCR/TMSR that the MI decisions are to be done post-award and prior to development.

2.3.2.3.2 Standard Numbering System

S1000D employs a standard numbering system (SNS) that is to be tailored for each project and aligned with the structure of the product for which the TM is being developed. The standard numbering system forms part of the data module code (DMC). The Acquiring Activity and the Preparing Activity should agree on the SNS prior to initiation of content development. A NAVSEA business rule states that all NAVSEA projects must use an approved SNS. That SNS should be, in order of preference, one of the following:

- a maintained SNS from the S1000D specification;
- Expanded Ship Work Breakdown Structure (ESWBS);
- a project-managed SNS that must be registered with and approved by the NAVSEA S1000D Configuration Control Board (CCB).

A NAVSEA business rule requires programs to identify the SNS being used by the material item category code (MICC), which is the first character of the SNS. The MICCs for ESWBS and project managed SNSs are specified in the NAVSEA business rule.

2.3.2.3.3 Disassembly Code

The disassembly code is used to identify the breakdown condition of an assembly to which maintenance information applies. The content and assignment of the disassembly code follows generic disassembly principles described in the S1000D specification. The disassembly code is also used for the sequential numbering of illustrated parts data modules as described in the S1000D specification.

2.3.2.3.4 Information Codes

The information code, in an S1000D application, is a numeric code used to describe the type of content in the data module. S1000D provides standard information codes for common activities, e.g., information codes in the 400's are reserved for fault report and isolation procedures, and the 500's for disconnect, remove, and disassemble procedures. NAVSEA users of S1000D, seeking to satisfy NAVSEA TM requirements, should use the NAVSEA information sets and associated information codes for the content requirements of MIL-DTL-24784, as published on the NAVSEA S1000D Tools Repository (see Section 1.5).

2.3.2.3.5 Item Location Code

The item location code indicates where the maintenance task will be performed in terms of the product or where the information is applicable. The possible codes are:

A – Information related to items installed on the product
B -- Information related to items installed on a major assembly removed from the product
C – Information related to items on the bench.
D – Information related to all three locations, A, B, and C
T – Information related to training-only data modules.

2.3.2.4 Data Module Requirements List

The Data Module Requirements List (DMRL) is a compilation of all data modules needed to satisfy the TM information requirements for a particular project. It is similar to a Book Plan for TMs. The specification of the desired type of manual, general content and functionality, and the information sets to be used collectively identifies the general TM product desired and the depth and range of content. The DMRL identifies the details of this content, such as which weapon system components are to be subject to what actions and other details necessary to fully scope the content to be developed.

The Acquiring Activity should identify an initial list of required data modules prior to and during the preparation of the TMCR/TMSR. After task award, the Preparing Activity must work with the Acquiring Activity to develop, finalize, and agree on the complete and approved DMRL for the project. The DMRL must be managed and maintained throughout the project as a mechanism to track progress and ensure that only

needed and desired data modules that provide the desired information are produced. There must be a DMRL for each required publication module. Activities seeking assistance in developing the DMRL for their project should consult resources available in the NAVSEA S1000D Tools Repository (see Section 1.5), as well as, contacts at NSWC Carderock Division and on the S1000D Sea Working Group, identified on the website.

2.3.2.5 Metadata

Metadata is data about data; it provides information that facilitates data management, control, storage, and identification, as well as, discovery by potential users or applications. The S1000D specification calls for a comprehensive set of metadata to be associated with each data module. Each metadata element has certain required data specified by S1000D and other data that is subject to project specific decisions also described in S1000D. Most metadata requirements in S1000D pertain to the identification and status section of the data modules which contains all the information required to address and manage the data module. The identification data includes the data module code, title, issue number, issue date, and language. It also includes status metadata addressing security classification, responsible partner company and originator, applicability, technical standard, quality assurance status, skill level, and reason for update of the data module. The extensive metadata capability laid out in identification and status section can be used for:

- Management of the data module within the Common Source Database (CSDB)
- Management of the use of applicability
- Management of the quality assurance process
- Management and control of retrieval functions
- Automatic compilation of sets and subsets of information
- General information for users accessing the CSDB
- Management and implementation of export controls

2.3.2.6 Information Sets

An information set is an S1000D concept defined as a collection of required information of a certain scope and depth that is created in the form of data modules managed in a CSDB (common source database). The collection of information sets will describe the complete depth and scope of the required content for the TM. Although the specification identifies a number of common information sets for S1000D implementers, **these information sets in the S1000D specification shall not be used by NAVSEA programs. To ensure NAVSEA's content depth and breadth requirements are met while developing technical manuals conforming to S1000D, NAVSEA has developed the following information sets, derived from the content requirements contained in MIL-DTL-24784,** and available from the NAVSEA S1000D Tools Repository (see Section 1.5).

- Hull, Mechanical, and Electrical Equipment
- Hull, Mechanical, and Electrical System

- Weapon Equipment
- Weapon System
- Electronic Equipment
- Electronic System
- Combat Systems Technical Operations Manual
- Technical Repair Standard - Electronic Equipment
- Technical Repair Standard - Hull, Mechanical, and Electrical
- Technical Repair Standard - Ordnance
- Ships Information Book
- Operations Station Book
- Training Aid Booklet
- Illustrated Parts Breakdown
- Commercial-Off-the-Shelf

To aid in the consistent development of NAVSEA data modules, S1000D information codes and schema types have been assigned to each of the content requirements in all information sets. Projects should be careful to consistently apply the information codes to facilitate discovery and re-use of data modules, not only within their project or program, but potentially among outside programs.

2.3.2.7 Publication Module

S1000D supports delivery of a wide range of types of publications in a variety of delivery formats, including robust interactive electronic TMs, as well as, traditional page oriented, paper-based and electronic publications. The publication module defines the content and structure of a publication by references to data modules, illustration data modules, other publication modules, and perhaps legacy technical publications. A publication module, therefore, is a set of data modules which have been arranged to make a publication, such as a checklist, guide, catalogue, or other document, on a particular subject, irrespective of the media of presentation (e.g. paper or screen). S1000D publication modules, like data modules, consist of an identification and status section and a content section and are to be prepared in accordance with the publication module DTD/Schema defined in the S1000D specification.

The Acquiring Activity should create a list of all desired publication modules, and the presentation media required for each, to be included in the TMCR/TMSR. This publication module list will help identify special documents required from the TM in addition to the full electronic document, such as special media versions, PDF, paper, and versions of, or portions of, the full publication. If only a single IETM is required, then this list of publication modules may not be necessary.

2.3.2.8 Publication Module Code

The Publication Module Code is a standardized structured identifier of the publication module or final deliverable publication(s). It is part of the unique identifier of the publication. It is used in the CSDB to manage the publication module and to allow data

modules and IETMs to reference and access the publication module. The structure of the publication module code is described in the S1000D specification and is comprised of the project's model identification code, a code identifying the issuing authority, a publication number assigned by the issuing authority to identify the publication and a volume number. The publication module code is an element of the publication module identification and status section.

2.3.3 Common Source Database (CSDB)

The S1000D specification conceptualizes a common source database (CSDB) for storing and managing S1000D compliant TM content. The CSDB stores and manages all information objects required to produce the TM, including data modules, illustrations (including any non-SGML/XML information associated with the data modules), data module lists, comments, and publication modules. The CSDB must support controlled authoring, publication, quality assurance, data exchange/sharing with partners, and delivery of TMs on various media. S1000D only specifies the data structure of the information objects to be stored and managed by the CSDB and this data structure is independent of any software implementation. The data module load is not complete until all necessary metadata and content have been entered into the database properly and according to the S1000D specification and all business rules. Note: Navy infrastructure provides the S1000D CSDB for NAVSEA as part of its CMS (content management system) (see Section 2.2).

2.3.4 Data Reuse

The data module approach in S1000D encourages and facilitates reuse of data modules to streamline publication development. The data modularity and metadata requirements of an S1000D implementation allow Preparing Activities to reuse data and minimize the re-authoring of data that typically occurs in traditional publication development approaches. S1000D data modules are self-contained information units, having sense and meaning in and of themselves without any other supporting data (save graphics). A particular TM development project may be part of, or related to, a larger program also developing data modules for other TMs. Subsystem data modules required in one project may often be required in other TMs associated with the larger system or project. The metadata associated with PMs, DMs, and graphics/multimedia in a S1000D development approach provides searchable material for locating potential reusable data modules.

Preparing Activities can use available metadata and search capabilities to locate useful modules and petition the original data provider for a copy of the content to be reused verbatim or slightly tailored for the current project. Using this method, development schedules can be advanced, regeneration costs can be avoided and the Navy can ensure consistency in their technical resources. Acquiring activities, program managers, and project managers should anticipate and plan for data module reuse both within the current

project and across previous and future projects. Developers can use the Common Source Database, metadata, and search capabilities to locate reusable modules.

2.4 NAVSEA S1000D Tools Repository

The NAVSEA S1000D Tools Repository is a collection of information, files, guidance, examples, and approved practices designed to assist NAVSEA S1000D acquisition managers and Preparing Activities to buy and deliver quality S1000D products. The Repository is maintained by NSWC Carderock Division on its website (see Section 1.5). The Repository contains:

- List of S1000D specification decision points with associated business rules (JS, Navy, NAVSEA, Community of Practice, Project)
- NAVSEA Information Sets
- Information Codes
- Registered NAVSEA Model Identifiers
- Schemas
- NAVSEA S1000D Functionality Matrix

2.5 S1000D IETM Assistance and Training

Assistance and training in the development of IETMs with S1000D methodology can be obtained through commercial training programs and also developed internally through participation in the S1000D management and development process. The development of S1000D is managed by an international S1000D Steering Committee. United States interests and participation are coordinated by the U. S. S1000D Management Group (USSMG), co-chaired by an industry and a DoD representative.

Interested S1000D developers and implementers in the United States are encouraged to participate in the Land, Air, and Sea Working Groups. This participation allows them to keep current in S1000D developments and benefit from implementation experience of others. These working groups are technical groups commissioned by the USSMG to deal with implementation issues and help solve implementation problems. Participation in these groups also provides valuable assistance to implementers and a forum for discussing and solving implementation problems. NAVSEA activities can best obtain assistance and training through the S1000D Sea Working Group, the NAVSEA S1000D Configuration Control Board, the NSDSA TMMP training course, and support from NSWC Carderock Division.

2.5.1 International USSMG S1000D Sea Working Group

The USSMG S1000D Sea Working Group is a technical subgroup of the USSMG formed to address implementation issues and problems associated with all maritime implementations. Participation in this group is a good way to keep abreast of S1000D Sea oriented developments as well as to advocate desired modifications and change. The

S1000D Sea Working Group is chaired by NSWC Carderock Division. The S1000D Sea Working Group coordinates with the S1000D Air and Land Working Groups to address and coordinate S1000D development and implementation issues.

2.5.2 NAVSEA S1000D Configuration Control Board

The DON Change Proposal Approval Process and Form (see Section 1.4) is a standard DON procedure for addressing and processing change requirements to the S1000D specification. An activity desiring a change to the specification must submit a change request to its SYSCOM S1000D representative (often a TMMA program manager). The representative works with the submitter to ensure the request is valid and properly documented and completes a Change Proposal Form (CPF) to submit to the Command S1000D focal point. NAVSEA has established a NAVSEA S1000D Configuration Control Board to serve as this focal point. The Control Board, Chaired by NSWC Carderock Division manages the review of the CPF to determine if there will be an overall impact on the current products being developed or delivered, and whether there would be impacts on business rules, acquisition guidance, or infrastructure. The Control Board is the official NAVSEA interface with the other Naval SYSCOMs on CPF issues and works with them to determine a coordinated Navy approach to submission of the CPF to the international S1000D management body.

2.5.3 NSDSA TMMP Training Course

The Naval Systems Data Support Activity (NSDSA) acts as an agent for NAVSEA in centralized TM management and TM life cycle support operations. To facilitate uniform implementation of the NAVSEA Technical Manual Management Program (TMMP), NSDSA provides a training program to guide and instruct personnel involved in TMMP functions, including the definition, development, distribution, disposal, and use of NAVSEA TMs. Information and registration for this training is available on the NSDSA website (see Section 1.5).

2.5.4 NSWC Carderock Division Technical Support for S1000D

Naval Surface Warfare Center (NSWC) Carderock Division provides policy guidance on digital data, as well as, technical assistance on emerging technical data technology for NAVSEA activities. NSWC Carderock manages the centralized repository, known as the Navy XML/SGML Repository, for Document Type Definitions (DTDs), Schemas, and Style sheets used to develop NAVSEA TMs. NSWC Carderock chairs the S1000D Sea Working Group and the NAVSEA S1000D Configuration Control Board. NSWC Carderock also manages the NAVSEA S1000D Tools Repository containing S1000D business rules, information sets, information codes, quality assurance guidance, and other S1000D implementation resources, and provides access to the Tools Repository through its website (see Section 1.5). NSWC Carderock points of contact (see section 1.5 a.) are

available to assist NAVSEA activities in the adoption and implementation of S1000D for technical publications.

3 S1000D TECHNICAL MANUAL DEFINITION PHASE

3.1 Scope - Relation to NAVSEA Technical Manual Management Program Definition Phase

This section addresses aspects of the definition phase of TM life cycle support that are specific to S1000D interactive electronic technical manuals (IETMs). The TM definition phase includes the actions necessary to ensure quality TMs are procured and developed. The procedures and guidance set forth here augment the procedures described in the NAVSEA Technical Manual Management Program (TMMP) Operations and Life Cycle Support Procedures manual. The guidance and procedures defined in the TMMP manual for IETM budgeting and funding, planning, cost estimating, and procurement also apply to S1000D IETMs.

3.2 S1000D Technical Manual Definition Process Model and Descriptions

The definition phase of S1000D TM life cycle includes several steps not addressed by the TMMP that pertain to basic S1000D concepts. Figure 3.1 presents a model of the TMMP TM Definition Process for S1000D TMs. Prior to TMCR/TMSR generation and contract development and award, the Acquiring Activity must decide what Issue of the S1000D specification is to apply to the contract. The Acquiring Activity must be familiar with, understand, and apply the higher level S1000D business rules (JS, DON, NAVSEA, and possibly community of practice levels) as they are mandatory for any S1000D implementation and must ensure that these are clearly cited as requirements in contract documents. The Acquiring Activity should decide the project level business rules that it wishes to impose before the contract and those that will be negotiated with the Preparing Activity after contract award. The Acquiring Activity must decide the type of manual and what functionality will be required and translate these requirements to desired information sets, information codes, NAVSEA functionality matrix, and a preliminary data module requirements list (DMRL). Some of these items may be modified in post-award guidance and planning conferences and program managers should realize that the DMRL is likely to evolve and change as TM development proceeds. The Acquiring Activity must address the numbering and coding requirements of S1000D and should decide and register the model identifier for the project. Other items particular to the definition of S1000D TMs include: metadata requirements, anticipated data reuse, special quality assurance requirements leveraging the S1000D modular quality assurance approach, and specification of publication module requirements and deliverables.

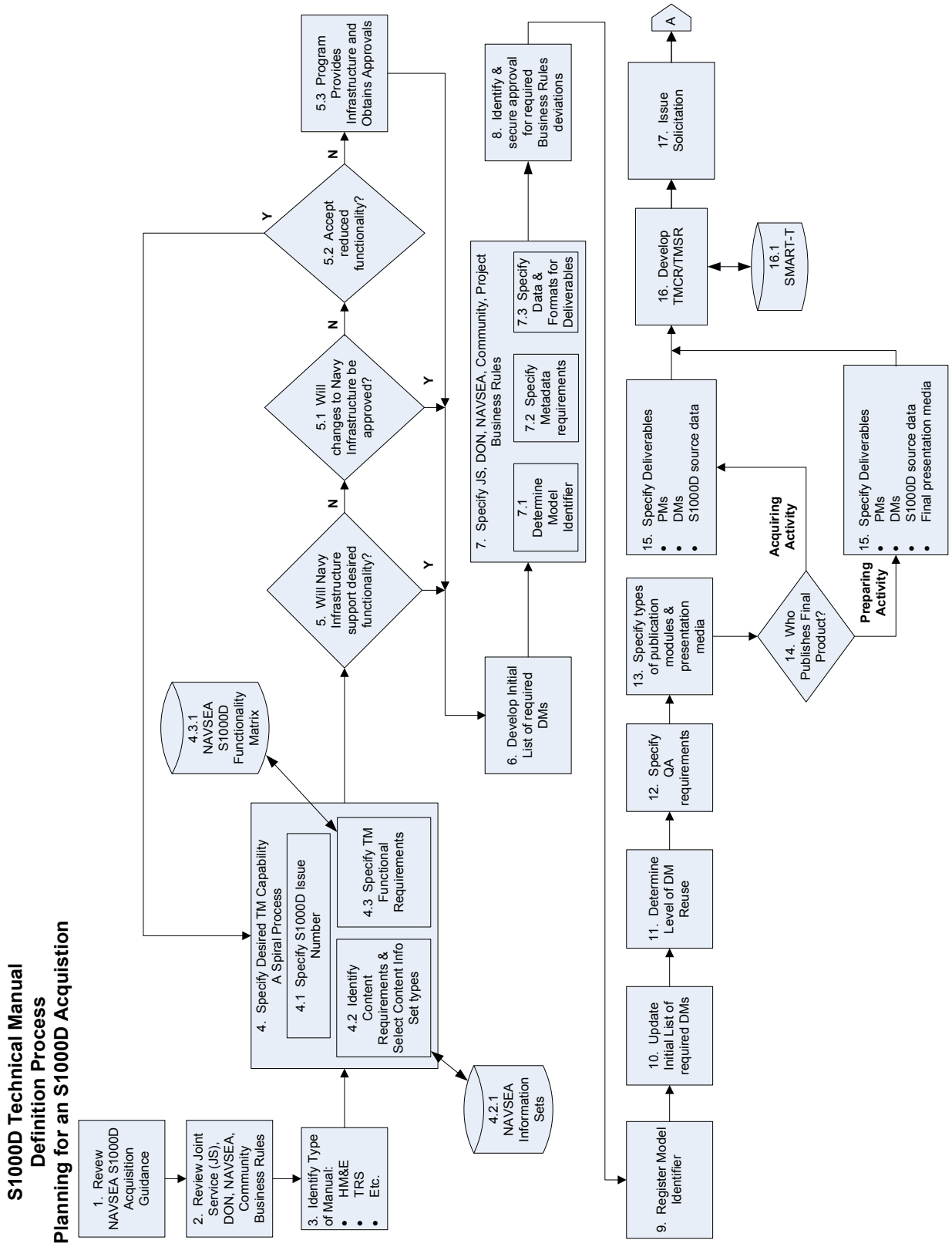


Figure 3.1 Definition Process Model for an S1000D IETM Acquisition

3.2.1 Process 1: Review NAVSEA S1000D Acquisition Guidance

Action: The Acquiring Activity reviews the most recent guidance for S1000D acquisition within NAVSEA.

Explanation: NAVSEA activities acquiring S1000D data should consult Naval Sea Systems Command Letter, "Use of S1000D Specification for Technical Manual Development and Management" 17 Feb 2010 as well as this guide and its references. Acquiring activities seeking assistance are encouraged to contact the S1000D Sea Working Group and NSWC Carderock Division for S1000D management and technical support (see Section 1.5).

3.2.2 Process 2: Review Joint Service (JS), DON, SYSCOM, and Community Business Rules

Action: The Acquiring Activity reviews JS, DON, NAVSEA and Community-specific S1000D Business Rules.

Explanation: S1000D is an international specification for technical publications that is designed to accommodate many alternatives and diversified needs for technical data. The specification of these alternatives is accomplished by the resolution of many "decision points" contained within the specification. These decision points allow organizations and similar activities, or communities of practice, to tailor the S1000D specification for their own use and business practices. To promote consistency in the development of S1000D data, the DoD Services, DON and NAVSEA have coordinated the resolution of some of the S1000D decision points by the establishment of Business Rules (BRs). The BRs are hierarchical, in that BRs set at one level cannot supersede BRs established at a higher level. The BR order of precedence is JS, DON, NAVSEA, Community, Project. JS, DON, and NAVSEA level business rules are mandatory for NAVSEA programs and S1000D projects. Furthermore, certain NAVSEA Communities of Practice have begun to establish their own Community BRs, based on common business processes practiced in their own community. These Community BRs may not supersede NAVSEA BRs. The majority of the decision points have been left for decisions at the project level. Therefore, Project BRs must be established prior to technical data development. The S1000D specification decision points requiring project level business rules are listed in the NAVSEA S1000D Tools Repository resident on the NSWC Carderock Division website. Some may be decided by the Acquiring Activity prior to contract solicitation, such as decisions affecting functionality, depth and breadth of content, deliverables, or project cost. Other project business rules, such as those dealing with implementation methods, optional functionality, and those requiring collaboration with venders, are best decided in collaboration with the Preparing Activity at the start of execution of work. The Acquiring Activity should coordinate the project business rules with NSWC Carderock Division. The final set of project BRs should be made a deliverable on the contract and a copy of the project BRs should be delivered to NSWC Carderock Division for posting in the NAVSEA S1000D Tools Repository. Project BRs may not supersede

Community BRs. All BRs may be accessed at the NAVSEA S1000D Tools Repository (see Section 1.5). The Acquiring Activity should review all appropriate business rules and ensure that they are included with the S1000D specification in contract documents.

3.2.3 Process 3: Identify Type of Manual

Action: The Acquiring Activity identifies the type of manual that is to be developed by identifying the ship, system, or equipment that the manual will support and the general purpose and scope of the manual.

Explanation: NAVSEA procures and manages a broad range of equipment and systems. Various technical data requirements for the different types of equipment and systems have evolved over the years into specific content requirements for NAVSEA TMs (ref: MIL-DTL 24784) resulting in the following types of manuals:

- Hull, Mechanical, and Electrical Equipment
- Hull, Mechanical, and Electrical System
- Weapon Equipment
- Weapon Systems
- Electronic Equipment
- Electronic System
- Combat Systems Technical Operations Manual
- Technical Repair Standard - Electronic Equipment
- Technical Repair Standard - Hull, Mechanical, and Electrical
- Technical Repair Standard - Ordnance
- Ships Information Book
- Operations Station Book
- Training Aid Booklet
- Illustrated Parts Breakdown
- Commercial Off the Shelf

Selection of one of these types of manuals corresponds to the content information set identified in Process 4.2, titled “Identify Content Requirements and Select Content Information Set Types”. These information set requirements are available from the NAVSEA S1000D Tools Repository (see Section 1.5).

3.2.4 Process 4: Specify the Desired TM Capability

Action: The Acquiring Activity describes the minimum content and performance requirements for the desired TM and the degree of implementation of S1000D features.

Explanation: In practice, this process typically consists of several sub-processes which are often conducted and revisited as the desired TM capability specification is initially

defined, revised, and finalized in a spiral process converging on the final TM specification. These sub-processes are:

- Specification of the S1000D issue number
- Specification of TM functional requirements
- Identification of content requirements and required content information sets

These sub-processes are described below.

3.2.5 Process 4.1: Specify S1000D Issue Number

Action: The Acquiring Activity identifies the Issue of the S1000D specification to which the desired S1000D data must conform.

Explanation: Official revisions and official new versions of S1000D are called "Issues" and each official and approved issue of S1000D is identified by its S1000D issue number. The issue number identifies which set of business rules and schemas accompany the S1000D specification. Different issues have incorporated different content and format and functionality requirements, including requirements requested by the US military. Consequently, a particular Issue of S1000D may be more appropriate than another for certain procurements. The Acquiring Activity must be aware that certain Issues of S1000D contain very substantive changes over previous issues. When specifying an Issue Number to apply to the procurement, the Acquiring Activity should be confident that the Government and associated vender toolsets can support the Issue selected. Activities requiring assistance in the selection of an Issue Number should contact NSWC Carderock Division (see Section 1.5).

3.2.6 Process 4.2: Identify Content Requirements and Select Corresponding Content Information Set Types

Action: The Acquiring Activity identifies the required content of the desired TM and identifies and selects the S1000D information sets that reflect that content.

Explanation: The Acquiring Activity should identify the type of manual desired, what ship, system, or equipment it is to support, and develop a concept of the expected use, purpose and scope of the required TM. TMs are developed to support installation, operation, testing, maintenance, repair and overhaul of equipment. The Acquiring Activity, in addition to identifying the general type of manual required, should also identify the depth and breadth of product data desired in the manual.

An information set is an S1000D concept defined as a collection of required information of a certain scope and depth that is created in the form of data modules managed in a CSDB (common source database). The collection of information sets will describe the

complete depth and scope of the required content for the TM. Though the S1000D specification identifies a number of common information sets, these information sets shall not be used by NAVSEA activities. **NAVSEA programs shall use information sets developed by NAVSEA and available from the NAVSEA S1000D Tools Repository (see Section 1.5).** These information sets, derived from the content requirements contained in MIL-DTL-24784, ensure NAVSEA's content depth and breadth requirements are met while developing TMs conforming to S1000D. The NAVSEA information sets are:

- Hull, Mechanical and Electrical Equipment
- Hull, Mechanical and Electrical System
- Weapon Equipment
- Weapon System
- Electronic Equipment
- Electronic System
- Combat Systems Technical Operations Manual
- Technical Repair Standard - Electronic Equipment
- Technical Repair Standard - Hull, Mechanical and Electrical
- Technical Repair Standard - Ordnance
- Ships Information Book
- Operations Station Book
- Training Aid Booklet
- Illustrated Parts Breakdown
- Commercial-Off-the-Shelf

To further aid in the consistent development of NAVSEA data modules, S1000D information codes and schema types have been assigned to each of the content requirements in all information sets. Projects should be careful to consistently apply the information codes to facilitate discovery and re-use of data modules, not only within their project/program, but potentially among outside programs.

3.2.7 Resource 4.2.1: NAVSEA Information Sets

NAVSEA has developed content information sets reflecting the content requirements of MIL-DTL-24784. These information sets are available from the S1000D Sea Working Group and posted in the NAVSEA S1000D Tools Repository (see Section 1.5).

3.2.8 Process 4.3: Specify TM Functional Requirements

Action: The Acquiring Activity specifies the minimum functionality required from the new TM, especially if it is to be an interactive electronic TM/publication (IETM).

Explanation: The Acquiring Activity shall use the NAVSEA S1000D Functionality Matrix, available from the NAVSEA S1000D Tools Repository, to complete this

functionality specification. This will facilitate compatibility with the NAVSEA TM infrastructure and ensure life cycle support of the IETM by the Navy infrastructure. **NAVSEA activities shall NOT use the functionality matrix found in the S1000D specification.** The resulting description will characterize how the TM data will be presented electronically to users and how the users will interact with the TM. Typical functionality options address:

- Linking to other parts of the TM, content, or references
- Navigation and tracking of where the user is going or has been in the TM
- Handling, manipulation, display of graphics
- Handling of special content such as alerts and help
- Processing of diagnostics and prognostics
- Ability to interact with external processes
- Use and handling of multiple media content (e.g., audio, video, animation)

3.2.9 Resource 4.3.1: NAVSEA S1000D Functionality Matrix

The NAVSEA Functionality Matrix contained in the NAVSEA S1000D Tools Repository provides a tool for acquisition managers to detail the functional requirements of the required TM (including paper, linear electronic and full IETP versions of the manual). It serves as a standard format for documenting functional needs and also provides standard definitions of functionalities to ensure that Preparing Activities have a clear understanding of requirements. It allows the Acquiring Activity to specify requirements for all information types and to tailor requirements for specific information types. It also ensures compatibility with the NAVSEA TM infrastructure.

3.2.10 Decision 5: Will Navy Infrastructure Support Desired Functionality?

Action: The Acquiring Activity decides if the envisioned TM (complete with the expected delivery and viewer software necessary to read the data) will function within the standard Navy infrastructure for management and use of TMs.

Explanation: While the data may be compliant with the S1000D specification, it must still be deliverable and readable using standard NAVSEA and shipboard information technology. New performance or functionality requirements sometimes require specialized software to achieve the desired effect. Acquiring Activities should be aware of any potential new software requirement for the effective use of the acquired TM and ensure that that software is approved, certified, and available on Navy IT platforms. If not, alternatives need be explored, either by securing the necessary approvals and/or waivers to include the software in Navy infrastructure or by working out alternative requirements or software. To avoid some of these difficulties, the TMCR/TMSR should specify that deliverables be fully compatible with the standard Navy infrastructure. Activities employing software suites compliant with this infrastructure's development and delivery requirements can be assured of expeditious and successful deployment of

publication products. For information on the current Navy infrastructure, see Section 2.2 and consult the Navy S1000D Information Center at NSWC Carderock Division (see Section 1.5).

3.2.11 Decision 5.1: Will changes to Navy Infrastructure be approved?

Action: The Acquiring Activity decides if the requisite changes to the Navy infrastructure are likely to be approved.

Explanation: Desired TM functionality, though not currently supported by the standard Navy infrastructure, may be achievable through modification, augmentation, or enhancement of that infrastructure software and architecture. The Acquiring Activity must discern what enhancements to Navy infrastructure are needed to support the desired TM functionality and then must decide if those required enhancements are likely to be approved by Navy. If approved, the Acquiring Activity must decide if NAVSEA is likely to implement and deploy the enhancements in time for the delivery of this procurement's TM. The Acquiring Activity must realize that funding enhancements to Navy infrastructure, vice developing new processes outside of the infrastructure, will reduce their overall life cycle costs and will enhance the technology and functionality of the whole NAVSEA process, while ensuring standardization of TMs in use by the Fleet. Acquiring Activities should consult with the NAVSEA S1000D Configuration Control Board, chaired by NSWC Carderock Division, for assistance in resolving their requirements with Navy infrastructure capabilities.

3.2.12 Decision 5.2: Can a Reduced Functionality be Accepted?

Action: The Acquiring Activity decides if it can accept the reduced functionality necessitated by the lack of infrastructure support.

Explanation: In the event Navy infrastructure modifications needed for the desired TM functionality cannot be made, the Acquiring Activity must decide if a reduced functionality that is supported by infrastructure will be acceptable. If reduced functionality is acceptable, the Acquiring Activity must change the TM functionality specified in Process 4.3 accordingly. If reduced functionality is not acceptable, the Acquiring Activity must work with the Program Office to both provide the necessary ship and shore infrastructure to support the desired functionality, and obtain the necessary approvals for its deployment and use. This approach will likely burden the program with the responsibility and cost of obtaining the necessary information assurance testing and certifications to permit the installation of the software on ship and on the Navy Marine Corps Intranet (NMCI).

3.2.13 Process 5.3: Program Provides Infrastructure and Obtains Approvals

Action: The Acquiring Activity and Program Office identify necessary infrastructure enhancements, secure the required approvals, and procure and deploy it.

Explanation: At this point, it has been determined that the existing, approved, certified, and deployed (or to be deployed) Navy information infrastructure does not support a required functionality of this procurement. The Acquiring Activity and the associated program office must now invest significant time and effort to ensure its deployment. The Acquiring Activity and Program Office must identify the necessary infrastructure enhancements (software, networking, and communications) to support the desired functionality and then must secure the required approvals from the appropriate DON Activities certifying and controlling deployment of hardware and software to the Fleet and shore activities. The Program will also be responsible for obtaining the necessary testing and certifications required by DON Information Assurance instructions, IT-21 shipboard installation, and NMCI deployment. In addition to the obvious additional costs of this approach, securing these tests and certifications can take a considerable, and sometimes indeterminate, amount of time.

3.2.14 Process 6: Develop Initial List of Required DMs

Action: The Acquiring Activity develops an initial list of the data modules (DMs) required to complete the full complement of information sets required for each desired TM.

Explanation: At this step in the definition phase, the Acquiring Activity specifies additional details of the desired TM by identifying data modules that must be developed or revised to complete the content. In the early stages of the definition phase, the Acquiring Activity may only have a draft TM title as part of the initial list of DMs. This initial Data Module Requirements List (DMRL) may be initiated, and subsequently augmented, by the Acquiring Activity prior to task award or the Acquiring Activity may opt to require the Preparing Activity to develop part or all of the DMRL after task award. This initial list may be just a list of TMs, their type, and the information sets needed for the depth and range of content coverage, as decided in Process 4. This list will form the basis for the DMRL that will eventually guide the authoring of the completed TM. Acquiring Activity efforts at defining initial data module requirements in the definition phase will result in more exact content requirements for placement in the TMCR/TMSR.

Processes 3 and 4 specified the desired type of manual, general content and functionality, and the information sets to be used to achieve the desired depth and range of content of the TM. The full realization of the details of this content is accomplished by determining the list of data modules required to complete the TM, i.e., the (initial, at this stage) DMRL. There should be a DMRL for each required TM.

The S1000D specification defines a data module as "the smallest self-contained information unit within a technical publication." Each data module must have enough information to convey meaning and make sense on its own without any supporting information and to be integrated as a whole into a larger publication. A data module can refer to a wide variety of technical data including: a discrete task composed of one to many steps, a description of how to operate equipment, parts information for a system, fault isolation information, etc. One objective of the data module approach in S1000D is to encourage and facilitate reuse of the data modules and streamline publication development. Activities seeking assistance in developing the DMRL for their project should consult resources available in the NAVSEA S1000D Tools Repository at the NSWC Carderock website, as well as, contacts at NSWC Carderock Division and on the S1000D Sea Working Group, identified on the website.

3.2.15 Process 7: Specify JS, DON, NAVSEA, Community, Project Business Rules

Action: The Acquiring Activity ensures that all necessary S1000D business rules are included in the TMCR/TMSR.

Explanation: NAVSEA activities procuring S1000D TMs will include the published JS, DON, and NAVSEA S1000D Business Rules verbatim, as well as any desirable Community business rules, in their acquisition's TM contract requirements (TMCR/TMSR). Some key business rules that must be specified are the model identifier, metadata requirements, and data and delivery formats. Though the SYSCOM level and higher business rules settle many of the S1000D decision points, many remain to be set at the program or project level. These project business rules may be specified by the Acquiring Activity now and specified on the contract, or they may be identified here as decisions to be resolved by the acquisition manager and the TM Preparing Activity after contract award and prior to development. The S1000D specification project decision points posted in the NAVSEA S1000D Tools Repository should be reviewed to complete the project BRs. The final set of project BRs should be made a deliverable on the contract and a copy of the project BRs should be delivered to NSWC Carderock Division for posting in the NAVSEA S1000D Tools Repository.

3.2.16 Process 7.1: Determine Model Identifier

Action: The Acquiring Activity determines an appropriate model identifier (MI) for the acquisition.

Explanation: The Acquiring Activity should decide on a proposed MI and describe how the MI is to be used in project business rules. In S1000D, the MI identifies the product to which the data applies and is a descriptive name that is intended to assist in uniquely identifying the TM or associated project. This model identification code then is used as a prefix to all data module codes, thereby providing part of a unique identifier for each data module. The Acquiring Activity must determine whether an existing or new MI will be

required for the current acquisition. Ideally, the MI should be easily associated with the project. Existing MIs can be reviewed at the Model Identifier Registry maintained by the NATO Maintenance and Supply Agency (NAMSA) (see Section 1.5). To establish a new model identifier, projects should apply to NAMSA for allocation of the MI. This central registry and database ensures global uniqueness of the MI. The Acquiring Activity should notify the NSWC Carderock Division of the selected MI.

The Acquiring Activity may choose to delay the selection of the MI until after contract award so that it may make the decisions of what it should be and how it is to be used in collaboration with the Preparing Activity. In this case, the Acquiring Activity must specify in the TMCR/TMSR that the MI decisions are to be done post-award and prior to development.

3.2.17 Process 7.2: Specify Metadata Requirements

Action: The Acquiring Activity specifies, in its business rules, how to populate the metadata elements and attributes required by S1000D.

Explanation: The S1000D specification calls for a comprehensive set of metadata to be associated with each data module (DM). Each metadata element has certain required data specified by S1000D and other data that is subject to project specific decisions. Most metadata requirements in S1000D are contained in the identification and status section of the data modules.

DMs have a basic structure consisting of two sections. The content section of the DM contains the data and information which is used to create the publication modules and the TMs. The other section is called an identification and status section, which is designed to contain all the information required to address and manage the data module, i.e., the metadata required for the S1000D TM. The identification and status section is described in detail in the S1000D specification. The identification data includes the data module code, title, issue number, issue date, and language. The status metadata includes security classification, responsible partner company and originator, applicability, technical standard, quality assurance status, skill level, and reason for update of the DM. The extensive metadata capability laid out in the identification and status section can be used for:

- Management of the DM within the CSDB
- Management of the use of applicability
- Management of the quality assurance process
- Management and control of retrieval functions
- Automatic compilation of sets and subsets of information
- General information for users accessing the CSDB

The Acquiring Activity accomplishes the specification of its S1000D metadata requirements through the definition of its business rules.

3.2.18 Process 7.3: Specify Data and Formats for Deliverables

Action: The Acquiring Activity specifies the data formats for all types of expected deliverable data, including both source data and presentation data, to be in accordance with Navy and NAVSEA digital product and technical data policy and NAVSEAINST 4160.3 TMMP.

Explanation: Incompatible file formats can compromise NAVSEA ability to deploy logistical documentation to the Fleet. In this process, the Acquiring Activity must decide, and specify in the TMCR/TMSR and associated CDRLs, the formats for all data to be delivered in this TM project, including both source data and presentation data. The formats should comply with DON and NAVSEA product data policy and be compatible with the NAVSEA infrastructure for the use and life cycle management of the data. This process includes citing standard digital formats and specifications for text, bitmaps, drawings, animations, video, engineering, and CAD data. The formats must be compatible with standard Navy and NAVSEA infrastructure (e.g., NIAPS, ATIS, NMCI, and the SPAWAR IT-21 PPL). NIAPS, Navy Information / Application Product Suite, is the collection of hardware and software products deployed aboard ships in support of the Navy's Distance Support effort. The SPAWAR IT-21 PPL (Preferred Products List) identifies software products that have been tested to not interfere with IT-21 network applications and that have been approved for interoperability with IT-21 workstations, servers, and operations centers. NMCI (Navy Marine Corps Intranet) is the shore-based version of IT-21. Required TM formats must be interpretable by software approved for use on NMCI machines and networks. In addition, TM data, intended to be delivered to ships on compact discs (CDs), must be compatible with ATIS (Advanced Technical Information Support). Currently, buying data formats compatible with SNIPP (Standard NAVSEA Integrated Publishing Process) will guarantee compatibility with all of these requirements.

3.2.19 Process 8: Identify and Secure Approval for Required Business Rule Deviations

Action: The Acquiring Activity obtains formal approval from the NAVSEA S1000D Configuration Control Board (CCB) of any deviations from JS, DON, and NAVSEA business rules.

Explanation: Circumstances may arise during the process of developing and specifying project business rules which may require a deviation from one or more of the JS, DON, or NAVSEA business rules. These business rules have been established and carefully coordinated among the Services to obtain consistency in the implementation of S1000D for United States military publications and are mandatory for all NAVSEA applications. Deviations from these rules must be formally approved by the NAVSEA S1000D CCB, which will coordinate approvals from DON and JS as required.

3.2.20 Process 9: Register Model Identifier

Action: The Acquiring Activity registers the selected model identifier (MI) if it is not already registered.

Explanation: To control the usage of MI codes and prevent duplications, the Acquiring Activity must register new model identifiers with the NATO Maintenance and Supply Agency (NAMSA). This registration ensures that the identifier is unique and will never be reused. A list of allocated MIs can be found at the NAMSA website (see Section 1.5). Projects should apply to NAMSA for their MI and should specify the number of MI to be reserved for models and variants. If the Acquiring Activity chooses to delay selection of the MI until after contract award, it must specify in the TMCR/TMSR that the MI decisions are to be done post-award and prior to development. NAVSEA Acquiring Activities should notify the NAVSEA S1000D Configuration Control Board, of the selected MI.

3.2.21 Process 10: Update Initial List of Required Data Modules

Action: The Acquiring Activity reviews the initial data module requirement list (DMRL) and revises and expands it as necessary.

Explanation: In the process of completing the identification of requirements for the new, or revised, TM, the Acquiring Activity may develop a greater understanding of the manual's content requirements. The Acquiring Activity should review the list of required data modules, created earlier, and expand, update, and revise the Data Module Requirements List (DMRL) as necessary. There should be a DMRL for each required TM. The Acquiring Activity may not be in a position at this stage of the definition process to identify all, or for that matter any, of the required data modules and may opt to require the Preparing Activity to generate all or part of the DMRL after task award.

3.2.22 Process 11: Determine Level of DM Reuse

Action: The Acquiring Activity specifies the desired level of data module reusability required for this project.

Explanation: At this stage in the process, the Acquiring Activity may not have enough information to determine the exact DMs for data reuse but the Acquiring Activity may research and identify potential data or other TMs that can be reused. Understanding the volume of potential data reuse can provide the Acquiring Activity with valuable information in determining an estimate of the acquisition's cost. The ability to reuse data is one of the greatest benefits of S1000D. S1000D data modules are to be self-contained information units, having sense and meaning in and of themselves without any other supporting data (save graphics). The Acquiring Activity, in concert with program and project managers, should anticipate the potential for data module reuse, both within the

current project and across previous and future projects, and decide the level of reuse that it wishes to require in the current acquisition. If possible and appropriate, the Preparing Activity should be directed to related Common Source Databases for potentially reusable DMs. Future considerations for S1000D use envision a NAVSEA metadata registry and repository to support reusability of DMs.

3.2.23 Process 12: Specify Quality Assurance (QA) Requirements

Action: The Acquiring Activity specifies the type and extent of quality assurance activity and documentation to be required of the Preparing Activity.

Explanation: NAVSEAINST 4160.3 Technical Manual Management Plan requires each system and equipment procurement or modification requiring TM development to include requirements for a TM Quality Assurance (QA) program using a Technical Manual Contract Requirement (TMCR) or a Technical Manual SEATASK Requirement (TMSR). In the TMCR/TMSR, the Acquiring Activity must define the range and depth of QA required to ensure the TM meets program technical requirements. The Acquiring Activity should direct the Preparing Activity to describe the scope and approach of its TMQA program in a TMQA Program Plan. The plan should detail the organization, planning, and data control to be exercised in the development of the TM, as well as, describe the actions to be taken to comply with the quality requirements of the TMCR/TMSR. The purpose of the TMQA Program Plan and procedures is to ensure the technical accuracy, adequacy, reading grade level (RGL), and comprehensibility of the TM. The goal is to ensure that the Navy receives accurate information of acceptable quality that may be easily used by the naval personnel who will operate and maintain the associated shipboard systems and equipment. QA is obtained by conducting appropriate quality assurance reviews, in-process reviews (IPRs), validations and verifications throughout the TM acquisition/development. In-process reviews are instrumental in assuring mutual understanding of requirements and the adequacy of the TM under development. IPRs for conventional TMs are usually scheduled at the 30%, 60%, and 90% completion stages of the TM. For S1000D TMs, IPRs should be scheduled when 30%, 60%, and 90% of the expected data modules have been completed. Consult the TMMP for a complete explanation of TMQA requirements and acquisition. Consult DON S1000D Technical Manual Quality Assurance Guidance (see Section 1.4) for additional S1000D specific QA guidance.

3.2.24 Process 13: Specify Types of Publication Modules and Presentation Media

Action: The Acquiring Activity creates a list of the titles of documents (publication modules) required of the project and identifies the presentation media required for each module.

Explanation: A publication module is a set of data modules which have been arranged to make a publication, such as a checklist, guide, catalogue, or other document, on a

particular subject, irrespective of presentation media (e.g. paper or screen display). The publication module defines the content and structure of the publication by references to data modules and other publication modules or legacy data. The Acquiring Activity should create a list of all desired publications modules, and the presentation media required for each, to be included in the TMCR/TMSR. This publication list will help identify special documents required from the technical manual in addition to the full electronic document, such as special media versions, PDF, paper, and versions of portions of the full publication. If only a single IETM is required, then this list of publication modules may not be necessary.

3.2.25 Decision 14: Who Will Publish Final Product?

Action: The Acquiring Activity specifies whether it or the Preparing Activity will publish the final product.

Explanation: The Acquiring or Preparing Activity should load and store data modules in a NAVSEA-approved content management system that is suitable for managing S1000D information objects and data modules. This content management system will be used to manage the data modules throughout the project and to publish the final products and deliverables. The Preparing Activity (developer/contractor) may be required to use its own content management system, or the Acquiring Activity may require that the Preparing Activity use a Government owned content management system. The Acquiring Activity may require the Preparing Activity to prepare/provide the data modules and publications module with the Acquiring Activity responsible for publishing.

3.2.26 Process 15: Specify Deliverables

Action: The Acquiring Activity creates the list of all desired deliverables to be specified in the TMCR/TMSR and associated CDRL(s). The Acquiring Activity should include all required data modules and publication modules and, in the case the Preparing Activity publishes the final products, the final presentation media.

Explanation: The Acquiring Activity should clearly identify all deliverables expected from the TM procurement and ensure they are clearly specified in the TMCR/TMSR and CDRL(s). Deliverables should include all desired publication modules (PMs) and all supporting data (graphics, illustrations, diagrams, animations, videos, etc.). Deliverables may include the S1000D source data and data modules (DMs). The CSDB enables the generation of the publication modules, various outputs, and the ability to reuse DMs without duplication of data. The Preparing Activity should be required to deliver a final master list of publication modules and a final Data Module Requirements List (DMRL), the Data Dispatch Note (DDN) (as required by S1000D), and all files. The Preparing Activity should also be required to deliver the final set of project business rules. Effectively, these lists are the final identification of all required DMs and PMs. In summary, deliverables should include the following:

- Final published product(s) unless Acquiring Activity is publishing
- List of all PMs
- Final set of project business rules
- Final DMRL
- Data Dispatch Note
- XML source data (including DMs and PMs developed/required)
- Graphics source files
- Identification of DTDs and schemas used
- Project specific style sheets and filters
- Entity files
- Project specific tagging conventions and authoring instructions

3.2.27 Process 16: Develop TMCR/TMSR

Action: The Acquiring Activity uses the Streamlined Modular Acquisition Requirements Tailoring Tool (SMART-T) to custom prepare TMCRs and TMSRs.

Explanation: NAVSEAINST 4160.3 requires that "technical manuals shall be acquired in accordance with a Technical Manual Contract Requirement (TMCR). The TMCR is mandatory for use in all procurements of technical manuals, changes, and revisions, and shall be an attachment to the Contract Data Requirements List (CDRL). For internal development of technical manuals the Command shall use a Technical Manual SEATASK Requirement (TMSR) in lieu of a TMCR."

The TMCR is to be used when a contractor is to be the Preparing Activity of the TM. The TMSR, containing the same requirements as a TMCR, is to be used when a Government activity is to develop the TM.

Acquisition managers are to use the interactive tool, SMART-T, to generate the TMCR or TMSR. The TMCR/TMSR is an organized compilation of specifications and definitions relating to a specific TM product. It provides general and specific requirements and directions for the preparation and delivery of TMs. It employs the associated specifications required for the TM development and ensures that the technical requirements comply with NAVSEA and DOD policies. The TMCR/TMSR also specifies TM quality assurance requirements and procedures and includes requirements for development/delivery of TMQA and associated TM development data products (e.g., Schedule and Status Report, TM Cost Report, TMQA Program Plan, IETM Content Plan, DMRL, Validation Plan, Validation Certificate, etc.). The development of a TMCR/TMSR assists the acquisition management activity in systematically analyzing requirements and ensures standardization of type, form, and style of TMs.

3.2.28 Resource 16.1: SMART-T

SMART-T (Streamlined Modular Acquisition Requirements Tailoring Tool) is a web-based application designed to support the management of much of the major acquisition procurement life cycle by assisting the development of tailored documents to be used throughout the pre-solicitation process. SMART-T supports the development of Technical Manual Contract Requirements (TMCRs), and Technical Manual SEATASK Requirements (TMSRs). A Public Key Infrastructure (PKI) certificate and an account are required to access SMART-T. Accounts may be obtained by registering for SMART-T on the SMART-T homepage accessible via the NSDSA website.

3.2.29 Process 17: Issue Solicitation

Action: The Acquiring Activity follows standard NAVSEA TM contracting procedures to place the TM requirements on a solicitation.

Explanation: The Acquiring Activity completes its TM development planning and issues a solicitation including the TMCR, Statement of Work, and CDRLs following the Acquisition procedures identified in the NAVSEA TMMP.

4 S1000D TECHNICAL MANUAL DEVELOPMENT PHASE

4.1 Scope - Relation to NAVSEA Technical Manual Management Program Development Phase

This section addresses aspects of the development phase of technical manual life cycle support that are specific to S1000D interactive electronic technical manuals (IETMs). The TM development phase includes the actions necessary to develop TMs in accordance with the Technical Manual Contract Requirements (TMCR) or Technical Manual SEATASK Requirements (TMSR). The procedures and guidance set forth here augment the TM development procedures described in the NAVSEA Technical Manual Management Program Operations and Life Cycle Support Procedures manual. All TM development phase actions and responsibilities described therein apply to S1000D IETMs.

4.2 S1000D Technical Manual Development Process Model and Descriptions

The development phase of S1000D technical manual life cycle includes several steps not addressed by the TMMP that pertain to basic S1000D concepts, as well as, augmentation and modification to TMMP processes dictated by the S1000D modular data development and management approach. Figures 4.1 and 4.2 present a model of the TMMP TM

Development Process for S1000D technical manuals. The processes and decision points in the model are described in the subsections below. The Acquiring Activity must work with the Preparing Activity to decide and determine the standard numbering system to be used for the TM project, agree on the project business rules, establish the S1000D oriented quality assurance program and determine the approach to in-process review of the modular development.

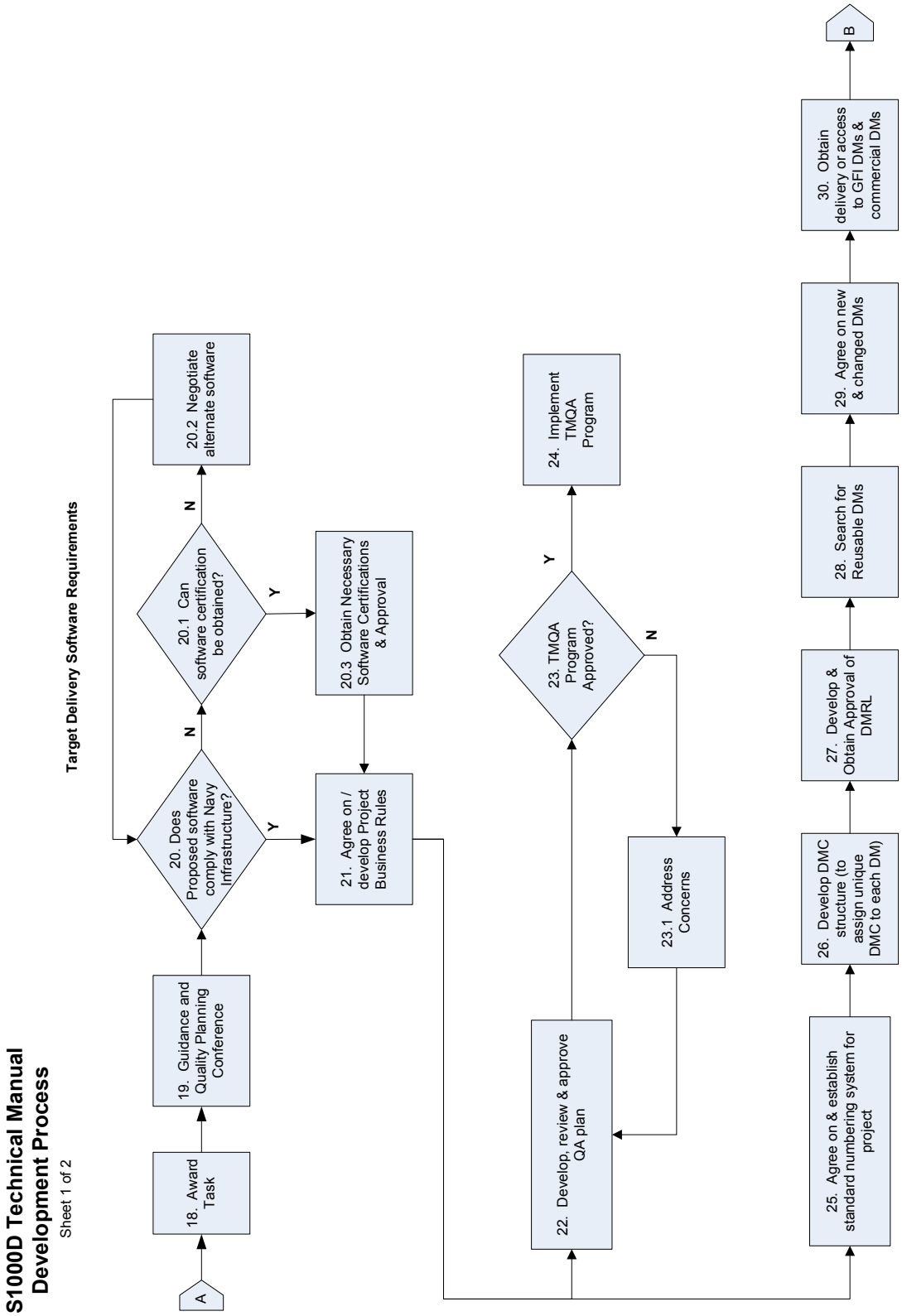


Figure 4. 1 (sheet 1 of 2) Process Model of Development Phase of S1000D IETM Acquisition

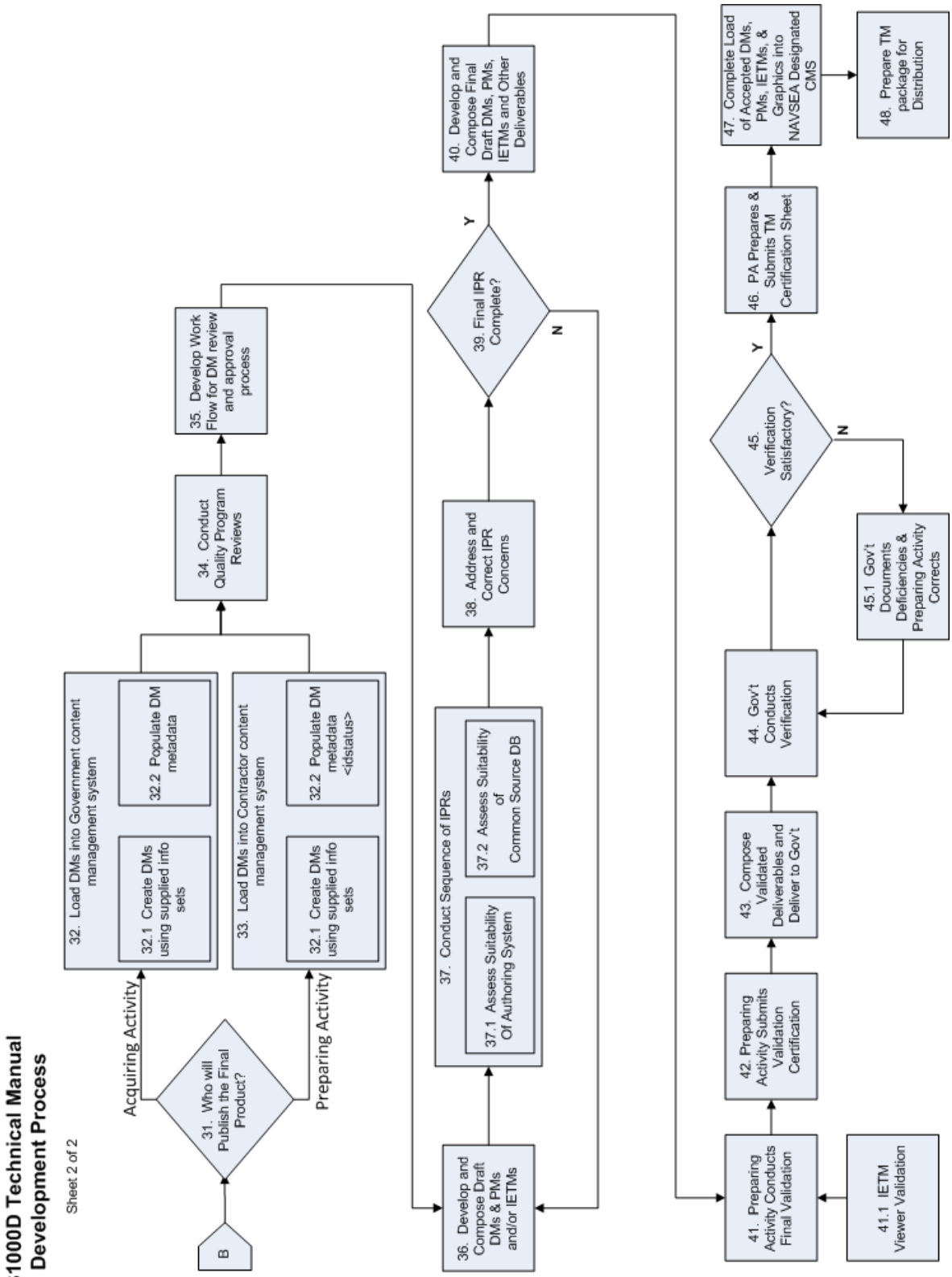


Figure 4. 2 (sheet 2 of 2) Continuation of Process Model of Development Phase of S1000D IETM Acquisition

4.2.1 Process 18: Award Task

Action: The Acquiring Activity initiates the contract with a Preparing Activity to achieve TM development.

Explanation: The Acquiring Activity follows standard NAVSEA contracting procedures to select a TM Preparing Activity and award the TM development task.

4.2.2 Process 19: Guidance and Quality Planning Conference

Action: The Acquiring Activity conducts a Guidance and Quality Planning Conference to establish guidelines for the project's development.

Explanation: The Guidance and Quality Planning Conference is a meeting that takes place at the start of TM development between the TM Acquiring and Preparing Activities to review and clarify TM development requirements. As stated in the TMMP, the guidance and quality planning conference is conducted to ensure the Preparing Activity understands the applicable specifications, TM contract requirements, formal instructions, established policies, and program requirements. The conference may sometimes be referred to as the Post Award Meeting or the Start of Work Meeting. The meeting is generally chaired by the Government Contracting Officer Representative (COR), Technical Representative, or the TM Manager and is attended by the Acquiring Activity project manager, quality assurance manager, key production personnel, writers and editors, and Government engineering or technical representatives and training or Fleet representatives as needed. The meeting should be held after contract award and before start of the TM development task. The conference agenda should include:

- Review of SOW, CDRLs, DIDs, TMCR/TMSR and schedule
- Discussion and resolution of any required or desired tailoring of the TMCR/TMSR
- Discussion of applicable requirements, specifications, and standards
- Discussion of S1000D decision points and business rules
- Digital data requirements and issues related to IETM development
- Source data, GFI, reuse of data
- Discussion of how deliverables will be delivered
- Discussion of how reviews and comments will be done, resolved and addressed
- Scheduling of IPRs
- Discussion of validation and verification processes

The purpose of the Guidance and Quality Planning Conference is to ensure that all parties to the TM acquisition and development have a clear understanding and agreement on requirements.

4.2.3 Decision 20: Does Proposed Software Comply with Navy Infrastructure?

Action: Acquiring and Preparing Activities determine if expected deliverables will comply within Navy infrastructure aboard ship and on the Navy Marine Corps Intranet.

Explanation: Proposals and contracts for the development and delivery of S1000D TMs should address the software that may be required to use the IETM product and all its functions. Proposed software must satisfy Navy infrastructure and NMCI shore and shipboard requirements. Approved software is listed in the DON Application and Database Management System (DADMS). If proposed software is not already approved, the Preparing and Acquiring activities must obtain this approval and secure its accreditation within NMCI. The potential for failing to achieve accreditation must be considered and addressed before final delivery of the S1000D data and product.

Software used within the Navy information infrastructure must comply with DON information assurance criteria and be certified and approved for use aboard ship and on the Navy Marine Corps Intranet (NMCI) infrastructure serving shore-based activities. Information assurance includes measures, procedures and precautions that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and nonrepudiation. Certain types of software, software code, and functions are precluded by Navy information assurance guidelines. In addition, due to the NMCI and shipboard security requirements, many commercial hardware and software products either fail to function at all, need some modifications or special procedures to operate, or have security vulnerabilities that must be corrected before being allowed on Navy systems and networks. NMCI does not allow users to install software, or hardware that requires software or drivers, onto NMCI desktops. In addition, all software and applications destined for shipboard installation must be approved and certified by SPAWAR and NETWARCOM. Consequently all software applications and components must be tested, certified compatible with NMCI and/or approved shipboard computing environments, and packaged for deployment to NMCI desktops and ships. In addition, all modifications to a product must be recertified before deployment. To assist activities in using approved software for shipboard use, NAVSEA has established a standard infrastructure for development, management, and use of technical manuals and data. Compatibility and compliance with this infrastructure will ease installation of TM data and applications on ship.

4.2.4 Decision 20.1: Can Software Certification be Obtained?

Action: The Acquiring and Preparing Activities decide if the software that is not compliant with Navy infrastructure can be certified for use and that the certification can be obtained in time for TM deployment.

Explanation: If proposed software for the S1000D deliverables is not already approved and certified for use in Navy (shore or ship), the Acquiring and Preparing Activities should assess the likelihood of achieving the necessary certifications before proceeding

with the development task. To proceed, the Acquiring Activity must secure the required approvals from the appropriate DON Activities certifying and controlling deployment of hardware and software to the Fleet and shore activities. The Acquiring Activity should be aware that testing and accreditation and final approval of software may take a long time and could impact delivery schedules. S1000D Preparing Activities are encouraged to use software that is already on the approved software lists. Innovative solutions employing new software or new information technology should be allowed sufficient lead times to attain the necessary software approvals.

4.2.5 Process 20.2: Negotiate Alternate Software

Action: The Acquiring Activity negotiates alternative solutions with its program managers, the Preparing Activity, and perhaps the contracting office.

Explanation: If proposed software cannot be executed on Navy systems, the Preparing and Acquiring Activities must seek alternative solutions.

4.2.6 Process 20.3: Obtain Necessary Software Certifications and Approvals

Action: The Acquiring and Preparing Activities obtain the necessary software certifications and approvals to allow introduction and use of the desired IETM in the Fleet.

Explanation: The Acquiring and Preparing Activities work with the proposed software vendor to ensure that the software required for the TM product to be fielded will satisfy all DON information assurance, networking, and functional area manger approval requirements. Experience has shown that this process can be very time consuming and costly and has no assurance of success. The Acquiring Activity should realize that funding enhancements to Navy infrastructure, vice developing new processes outside of Navy infrastructure, will reduce overall life cycle costs and enhance the technology and functionality of the whole NAVSEA process.

4.2.7 Process 21: Agree upon / Develop Project Business Rules

Action: The Acquiring Activity and the Preparing Activity review each S1000D project decision point and agree upon all business rules applicable to the project and develop new project business rules as needed.

Explanation: All S1000D project decisions points should be reviewed and business rules developed and agreed upon prior to the start of development of technical data. The TM Acquisition Manager and the Preparing Activity should review the decision points in the S1000D specification that have been left for individual project determination and agree on the specific resolution of these decisions that will be followed for this TM project.

The higher-level S1000D business rules (JS, DON, NAVSEA, and any others imposed by the TMCR/TMSR) should be reviewed to ensure common understanding of how they are to be implemented. The S1000D specification project decision points posted in the NAVSEA S1000D Tools Repository should be reviewed to complete the project BRs. Many of the project decision points relate to the metadata associated with the data modules to be created. The specified metadata contained in the identification and status section of the data modules includes many optional elements which affect how the data modules are to be identified and managed in the CSDB and also which affect how the status, applicability, and review of the data modules are to be tracked. The project business rules should be tabulated, documented, and signed off by the Acquisition Manager and the Preparing Activity project manager. The final set of project BRs should be a deliverable on the contract and a copy of the project BRs should be delivered to NSWC Carderock Division for posting in the NAVSEA S1000D Tools Repository.

4.2.8 Process 22: Develop, Review, and Approve the QA Plan

Action: When directed by the Acquiring Activity, the Preparing Activity documents its technical manual quality assurance program and submits it for review.

Explanation: NAVSEAINST 4160.3 Technical Manual Management Program requires all new TMs to be procedurally validated by the Preparing Activity and verified by the Government to ensure information contained therein is technically accurate and adequate and suitable for support of the associated systems and equipment. The TM Quality Assurance (TMQA) Program Plan is developed by the Preparing Activity and defines the methods, procedures, controls, tools, and resources it expects to apply to validate the TM data.

The TMQA Program Plan should describe the scope and approach of the Preparing Activity's quality assurance program. It should detail the organization, planning, and data control that will be in place and exercised to ensure delivery of a quality TM and ensure that the quality requirements of the TMCR/TMSR are to be satisfied. Refer to DI-TMSS-81817 Technical Manual Quality Assurance Program Plan for specific content to be included in a TMQA Plan.

4.2.9 Decision 23: TMQA Program Approved?

Action: The Acquiring Activity decides whether to approve the TMQA Program.

Explanation: The Acquiring Activity reviews the Preparing Activity's documentation of its quality assurance program. The TMQA Program should be approved if it meets all requirements of the contract specification and satisfactorily ensures delivery of a quality product.

4.2.10 Process 23.1: Address Concerns (re: TMQA Program)

Action: The Preparing and Acquiring Activities work together to resolve concerns about the TMQA Program.

Explanation: The Acquiring Activity, in disapproving the TMQA Program, should identify its concerns and work with the Preparing Activity to resolve them.

4.2.11 Process 24: Implement TMQA Program

Action: The Preparing Activity implements the TMQA Program

Explanation: The Preparing Activity should execute the various aspects of its TMQA program as integral parts of the TM development. This should include both preventive and corrective actions to ensure identification and correction of all deficiencies, control of source data to ensure currency and accuracy, and control of subcontractors to ensure they have satisfactory TMQA Programs and to ensure the quality of their products.

4.2.12 Process 25: Agree on and Establish Standard Numbering System for the Project

Action: The Acquiring and Preparing Activities jointly agree on the Standard Numbering System to be used for the S1000D TM development.

Explanation: S1000D uses a standard numbering system (SNS) that is to be tailored for each project and aligned with the structure of the product for which the TM is being developed. The standard numbering system forms part of the data module code (DMC) that uniquely identifies each data module. The Acquiring Activity and the Preparing Activity should agree on the SNS prior to initiation of content development. A NAVSEA business rule states that all NAVSEA projects must use an approved SNS. That SNS should be, in order of preference, one of the following:

- a maintained SNS from the S1000D specification;
- Expanded Ship's Work Breakdown Structure (ESWBS);
- a project-managed SNS that must be registered with and approved by the NAVSEA S1000D Configuration Control Board (CCB).

A NAVSEA business rule states that the program should identify the SNS being used by the MICC (material item category code), which is the first character of the SNS. MICCs for maintained SNSs are listed in the S1000D specification. The MICCs for ESWBS and project managed SNSs are specified in the NAVSEA business rule.

4.2.13 Process 26: Develop DMC Structure (to Assign Unique DMC to each DM)

Action: The Acquiring and Preparing Activities agree on the structure of the data module codes (DMCs) to be used in the TM development.

Explanation: An S1000D TM is a collection of data modules stored and managed in a common source database (CSDB). Each data module is to be assigned a unique data module code (DMC). The DMC uniquely identifies the data modules, ties the data module to components and subcomponents of the product being documented, and provides descriptive information about the contents of the data module and how it may relate to other data modules.

4.2.14 Process 27: Develop and Obtain Approval of the DMRL

Action: The Preparing Activity develops the Data Module Requirements List (DMRL) for the project and obtains approval from the Acquiring Activity.

Explanation: The approved Data Module Requirements List (DMRL) should be a compilation of all data modules needed to satisfy the TM requirements of the Acquiring Activity for this project and is similar to an approved book plan. The Acquiring Activity identifies an initial list of required data modules prior to and during the preparation of the TMCR/TMSR. After task award, the Preparing Activity should work with the Acquiring Activity to develop, finalize, and agree on the complete Government approved DMRL for the project. This process may prompt some cost and funding modifications. The approved DMRL should be managed and maintained throughout the project as a mechanism to track progress and ensure that only needed and desired data modules that provide the desired product are produced.

4.2.15 Process 28: Search for Reusable DMs

Action: The Preparing Activity searches available content management systems to determine if previously developed publication modules (PMs), data modules (DMs), and/or graphics/multimedia can be reused for the current project.

Explanation: The current TM development project may be part of, or related to, a larger program also developing data modules for other TMs. As the use of S1000D and common source databases (CSDBs) for developing and storing data modules expands, the potential for sharing data modules among TM Preparing Activities also increases. The large amount of metadata associated with PMs, DMs and graphics/multimedia in a S1000D development approach provides a rich source of searchable material for locating potential reusable data modules. Acquiring Activities should advise Preparing Activities of related content management systems and CSDBs that may have DM reuse potential in the current project. The Acquisition office and developer should work together to ensure the Preparing Activity has authorized access to the data repositories, that metadata fields

are properly and exhaustively searched, and that candidate PMs, DMs, and graphics and multimedia identified for potential reuse are appropriate for the Project's end products. Using this method, development schedules can be advanced, duplication costs are avoided and the Navy ensures consistency in their technical resources.

4.2.16 Process 29: Agree on New and Changed DMs

Action: The Acquiring Activity and the Preparing Activity agree on new and changed data modules.

Explanation: The Acquiring and Preparing Activities may decide to change certain data modules or expand or reduce the original DMRL as the TM development proceeds. Both activities must agree on all changes, additions, and deletions.

4.2.17 Process 30: Obtain Delivery or Access to GFI and Commercial DMs

Action: The Acquiring and Preparing Activities cooperate to obtain necessary Government furnished information (GFI) and commercial data modules to support the project.

Explanation: The Acquiring Activity and Preparing Activity must work together to identify additional source material that ensures a comprehensive final deliverable. Likewise, the Government must provide to the preparer any pre-existing commercial data modules that are required by the TMCR/TMSR. The Preparing Activity may discover other commercial DMs that are useful for the current development project. The use of these commercial DMs must be approved by the Acquiring Activity.

4.2.18 Decision 31: Who Will Publish the Final Product?

Action: Development proceeds in accordance with the direction decided in Process 14 (Section 3.2.25) on which activity is to publish the final product.

Explanation: The Preparing Activity should load and store data modules in a NAVSEA-approved content management system that is suitable for managing S1000D information objects and data modules. This content management system will be used to manage the data modules throughout the project and to publish the final products and deliverables. The Preparing Activity (developer/contractor) may be required to use its own content management system, or the Acquiring Activity may require that the Preparing Activity use a Government owned content management system. The Acquiring Activity may also require the Preparing Activity to prepare/provide the data modules and publication modules with the understanding that the Acquiring Activity will be responsible for publishing.

4.2.19 Process 32: Load DMs into Government Content Management System

Action: The Preparing Activity creates data modules with associated metadata and loads them into the Government (NAVSEA approved) content management system.

Explanation: The S1000D specification conceptualizes a common source database (CSDB) for storing and managing S1000D compliant TM content. The CSDB stores and manages all information objects required to produce the TM, including data modules, illustrations (including any non-XML information associated with the data modules), data modules lists, comments, and publication modules. The CSDB must support controlled authoring, publication, quality assurance, data exchange/sharing with partners, and delivery of TMs on various media. S1000D only specifies the data structure of the information objects to be stored and managed by the CSDB and this data structure is independent of any software implementation. The data module load is not complete until all necessary metadata and content have been entered into the database properly and according to the S1000D specification and all applicable business rules.

4.2.20 Process 32.1: Create DMs Using Supplied Information Sets

Action: The Preparing Activity begins data module development.

Explanation: The Preparing Activity interprets the detailed content requirements identified during preceding processes to start data module development using the information sets required by the task.

4.2.21 Process 32.2: Populate DM Metadata

Action: The Preparing Activity ensures that all required metadata is created for each data module.

Explanation: Data modules are composed of two sections, the content section that will form the substance of published data, and a metadata section, called the identification and status section, that contains information about the content and its status. Identification data includes the data module code, title, issue number, issue date and language. Status data includes such information as security classification, originator, applicability, quality assurance status, and reason for update. The identification and status section information supports management of the data modules within a common source database, management of the use of applicability, and management of the quality control process. Much of the identification and status section will be filled out when the DMRL is created. Some of the metadata items remain constant for a project and can be completed for DMs using a common template created by the Acquiring Activity and Preparing Activity.

4.2.22 Process 33: Load DMs into Contractor Content Management System

Action: The Preparing Activity creates data modules with associated metadata and loads them into the Preparing Activity's content management system.

Explanation: The Acquiring Activity may allow the Preparing Activity to use its own content management system for DM development but it must require the Preparing Activity to provide the DMs and publication modules for load into a NAVSEA approved CSDB. The S1000D specification conceptualizes a common source database (CSDB) for storing and managing S1000D compliant TM content. The CSDB stores and manages all information objects required to produce the TM, including data modules, illustrations (including any non-SGML/XML information associated with the data modules), data modules lists, comments, and publication modules. The CSDB must support controlled authoring, publication, quality assurance, data exchange/sharing with partners, and delivery of TMs on various media. S1000D only specifies the data structure of the information objects to be stored and managed by the CSDB and this data structure is independent of any software implantation. The data module load is not complete until all necessary metadata and content have been entered into the database properly and according to the S1000D specification and all business rules.

4.2.23 Process 34: Conduct Quality Program Reviews

Action: The Acquiring Activity reviews the Preparing Activity's TM quality assurance program and conducts quality reviews.

Explanation: Quality program review(s) will be chaired by a Government representative and held at the Preparing Activity's facility. The Preparing Activity will support the reviews as requested by the Acquiring Activity. During the program review, the Preparing Activity will demonstrate the operation of the TMQA program, show that product quality reviews are correctly implemented, and that defects are being identified and corrective measures are being implemented. Quality review results will be documented by the Acquiring Activity.

The Preparing Activity's Quality Assurance organization should also conduct quality program reviews to ensure compliance with the TMQA Program and provide corrective action if necessary.

4.2.24 Process 35: Develop Work Flow for DM Review and Approval Process

Action: The Preparing Activity defines the process by which draft data modules will receive validation and verification review under the S1000D development process. Note: The S1000D specification uses the term, first verification, to refer to validation, and uses the term, second verification, to refer to verification.

Explanation: The Preparing Activity is responsible for assuring that the correct data modules and data module content are produced, that the data modules fulfill the purpose for which they were developed, that they adequately describe the product and are technically accurate and satisfy safety requirements. S1000D allows DMs to be produced concurrently and independent of each other. The identification and status section metadata associated with each DM provides mechanisms for both commenting on the DM and indicating completion of the Preparing Activity validation of the DM content. The Preparing Activity's Technical Manual Quality Assurance Plan (see Process 22) should define the workflow and processes required for this review to take place. The DM reviews are expected to take place as DMs are completed. In this way groups of DMs will complete validation for further review in upcoming In Process Reviews (IPRs).

Validation of the draft data modules (DMs) and publication modules (PMs) must be performed by the Preparing Activity before delivery to the Government. Engineering reviews to ensure the accuracy and appropriateness of the technical content are a critical part of validation. There are two different validation types: a "hands-on" validation is performed on the actual equipment itself and a desktop validation that validates the descriptive text and procedures of the DMs and PMs against equipment designs, engineering drawings, images, and design changes. The validation must ensure that all technical content is safe, complete, logical, technically accurate, and comprehensible. The engineering review should ensure that equipment and procedures are accurately and properly described; nomenclature is accurately and consistently used, dangers, warnings, and cautions are accurately provided and properly displayed; names of controls and indicators are correctly and consistently used; and illustrations, tables and drawings are properly used and referenced. The Preparing Activity must record all discrepancies or problems and track and record all resolutions. These engineering reviews are to enable the Preparing Activity to certify that the technical information permits efficient performance of the intended equipment support functions and that the technical information is ready for validation.

S1000D identifies the validation of content as first verification. First verification can be:

- "onobject", used to indicate that the first verification was carried out at the Product
- "tabtop", used to indicate that the first verification was carried out on a desktop
- "ttandoo", used to indicate that the first verification was carried out at the Product and on a desktop

The QA status of data modules is contained within the metadata content of the identification and status section. Although data modules can be independently verified, they must also be verified when packaged together within the draft PM. This ensures the sequential order of the DMs as they appear in the PM is accurate and complete.

4.2.25 Process 36: Develop and Compose Draft DMs, PMs, and/or IETMs

Action: The Preparing Activity produces draft deliverables completed to date.

Explanation: The Preparing Activity must develop and compose completed draft data modules (DMs), aggregate them into draft publication modules (PMs), and produce either hard copy PMs, or IETMs, to the extent possible at this stage of development. These draft PMs and/or IETMs are to be developed to reflect requirements of the TMCR/TMSR so that they may be reviewed to ensure content has been produced to the depth and breadth detailed in the specified information sets, that content is sequentially arranged in the PM as specified in the list of PMs and, for an IETM, that all functionality behaves as specified in the TMCR/TMSR.

4.2.26 Process 37: Conduct Sequence of IPRs

Action: The Technical Manual Manager conducts the sequence of IPRs specified in the contract.

Explanation: In Process Reviews (IPRs) are quality assurance activities conducted to ensure the TM under development is adequate, accurate, and comprehensible; satisfies user requirements; and complies with the contract and cited specifications. The number of required IPRs should be established in the contract/task. The IPR schedule should be discussed and agreed upon at the Guidance and Quality Planning Conference. The IPRs are authorized and convened by the Acquiring Activity. The Preparing Activity should support each IPR and provide access to source data, intermediate and final products. The Acquiring Activity performs the technical and editorial reviews and provides comments to the Preparing Activity. Follow-on discussions between the two are conducted to resolve questions and issues. The exchange, recording, and processing of review comments should be conducted in the manner agreed upon at the Guidance and Quality Planning Conference.

The Technical Manual Manager coordinates the reviews on the Government side. Reviewers should include engineers and technicians familiar with similar equipment, training command representatives, Fleet representatives, technical writers and editors familiar with NAVSEA TM/IETM requirements, and software or computer engineers familiar with IETM functionality requirements. The TM products should be reviewed for compliance with the TMCR/TMSR, SOW, and CDRLs. The TM Manager should maintain a record of comments and is responsible for ensuring that Government comments are addressed and agreed resolutions are incorporated into the final product.

The first IPR is usually scheduled at about 30% completion of the TM, or, in the case of S1000D, when about 30% of the data modules in the DMRL have been completed. The IPR will review intermediate and completed materials and evaluate source data, TM preparation methods, readability, data modules, DMRL, and preliminary publication modules. The initial IPR should feature a demonstration of the TM authoring system to

ensure it functions adequately to create the desired S1000D TM products. This and subsequent IPRs should evaluate the IETM to ensure compatibility with the presentation system and display device, ensure comprehensive and user friendly commands are provided to support user navigation of the information, assess IETM functionality against requirements, and ensure use of proper presentation techniques.

The second IPR is customarily conducted when about 60% of the TM or DMRL has been completed. The review proceeds in the same manner as the initial IPR with the same objectives to ensure a quality product that complies with the TMCR/TMSR, SOW, and CDRLs. The IETM functionality should be coming into better perspective at this point and require closer review. The focus of the reviews will remain on the technical and engineering accuracy and comprehensibility as well as grammar and style. Aside from technical inaccuracies and grammar and spelling errors, typical problems found on review include inconsistencies, nomenclature errors, incorrect references to other sections/modules, ambiguous text, and unresolved comments from previous reviews. The Preparing Activity's and the TM Manager's responsibilities for this IPR are the same as for the initial IPR.

The final IPR is conducted just prior to final delivery of the TM. Preparing Activity modular validation and Acquiring Activity modular verification of the DMs and PMs should be complete. This IPR is intended primarily to ensure that all Acquiring Activity review comments and comments generated by the modular validation and verification during development have been resolved and properly incorporated. Normally, the final IPR adds no new comments except those related to errors in incorporating previous review comments.

4.2.27 Process 37.1: Assess Suitability of Authoring System

Action: During the initial IPR, the Acquiring Activity reviews the authoring system being used by the Preparing Activity to ensure its suitability.

Explanation: The Preparing Activity authorizes, enables, and supports the initial IPR to monitor and evaluate the use of the authoring system used for creation of the required TM data. If the Preparing Activity is using an authoring system already approved by the Acquiring Activity, this review concentrates only on the proper application of the system. If not, the review is to include a demonstration that the authoring system functions, as outlined in the Preparing Activity's TM QA program plan, are in working order and are being used to create the TM. The review should also address the acquisition and use of relevant source data in the authoring process.

4.2.28 Process 37.2: Assess Suitability of the Common Source Database (CSDB)

Action: During the initial IPR, the Preparing Activity supports the IPR in evaluating the suitability of the CSDB.

Explanation: The Preparing Activity authorizes, enables and supports the initial IPR to monitor and evaluate the use of the common source database (CSDB) for the creation of S1000D compliant TM data. If the Preparing Activity is using a CSDB already approved by the Acquiring Activity, this review concentrates only on the proper application of the CSDB. The review should include a demonstration that the functions of the CSDB, outlined in the Preparing Activity's TMQA program plan, are in working order and are being properly used to store and manage data modules and their related metadata, and that the CSDB supports identification, sharing and reuse of DMs.

4.2.29 Process 38: Address and Correct IPR Concerns

Action: The Preparing Activity satisfies concerns and corrects deficiencies identified during the IPR.

Explanation: The Acquiring Activity is responsible for recording all results, decisions, and findings during the IPR and providing a copy to the Preparing Activity. The Preparing Activity reviews deficiencies and concerns identified by the Government and either makes the necessary corrections or works with the Government to resolve all concerns and issues. All discrepancies and deficiencies must be corrected prior to the TM certification and acceptance.

4.2.30 Decision 39: Is Final IPR Complete?

Action: The Acquiring Activity determines if the just-completed IPR is the last one to be performed for this TM development.

Explanation: If the IPR just completed was not the last required IPR, TM development will proceed with continued development of draft DMs and PMs. If this were the last IPR, the Preparing Activity modular validation and Acquiring Activity modular verification of the DMs and PMs should be complete. The last IPR is intended primarily to ensure that all Acquiring Activity review comments and comments generated by the validation and verification have been resolved and properly incorporated within the TM product. Normally, the final IPR adds no new comments except those related to errors in incorporating previous review comments. After the last IPR, development activity proceeds with production of draft deliverables and final overall TM validation and verification.

4.2.31 Process 40: Develop and Compose Final Draft DMs, PMs, IETMs, and other Deliverables

Action: The Preparing Activity produces draft deliverables.

Explanation: The Preparing Activity should develop and compose the final draft DMs, and drafts of all required publication modules including hardcopy and IETMs and other deliverables. The draft DMs, PMs, IETM, DMRL, project BRs, and all other deliverables are to be prepared as specified by the TMCR/TMSR so that they can be reviewed to ensure all content has been produced to the depth and breadth detailed in the specified information sets and, for an IETM, that all functionality behaves as specified in the TMCR/TMSR.

4.2.32 Process 41: Preparing Activity Conducts Final Validation

Action: The Preparing Activity conducts final validation of the product.

Explanation: Validation is a Preparing Activity responsibility that is conducted in accordance with the TMQA Program Plan (and Validation Plan, when it is acquired) to ensure the overall accuracy and quality of the TM. The validation process itself should be performed by individuals who are of the same education, experience, and skill levels as the expected users of the manual. The Acquiring Activity has the right to review the validation process and should be notified of their schedule by the Preparing Activity before they begin. TM validation should check and ensure the following:

- all engineering technical reviews have been completed
- information reflects configuration of systems and equipment
- procedural instructions are readily understandable by target users and adequate to perform the intended functions
- data is adequate to support the approved maintenance and support plan
- proper hardware and configuration is used in the validation
- IETM functionality meets requirements
- IETM navigation is logical, manageable, and user friendly
- IETM descriptive, operation, maintenance, troubleshooting, and parts information is readily accessible from the table of contents
- IETM technical information (text, graphics, tables, etc.) appear in proper areas of display
- source files and data modules are properly tagged according to the proper schema or DTD

Validation of S1000D data at the data module level should occur throughout the TM development process. Draft DMs should be reviewed, validated, revised as necessary and validation indicated by the appropriate value of the <qa> element in the DM identification and status metadata. When all data modules have been developed and before final delivery of the TM and associated data, the Preparing Activity performs a final validation that all data has been reviewed and validated, all required DMs have been produced, all publication modules completed correctly, and the final complete IETM package is satisfactory and meets contract requirements.

4.2.33 Process 41.1: IETM Viewer Validation

Action: The Preparing Activity validates the IETM presentation system.

Explanation: The Preparing Activity should validate the IETM presentation system by demonstrating the functionality, navigation, and content sufficient to establish the IETM accuracy and capabilities and compatibility with the target Government systems and contractual requirements. The IETM presentation system includes the integration and interoperability of electronic display system (EDS) hardware, the IETM, and the presentation software. The validation should:

- demonstrate visibility and readability of content
- check that all data access links and branches are valid and operable
- ensure there are no open loops in fault isolation tasks
- ensure there is no unreferenced or inaccessible data
- demonstrate that required functionalities are operable

4.2.34 Process 42: Preparing Activity Submits Validation Certification

Action: Preparing Activity submits Validation Certification Document.

Explanation: The Preparing Activity prepares a validation certification attesting to the TM adequacy and accuracy. The Preparing Activity must certify that the TM delivered to the Government for verification has been validated, that all corrections have been made, and that all contract requirements have been met. The certification must list any exceptions, the document(s) authorizing the exceptions, and as applicable, the signature of Government witnesses present at the validation. Individual validation certification reports shall be prepared for each TM and delivered as specified in the contract.

4.2.35 Process 43: Compose Validated Deliverables and Deliver to Government

Action: The Preparing Activity delivers final validated deliverables.

Explanation: The Preparing Activity composes and delivers to the Government the final published DMs, and all required publication modules including hardcopy and IETMs, the final DMRL, final project business rules, and other deliverables. The DMs, PMs, IETM, and all other deliverables should be composed and published to the depth and breadth detailed in the specified information sets, all content should be sequentially arranged in the PM as specified in the PM list, and IETM functionality should present and behave as specified in the TMCR/TMSR.

4.2.36 Process 44: Government Conducts Verification

Action: Acquiring Activity performs product verification.

Explanation: Verification is the process by which TMs are tested and proved by the Acquiring Activity to satisfy contractual requirements and to be adequate for the operation and maintenance of equipment by operational units. Verification of new TMs is required by NAVSEAINST 4160.3. Verification (also known as second verification in S1000D), is performed under the jurisdiction of the Acquiring Activity after the Preparing Activity's validation process has been completed. It should be performed by Fleet or training personnel of the target user's level and in a facility of the same maintenance level as that covered by the TM. Verification is performed on the review draft copy or preliminary version of the data modules, publication modules and draft deliverable IETM after the Preparing Activity has completed its validation. The degree of verification depends on the scope and complexity of the TM product. The verification process must ensure the accuracy, adequacy, and appropriateness of the publishing format (grammar, style, spelling, layout presentation, structure), the digital data format (IETM functionality, navigation, linking), and the technical content. Technical content verification may be achieved through a desktop analysis, hands-on use of the TM on real equipment, or use of the TM in a system/equipment simulation. Verification must ensure that all parts (DMs, PMs, IETMs) of the product are complete, illustrations are correctly used and referenced, style and organization are consistent, content is written to proper reading grade level (RGL), and that the product conforms to the TMCR/TMSR. The identification and status section of every DM contains a <second verification> element to record the status of second verification for that DM. The following attributes are used to record the status and type of second verification performed:

- "onobject", used to indicate that the second verification was carried out at the Product
- "tabtop", used to indicate that the second verification was carried out on a desktop
- "ttandoo", used to indicate that the second verification was carried out at the Product and on a desktop

The Acquiring Activity should review and verify all data, record all discrepancies, and provide the discrepancy list to the Preparing Activity for resolution. The Preparing Activity, if required in the contract, may support the verification process by serving as verification recorder, preparing and maintaining records of changes associated with the verification, and assisting the Acquiring Activity in performing verification tasks.

4.2.37 Decision 45: Is Verification Satisfactory?

Action: The Acquiring Activity decides if the TM product verification is satisfactory.

Explanation: The Acquiring Activity decides if all TM products have been properly verified and that all previous discrepancies have been adequately corrected and addressed.

4.2.38 Process 45.1: Government Documents Deficiencies & Preparing Activity Corrects

Action: The Acquiring Activity documents deficiencies discovered during verification and the Preparing Activity corrects them.

Explanation: The Preparing Activity reviews the discrepancy records obtained from the Government Verification Process. The Preparing Activity must maintain records of its analyses of the verification comments and correct the TM discrepancies or otherwise resolve the issues.

4.2.39 Process 46: Preparing Activity Prepares and Submits TM Certification Sheet

Action: The Preparing Activity prepares and submits verification incorporation certification.

Explanation: Upon completion of all verification actions, the Preparing Activity shall certify that all discrepancies and deficiencies recorded during verification have been corrected or resolved. This TM Certification Sheet (Form 4160/8) should be scanned and included as an image in a front matter data module with an info code of 023B.

4.2.40 Process 47: Complete Load of Accepted DMs/PMs/IETMs/Graphics into NAVSEA Designated CMS

Action: The responsible activity loads TM development products into the designated content management system.

Explanation: S1000D data delivery from the Preparing Activity to the Government should comply with the data interchange requirements specified in the S1000D specification. The final delivery should consist of all data modules specified in the DMRL and all other deliverables required by the contract and TMCR/TMSR. The TMCR/TMSR should specify the content management system into which the TM products developed under this effort are to be loaded and also specify the activity responsible for performing that load. The activity may be the Preparing Activity, the Acquiring Activity, or other as specified in the TMCR/TMSR.

4.2.41 Process 48: Prepare TM Package for Distribution

Action: The responsible activity publishes the required suite of publication modules for final issue and prepares the IETM for distribution.

Explanation: The activity responsible for publication and distribution of the TM product (the Preparing Activity or the Acquiring Activity as specified in the contract) prepares the TM for final issue and distribution. The TM publication must conform to accepted and approved formats and presentation and viewing software to be acceptable for use ashore and on board ship. To ensure acceptability and certification for use, the TM products should be published in accordance with the standard Navy infrastructure for TM data. This is an approved, established, and supported infrastructure and process for publishing and distributing final product NAVSEA publications. This infrastructure includes the Common Source Database software necessary to support S1000D acquisition, authoring, development, and management, as well as, the publishing software to produce publication module products. S1000D application buyers and Preparing Activities employing software suites compliant with Navy infrastructure development and delivery requirements can be assured of expeditious and successful deployment of publication products.

4.3 S1000D IETM Product Numbering

For S1000D TM developments, only the fully aggregated publication module (IETM) that is distributed to end users is assigned a publication number. Assignment of Technical Manual Identification Numbers (TMINS) and National Stock Numbers (NSNs) shall conform to the guidelines and procedures outlined in S0005-AA-PRO-010/TMMP, NAVSEA Technical Manual Management Program Operations and Life Cycle Support Procedures.

5 S1000D TECHNICAL MANUAL DISTRIBUTION PHASE

The procedures and guidance for the distribution of S1000D technical manuals are those described in the Distribution section of S0005-AA-PRO-010/TMMP, NAVSEA Technical Manual Management Program Operations and Life Cycle Support Procedures.

6 S1000D TECHNICAL MANUAL DISPOSAL PHASE

The procedures and guidance for the disposal of S1000D technical manuals are those described in the Disposal section of S0005-AA-PRO-010/TMMP, NAVSEA Technical Manual Management Program Operations and Life Cycle Support Procedures.

Appendix A

List of Acronyms and Abbreviations

AIA:	Aerospace Industries Association of America
ASD:	AeroSpace and Defense Industries Association of Europe
ATA:	Air Transport Association of America
ATIS:	Advanced Technical Information Support
BR:	Business Rule
CCB:	Configuration Control Board
CDRL:	Contract Data Requirement List
CMS:	Content Management System
COR:	Contracting Officer Representative
COTS:	Commercial off-the-shelf
CPF:	Change Proposal Form
CSDB:	Common Source Database
CSTOM:	Combat System Technical Operations Manual
DADMS:	DON Application and Database Management System
DDN:	Data Dispatch Note
DID:	Data Item Description
DM:	Data Module
DMC:	Data Module Code
DMRL:	Data Module Requirements List
DoD:	Department of Defense
DON:	Department of the Navy
DTD:	Document Type Definition
EDS:	Electronic Display System
ESWBS:	Expanded Ship's Work Breakdown Structure
ETM:	Electronic Technical Manual
FAM:	Functional Area Manager
FDM:	Functional Data Manager
GFI:	Government Furnished Information
HM&E:	Hull, Mechanical, and Electrical
IC:	Information Code
ICV:	Information Code Varient
IETM:	Interactive Electronic Technical Manual
IETP:	Interactive Electronic Technical Publication
IPB:	Illustrated Parts Breakdown
IPR:	In-Process Review
IT-21:	Information Technology for the 21st Century
JS:	Joint Service

MI:	Model Identifier
MIC:	Model Identification Code
MICC:	Material Item Category Code
NAMSA:	NATO Maintenance and Supply Agency
NATO:	North American Treaty Organization
NAVSEA:	Naval Sea Systems Command
NETWARCOM:	Naval Network Warfare Command
NIAPS:	NAVSEA Integrated Application Product Suite
NLL:	Naval Logistics Library
NMCI:	Navy Marine Corps Intranet
NSDSA:	Naval Systems Data Support Activity
NSN:	National Stock Number
NSWC:	Naval Surface Warfare Center
OSB:	Operations Station Book
PDF:	Portable Document Format
PM:	Publication Module
PMC:	Publication Module Code
PPL:	Preferred Products List
QA:	Quality Assurance
RGL:	Reading Grade Level
SCORM:	Sharable Content Object Reference Model
SIB:	Ship Information Book
SGML:	Standard Generalized Markup Language
SMART-T:	Streamlined Modular Acquisition Requirements Tailoring Tool
SNIPP:	Standard NAVSEA Integrated Publishing Process
SNS:	Standard Numbering System
SOW:	Statement of Work
SPAWAR:	Space and Naval Warfare Systems Command
SYSCOM:	System Command
TAB:	Training Aid Booklet
TDMIS:	Technical Data Management Information System
TM:	Technical Manual
TMCR:	Technical Manual Contract Requirement
TMDER:	Technical Manual Deficiency/Evaluation Report
TMINS:	Technical Manual Identification Numbering System
TMMP:	Technical Manual Management Program
TMQA:	Technical Manual Quality Assurance
TMSR:	Technical Manual SEATASK Requirement
TRS:	Technical Repair Standard
USSMG:	U. S. S1000D Management Group
XML:	Extensible Markup Language

Appendix B

Definition of Terms

Authoring System: Computer software that assists one or more individuals in the creation of textual content for publications. Authoring systems usually guide the generation of content to conform to SGML and XML DTDs and schemas.

Business Rule (BR): An agreement among program managers and Preparing Activities on how to treat a decision point, or alternative, presented by the S1000D specification.

Change Proposal Form (CPF): Form to be used for the formal submission of proposed changes to the S1000D specification.

Common Source DataBase (CSDB): A database and related software designed to support the development of S1000D data and store, manage, update and retrieve the data modules, publication modules, and related metadata for an S1000D application.

Community of Practice: A group of people, activities, programs that share a common interest or common approaches to some action.

Content Management System (CMS): A computer system or collection of computer software designed to support the collaborative creation, review, approval and management of content for publications.

Data Dispatch Note (DDN): A text file, marked up with SGML or XML, that is usually the first file in an S1000D file transfer package, and that defines the sender, receiver, and content of the dispatch.

Data Module (DM): A self-contained unit of data for the description, operation, identification of parts or maintenance of the Product and its support equipment. The unit of data consists of an identification and status section and content section and is produced in such a form that it can be input into, and retrieved from, a database using the data module code as the identifier.

Data Module Code (DMC): A code identifying the type and the applicability of the data in a data module and enabling it to be input into, and retrieved from, a database.

Data Module Requirements List (DMRL): The list of data modules necessary to satisfy the content requirements of the S1000D technical manual.

Document Type Definition (DTD): A set of markup declarations that define the structure and/or content of a document type for SGML or XML markup.

First Verification: The term used within the S1000D specification for the process that the Navy has traditionally called "validation", performed by the developing/preparing activity.

Functionality Matrix: A list of required and/or optional features of IETMs that may be used to identify and define requirements for IETM performance in commonly accepted language that is widely understood by IETM developers and providers.

Guidance and Quality Planning Conference: A meeting of the TM requiring and preparing activities to review and clarify TM development requirements; a key element of the NAVSEA Technical Manual Management Plan

Identification and Status: The name of the metadata section of each S1000D data module; it contains identification and status information about the data module including title, data module code, security classification, originator, quality assurance status, etc., as specified in the S1000D Specification.

Information Code (IC): The fifth (together with information code variant) part of the data module code. The information code consists of three characters and identifies the type of information within a data module.

Information Code Variant (ICV): The fifth (together with information code) part of the data module code. The information code variant consists of one character used to identify any variation in the activity defined by the information code.

Information Set: The collection of required information of a certain scope and depth that is created in the form of data modules managed in a CSDB (common source database).

Info Set: A short form for information set.

Interactive Electronic Technical Manual (IETM): A set of information needed for the description, operation and maintenance of the product, optimally arranged and formatted for interactive screen presentation to the end user on an electronic display system. An IETM includes conditional branching mechanisms, which can be based on user feedback. Parameters are evaluated at run-time and their values can depend on context and specific user input.

Interactive Electronic Technical Publication (IETP): The term used in the S1000D specification for IETMs.

Issue: Term used by the S1000D specification to refer to official revisions and official new versions of the specification.

Linear TM: A serially structured document designed for sequential presentation either in a paper or electronic medium.

Material Item Category Code (MICC): An optional code at the beginning of standard numbering system numbers that identifies the standard numbering system being used.

Metadata: Data about data employed to support its management, discovery, use and reuse.

Model Identifier (MI): An alphanumeric descriptive name/code, identifying the product to which the S1000D TM data applies, consisting of at least 2 alphanumeric characters and up to a maximum of 14 alphanumeric characters. It is intended to assist in uniquely identifying the technical manual or associated project.

Model Identification Code (MI code): The first part of the data module code, which identifies the Product to which the data applies. The code is allocated by AECMA and is used to identify the Product.

NATO/National Stock Number (NSN): The unique identification of an item of supply by a number assigned by the national codification bureau to each approved item identification.

NAVSEA Information Sets: Information sets developed by NAVSEA and derived from the content requirements contained in MIL-DTL-24784 to ensure NAVSEA content depth and breadth requirements are met while developing technical manuals conforming to S1000D.

Nonlinear TM: A document consisting of packages of information content organized in a non-sequential fashion that are designed to be viewed and presented in a context sensitive order and in an electronic form.

Product: Any platform, system or equipment (air, sea, land vehicle, equipment or facilities, civil or military). The term product is used in the S1000D specification and in this guide to mean platforms, systems, subsystems, sub-subsystems, assemblies, equipment, components, parts, etc.

Publication: A generic term used to describe the presentation of a set of data modules, which have been arranged to make a publication, checklist, guide, catalogue, etc. on a particular subject, irrespective of the media of presentation (e.g., paper or screen). This can be an IETM, a paper publication compiled from DMs or a publication containing legacy data.

Publication Module (PM): A set of data modules which have been arranged to make a publication, such as a checklist, guide, catalogue, or other document, on a particular subject, irrespective of the media of presentation (e.g. paper or screen). The publication module defines the content and structure of the publication by references to data modules and other publication modules or legacy data.

Publication Module Code (PMC): The unique, standardized and structured identifier code of a publication module.

Quality Assurance: The systematic program or procedures established to monitor and evaluate the sufficiency and quality of a product development.

S1000D: *International Specification for Technical Publications Utilizing a Common Source Database S1000D*

S1000D Sea Working Group: A working group established by the U. S. S1000D Management Group (USSMG) to coordinate issues, changes and adjustments relating to U.S. maritime requirements for S1000D.

NAVSEA S1000D Tools Repository: A collection of guidance, business rules, common practice, information sets, information codes, quality assurance guidance, and related aids and tools to assist NAVSEA developers of S1000D TMs.

Schema: A set of markup declarations that define the structure and/or content of a document type that also has extensive capabilities for the treatment of data and data types.

Second Verification: The term used within the S1000D specification for the traditional verification process performed by the Government.

SCORM (Shareable Content Object Resource Model): A set of technical standards from the DoD Advanced Distributed Learning Initiative (ADL) for e-learning software products.

SGML (Standard Generalized Markup Language): An international standard (ISO 8879:1986 SGML) for the description of marked-up electronic text allowing for device and system independent methods for representing this text.

SNIPP (Standard NAVSEA Integrated Publishing Process): NAVSEA approved process and associated hardware and software infrastructure for the acquisition, development, maintenance, data storage, and distribution of NAVSEA TM source data and presentation.

Standard Numbering System (SNS): The third part of the data module code, consisting of three groups of characters, intended to provide standardization in the arrangement or addressing of the Product.

Technical Manual (TM): Document containing instructions for installation, operation, use, maintenance, support, parts lists, and associated training for equipment and systems.

Technical Manual Contract Requirement (TMCR): A definitive contractual document that provides complete content, format, and quality assurance requirements for the preparation and delivery of one or more TMs and TM management data items.

TMMP (Technical Manual Management Program): The collection of policies and responsibilities for the life cycle management and control of Naval Sea Systems Command technical manuals (NAVSEAINST 4160.3)

TMQA (Technical Manual Quality Assurance) Program: The set of procedures and processes established by the Acquiring and Preparing activities to ensure the development of quality technical manuals satisfying contractual requirements and meeting standards of reliability, readability, adequacy, completeness, usability and compatibility to user needs.

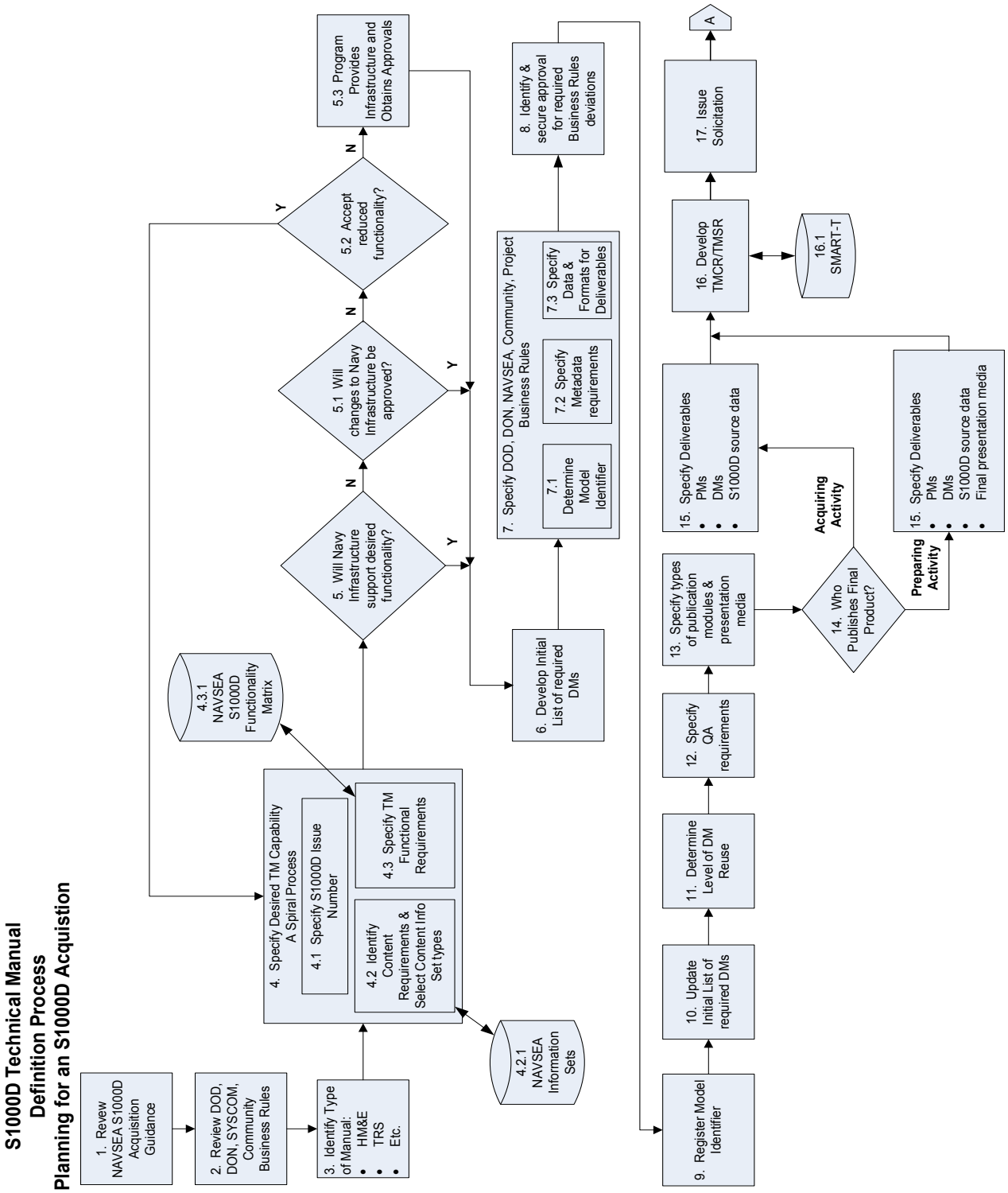
Validation: A Preparing Activity responsibility that is performed to ensure the overall accuracy and quality of the TM (identified as “first verification” within S1000D)

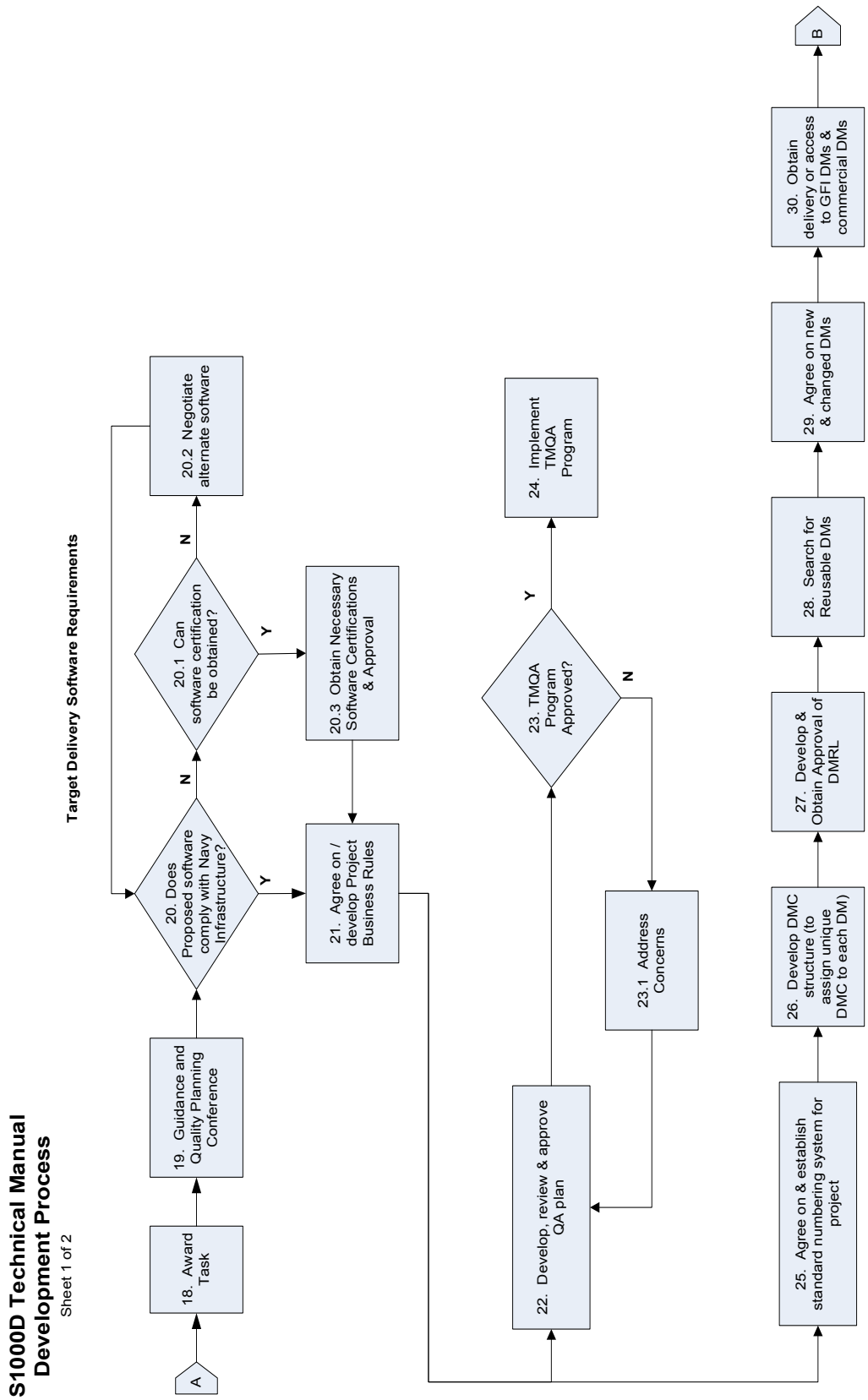
Verification: The process by which TMs are tested and proved by the Acquiring Activity to satisfy contractual requirements and to be adequate for the operation and maintenance of equipment by operational units (identified as “second verification” within S1000D)

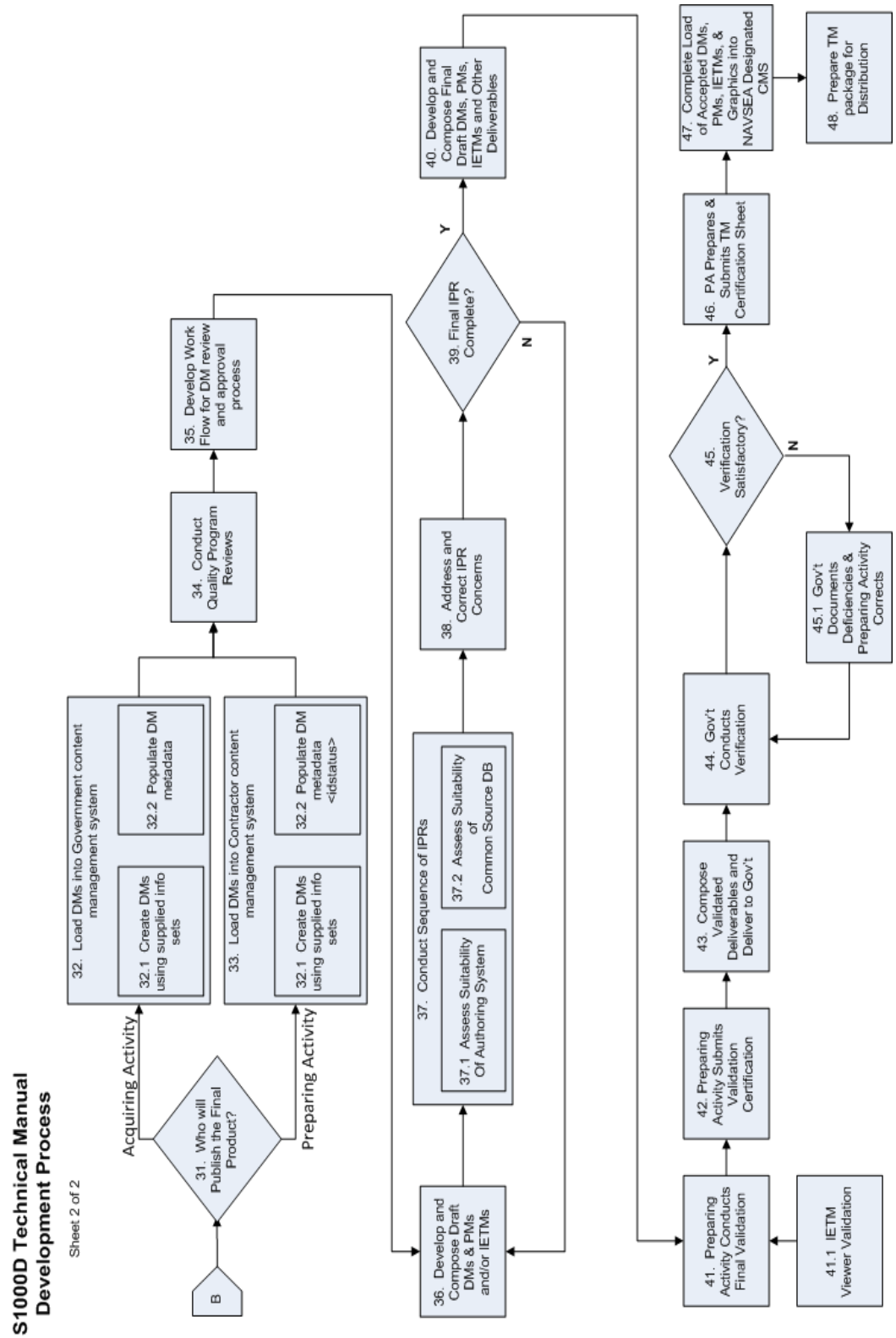
XML (Extensible Markup Language): A set of rules for encoding documents electronically conforming to the World Wide Web Consortium XML specification.

Appendix C

S1000D Acquisition Process Model


S1000D Technical Manual
Definition Process
Planning for an S1000D Acquistion
1. Revew NAVSEA S1000D Acquisition Guidance
2. Review DOD, DON, SYSCOM, Community Business Rules
3. Identify Type of Manual:
• HM&E
• TRS
• Etc.
4. Specify Desired TM Capability A Spiral Process
4.1 Specify S1000D Issue Number
4.2 Identify Content Requirements & Select Content Info Set types
4.3 Specify TM Functional Requirements
4.2.1 NAVSEA Information Sets
4.3.1 NAVSEA S1000D Functionality Matrix
5. Will Navy Infrastructure support desired functionality?
5.1 Will changes to Navy Infrastructure be approved?
5.2 Accept reduced functionality?
5.3 Program Provides Infrastructure and Obtains Approvals
Y
N
6. Develop Initial List of required DMs
7. Specify DOD, DON, NAVSEA, Community, Project Business Rules
7.1 Determine Model Identifier
7.2 Specify Metadata requirements
7.3 Specify Data & Formats for Deliverables
8. Identify & secure approval for required Business Rules deviations
9. Register Model Identifier
10. Update Initial List of required DMs
11. Determine Level of DM Reuse
12. Specify QA requirements
13. Specify types of publication modules & presentation media
14. Who Publishes Final Product?
Acquiring Activity
Preparing Activity
15. Specify Deliverables
• PMs
• DMs
• S1000D source data
16. Develop TMCR/TMSR
16.1 SMART-T
17. Issue Solicitation
A


S1000D Technical Manual
Development Process
Sheet 1 of 2
Target Delivery Software Requirements
A
18. Award Task
19. Guidance and Quality Planning Conference
20. Does Proposed software comply with Navy Infrastructure?
Y
N
20.1 Can software certification be obtained?
Y
N
20.2 Negotiate alternate software
20.3 Obtain Necessary Software Certifications & Approval
21. Agree on / develop Project Business Rules
22. Develop, review & approve QA plan
23. TMQA Program Approved?
Y
N
24. Implement TMQA Program
23.1 Address Concerns
25. Agree on & establish standard numbering system for project
26. Develop DMC structure (to assign unique DMC to each DM)
27. Develop & Obtain Approval of DMRL
28. Search for Reusable DMs
29. Agree on new & changed DMs
30. Obtain delivery or access to GFI DMs & commercial DMs
B


S1000D Technical Manual
Development Process
Sheet 2 of 2
B
31. Who will Publish the Final Product?
Acquiring Activity
Preparing Activity
32. Load DMs into Government content management system
32.1 Create DMs using supplied info sets
32.2 Populate DM metadata
33. Load DMs into Contractor content management system
32.1 Create DMs using supplied info sets
32.2 Populate DM metadata <idstatus>
34. Conduct Quality Program Reviews
35. Develop Work Flow for DM review and approval process
36. Develop and Compose Draft DMs & PMs and/or IETMs
37. Conduct Sequence of IPRs
37.1 Assess Suitability Of Authoring System
37.2 Assess Suitability of Common Source DB
38. Address and Correct IPR Concerns
39. Final IPR Complete?
Y
N
40. Develop and Compose Final Draft DMs, PMs, IETMs and Other Deliverables
41. Preparing Activity Conducts Final Validation
41.1 IETM Viewer Validation
42. Preparing Activity Submits Validation Certification
43. Compose Validated Deliverables and Deliver to Gov't
44. Gov't Conducts Verification
45. Verification Satisfactory?
Y
N
45.1 Gov't Documents Deficiencies & Preparing Activity Corrects
46. PA Prepares & Submits TM Certification Sheet
47. Complete Load of Accepted DMs, PMs, IETMs, & Graphics into NAVSEA Designated CMS
48. Prepare TM package for Distribution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