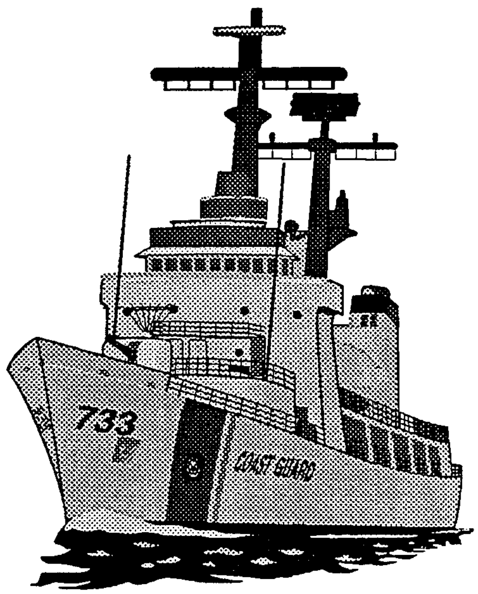
Fleet Logistics System

Data Administration Plans and Procedures Manual



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13. ABSTRACT
This manual provides data administration (DA) procedures for developers and maintainers of Coast Guard fleet logistics information systems. Fleet logistics includes a community of supply, logistics, maintenance, and shipboard functions. The information for these functions form a cross-functional system that supports the organizational processes of several functional divisions, in accordance with Coast Guard information resource management policy. This approach is based on Coast Guard data administration practice, with refinement required for sharing data with other Government agencies and private-sector supplier organizations. The manual provides procedures, formats, and planning guidelines for information system developers and maintainers, users of standard data, data stewards, and data administration staff.

The DAPAP manual provides a process for development and integration of logical data models, data element standardization, sharing of legacy data by mapping or migration, functional requirements for a metadata repository, data quality criteria, a data stewardship program, a summary of DA-related roles and responsibilities, and relationship to the Coast Guard Data Administration Dictionary System (DADS). Appendices include a summary of information systems concepts, a class word list, data element attribute descriptions, forms, and a glossary.

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METRIC/ENGLISH CONVERSION FACTORS

ENGLISH TO METRIC

LENGTH (APPROXIMATE)

1 inch (in)	= 2.5 centimeters (cm)
1 foot (ft)	= 30 centimeters (cm)
1 yard (yd)	= 0.9 meter (m)
1 mile (mi)	= 1.6 kilometers (km)

AREA (APPROXIMATE)

1 square inch (sq in, in^2)	= 6.5 square centimeters (cm^2)
1 square foot (sq ft, ft^2)	= 0.09 square meter (m^2)
1 square yard (sq yd, yd^2)	= 0.8 square meter (m^2)
1 square mile (sq mi, mi^2)	= 2.6 square kilometers (km^2)
1 acre = 0.4 hectare (he)	= 4,000 square meters (m^2)

MASS - WEIGHT (APPROXIMATE)

1 ounce (oz)	= 28 grams (gm)
1 pound (lb)	= 0.45 kilogram (kg)
1 short ton = 2,000 pounds (lb)	= 0.9 tonne (t)

VOLUME (APPROXIMATE)

1 teaspoon (tsp)	= 5 milliliters (ml)
1 tablespoon (tbsp)	= 15 milliliters (ml)
1 fluid ounce (fl oz)	= 30 milliliters (ml)
1 cup (c)	= 0.24 liter (l)
1 pint (pt)	= 0.47 liter (l)
1 quart (qt)	= 0.96 liter (l)
1 gallon (gal)	= 3.8 liters (l)
1 cubic foot (cu ft, ft^3)	= 0.03 cubic meter (m^3)
1 cubic yard (cu yd, yd^3)	= 0.76 cubic meter (m^3)

TEMPERATURE (EXACT)

[(x-32)(5/9)] °F = y °C

METRIC TO ENGLISH

LENGTH (APPROXIMATE)

1 millimeter (mm)	= 0.04 inch (in)
1 centimeter (cm)	= 0.4 inch (in)
1 meter (m)	= 3.3 feet (ft)
1 meter (m)	= 1.1 yards (yd)
1 kilometer (k)	= 0.6 mile (mi)

AREA (APPROXIMATE)

1 square centimeter (cm^2)	= 0.16 square inch (sq in, in^2)
1 square meter (m^2)	= 1.2 square yards (sq yd, yd^2)
1 square kilometer (km^2)	= 0.4 square mile (sq mi, mi^2)
10,000 square meters (m^2)	= 1 hectare (he) = 2.5 acres

MASS - WEIGHT (APPROXIMATE)

1 gram (gm)	= 0.036 ounce (oz)
1 kilogram (kg)	= 2.2 pounds (lb)
1 tonne (t) = 1,000 kilograms (kg)	= 1.1 short tons

VOLUME (APPROXIMATE)

1 milliliter (ml)	= 0.03 fluid ounce (fl oz)
1 liter (l)	= 2.1 pints (pt)
1 liter (l)	= 1.06 quarts (qt)
1 liter (l)	= 0.26 gallon (gal)
1 cubic meter (m^3)	= 36 cubic feet (cu ft, ft^3)
1 cubic meter (m^3)	= 1.3 cubic yards (cu yd, yd^3)

TEMPERATURE (EXACT)

[(9/5) y + 32] °C = x °F

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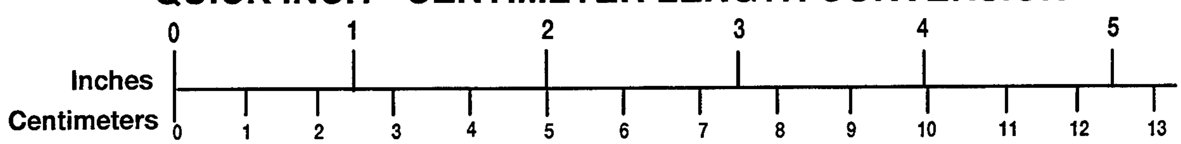

QUICK FAHRENHEIT - CELSIUS TEMPERATURE CONVERSION

°F	-40°	-22°	-4°	14°	32°	50°	68°	86°	104°	122°	140°	158°	176°	194°	212°
°C	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°

For more exact and or other conversion factors, see NBS Miscellaneous Publication 286, Units of Weights and Measures. Price $2.50 SD Catalog No. C13 10286

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SECTION 1

INTRODUCTION

1.1. Overview

Foreword

This section presents the purpose, scope, and context of the Coast Guard (CG) fleet logistics Data Administration Plans and Procedures (DAPAP) manual. This document is written for:

- Information system developers and maintainers (i.e., those responsible for maintaining current systems and creating new ones)
- Administrators and users of information systems that create and/or use logistics information, including users who write SQL-based inquiries and reports
- Program managers, planners, and system acquisition personnel
- Data administrators and data stewards who develop data standards for developers and users.

This manual is necessary because the CG is developing and maintaining fleet logistics information systems that share data with other organizations. To accomplish this level of data sharing, a consistent set of data standards, guidelines, and processes is necessary to ensure reliable, efficient, and high-quality data sharing inside and outside the CG. This approach supports the CG's data element standardization initiative while at the same time it enables fleet logistics information systems to share data with customers and suppliers outside the CG. The primary benefit of this initiative is to provide a more complete, reliable, timely, and accessible information resource to all CG personnel who use fleet logistics information.

In this Section

This section contains information on the following topics:

Topic	Section
Purpose of This Document	1.1
Scope	1.2
Background	1.3
Related Documents	1.4
Organization of This Document	1.5

1.2. Purpose

Introduction

This manual provides uniform guidance for the implementation of data administration within standard fleet logistics information systems. This manual implements CG information resource management (IRM) standards, other Government agency and industry standards, and information systems engineering principles. Its orientation is not to teach information systems engineering, but rather to provide achievable processes that permit CG information systems users to share information reliably and efficiently.

Document Objectives

This manual describes a proactive data administration (DA) program for Coast Guard fleet logistics information systems. The fleet logistics DA program is described in **Section 2**. This DA program provides significant benefits to information system developers, to the users of the information in these systems, and to the efficient operation of the CG. To implement the fleet logistics DA program, this manual has the following objectives:

1. Describe a system of guidelines and business processes which, when implemented, will ensure efficient sharing of consistent data among the systems that have been designed to meet this data interchange requirement.
2. Provide definitions and concept summaries that explain the guidelines and process
3. Provide guidance and direction for logistics data administration and its customers.
4. Allocate roles, responsibilities and relationships among fleet logistics data administration, logistics functional organizations, and systems development groups.
5. Set a standard for multi-enterprise data sharing that meets CG, other Government agency, and industry standards, and anticipates the increasing demand for wider sharing of information resources.
6. Provide a basis for planning and managing the development of coordinated, standard information systems.
7. Serve as the operational framework and guidance for implementing detailed Fleet Logistics data administration procedures.
8. Describe what fleet logistics data administration is doing to support fleet logistics functions, while responding to CG data administration standards and IRM policy.

1.3. Scope

The Fleet Logistics Enterprise

The enterprise currently covered by this manual is CG fleet logistics operations. Use of the term “enterprise” in this manual refers exclusively to the fleet logistics enterprise, not the corporate CG enterprise as a whole.

A data administration program is implemented for an enterprise, that is, an identifiable organization that works together to accomplish a mission. The scope of the enterprise is likely to evolve over time as the requirement and opportunity for information sharing increases.

Fleet logistics is not a single CG organization, but is a collection of supply, maintenance, and shipboard configuration management functions that have created a community of interest across several organizations. The use of this generic term is meant to emphasize the critical nature of the information shared by fleet logistics functions.

Because the scope of the enterprise is likely to expand, planners, information system architects, and data stewards are encouraged to look beyond the fleet logistics enterprise, to design-in compatibility with other CG, other Government agency, and industry information systems. Refer to “Evolution of the Enterprise” later in this section.

Data Administration

Data administration (DA) performs “the management of information describing the data, functions, operations, and structure of both manual and automatic data processing systems and databases...throughout the information systems life cycle.” [NIST Special Pub 500-173].

DOD 8320.1 describes DA as "... procedures, guidelines, and methods for effective data planning, analysis, standards, modeling, configuration management, storage, retrieval, protection, validation, and documentation."

This DA program includes a data modeling and data element definition process, data administrators, data stewards, a tailored set of standards and guidelines, and a repository. **Section 2** describes the components of the program. The DA program depends on participation by various CG communities, including acquisition, mission area management, information system users, and system developers, maintainers, and administrators.

Continued on next page

1.3. Scope, Continued

Fleet Logistics Data Administration

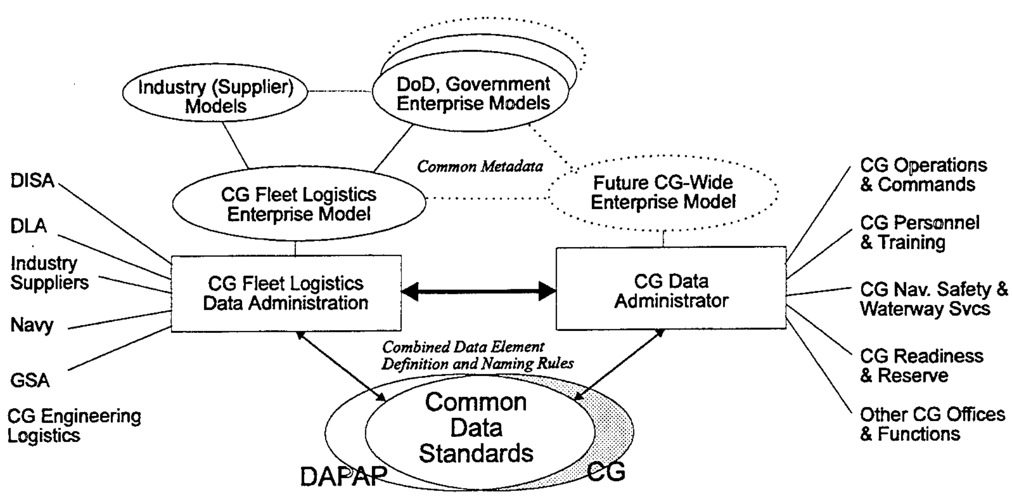
Fleet logistics data administration (DA) is responsible for overseeing the management of logistics data across fleet logistics functions and for overall information planning and control. This manual brings together into a single document the responsibilities for logistics data otherwise identified in data administration procedures, functional process improvement procedures, logistics business plans, and other fleet logistics planning documents.

The fleet logistics data administration program covers the following areas of responsibility with respect to fleet logistics information system.

1. Data used by CG Engineering Logistics and fleet supply and maintenance personnel, and data used by cutter personnel for shipboard configuration management
2. Technical development, including strategic data planning, information management, data definition, interface design, and database design for fleet logistics information systems
3. All functions not otherwise assigned that affect data quality, integrity, or security for information processed by or shared between fleet logistics information systems.

Figure 1-1 shows the current relationship between the fleet logistics DA program and the CG DA program. It also shows the process for evolution of fleet logistics (and other division-level enterprises) into a unified CG enterprise.

Coordination of Fleet Logistics and CG Data Standards



Premise: Fleet logistics shares more data with DoD agencies and industry suppliers than it does with CG organizations. This ratio will change as the CG enterprise shares more data.

Figure 1-1. Relationship of Fleet Logistics and Coast Guard DA

Continued on next page

1.3. Scope, Continued

Evolution of the Enterprise

The fleet logistics DA program must support data exchange with a variety of Government agencies outside the Coast Guard. Today, the subset of DoD and Coast Guard metadata standards that permits dual compliance must guide the DAPAP instructions to fleet logistics information system developers. In the future, we anticipate that a DoD-wide, and later a Government-wide enterprise model and metadata standard will develop. Then, the dual compliance standard will become unnecessary because the Coast Guard's metadata standard will evolve to meet the Government-wide standard. So, efforts both at the fleet logistics enterprise level and the Coast Guard level that move toward Government-wide information interchange are strategically appropriate.

Areas Addressed

This guidance document addresses, in addition to DA operational services, program management, strategic data and resource planning, business process improvement, and technical infrastructure provisioning.

Parts of the DA Program

A coordinated set of data administration processes includes an enterprise data repository, an evolving enterprise data model, data stewardship program, data modeling standards, strategic data planning, and an outreach and technical support function. This manual describes this set of DA processes. Clearly, all processes will not be fully funded and operational at the outset. This manual provides a basis for a master plan that, if followed, will result in an efficient and effective DA program, benefitting the fleet logistics community and ultimately the corporate Coast Guard enterprise.

The CG is implementing a proactive information resource management program through a series of Commandant's Instructions. COMDTINST 5230.41, *Information Resource Management,* provides policy and direction for the initiative. COMDTINST 5231.2, *Planning Approval for Automated Information Systems,* sets a process for initiating an information system development program. COMDTINST 5230.42 is as a standard for naming and defining data elements.

Other standards are in development, at the CG or logistics level. Other Government and industry standards provide companion standards to complete the set of guidance. These standards include process and data modeling, configuration management of metadata (including the process for submitting and reviewing new and updated models and data element definitions), strategic data planning, criteria for acceptance of application systems for data sharing, coordination of metadata with other government agencies, a data stewardship program, operation of a Coast Guard metadata repository, and a program of outreach (education, tools support, and enforcement).

Continued on next page

1.3. Scope, Continued

Benefits of an Effective DA Program

As the fleet logistics data administration program evolves, it will provide the following benefits to the Coast Guard:

- Reduce data conversion and system incompatibility expenses.
- Make transparent data sharing possible, providing benefits of coordination, analysis, rapid update, decision support.
- Increase the availability of valid, current data to authorized users and application systems.
- Reduce duplication of similar data across systems, thereby improving data quality and reducing storage costs.
- Reduce time to develop new applications by reducing the extent of analysis needed for specific systems and providing precise requirements for new application work.
- Focus staff attention on improving business processes and information flow.
- De-mystify system development and return control of data definitions and responsibility for data quality to the primary user communities.

Continued on next page

1.3. Scope, Continued

Success Factors for Data Administration

For the fleet logistics data administration program to provide the intended benefits, the DA program must achieve the following characteristics:

- The fleet logistics DA program must provide more value to the user and developer communities than the cost incurred for data standards compliance.
- The DA process must not be seen as a bottleneck to information system development.
- Information system developers must work toward the goal of an enterprise-wide data resource by commitment to compatibility, diligent strategic data planning, reliance on the enterprise data model, minimizing application-unique definitions, and proper and early preparation of design documents, deliverable data models, and change requests.
- The DA program must enable and support data stewards and empower user communities.
- Keepers of the enterprise data model must keep enterprise metadata at a high level, so the next application (to be standardized) will be accommodated without significant re-defining of standard entities or data elements.
- The DA program will enable (through initial and ongoing education and technical support) developers to use DA processes and metadata and to develop standard information systems.
- The DA program will provide timely and accurate assessments of the effect of proposed metadata changes on current standard systems and interfaces.
- CG divisions, programs, and mission areas must participate by providing experienced and authoritative data stewards, identifying specialized subject matter experts, and including the work of data definition and process modeling as part of their respective process improvement programs
- CG Senior managers and program managers must ensure that data administrators participate in all strategic data planning, process improvement, and information sharing initiatives.
- Only information systems that follow the enterprise data standard or whose data has been certified (by DA) to be compatible with the standard will be allowed to share data with systems that do meet the standard.

Continued on next page

1.3. Scope, Continued

Applicability

The Fleet Logistics Data Administration Plans and Procedures (DAPAP) manual applies to:

1. All *business data* processed by CG fleet logistics information systems, regardless of application. They also address the functions related to the identification, specification, capture, storage, transformation, distribution, utilization, modification, and retirement of data.

2. Fleet logistics data administration *operational services*: data modeling, data element standardization, data security (designation of access), data quality, database administration, data configuration management, and data collection, synchronization, and distribution.

3. Fleet logistics *processes*, information systems, and data (including data elements, codes, and values), and the business rules for generating and modifying data.

4. Logistics *near-term initiatives, migration systems, and legacy systems,* and their data models, databases, files, records, and data elements, throughout their life-cycles. Legacy systems need not conform to the guidance in this document until the legacy system is also a designated migration system or unless the data associated with the legacy system is the only data supporting a logistics area, which makes the data elements migration data elements by default.

1.4. Background

Introduction

This subsection describes the context for the fleet logistics DA program.

Data Sharing with Other Agencies

A significant portion of fleet logistics data sharing occurs with other Government agencies, especially Defense Logistics Agency, General Services Administration, and the Department of the Navy. Therefore, fleet logistics applications must store data in a format and with definitions that are compatible with Department of Defense (DoD) and other Government and industry data standards.

CG DA Initiatives

Coast Guard data administration is evolving toward an enterprise information resource management capability. This capability is part of the Coast Guard's Information Systems Technology Architecture, as described in COMDTINST 5230.45. The Coast Guard Data Administrator (G-TTC-3) is working to improve the CG-wide information resource as more Coast Guard organizations begin to utilize enterprise-wide data sharing. This role of proactive data administration is key to achieving those advantages.

The CG data administration program is currently collecting, describing, and coordinating data elements and evaluating data models to develop a descriptive and supportive enterprise data model and data encyclopedia. The data encyclopedia will meet requirements of an Information Resource Dictionary System (IRDS, FIPS PUB 151). COMDTINST 5230.45 states the intention for Coast Guard information systems to become standards-driven rather than hardware-dependent. To achieve this open architecture and application portability, this Instruction cites seven types of services, one of which is data management services. Structured Query Language (SQL) is cited as the "long-term standard for common access to data bases." The intention is clear to provide data sharing "among disparate, large heterogeneous and distributed databases." For SQL queries and reports across systems to be possible or useful, the data in those systems must be defined consistently and compatibly. Effective and proactive data administration and metadata standards is critical to the success of the goal of open data sharing.

Continued on next page

1.4. Background, Continued

Data Sharing through Standards

The most reliable means to ensure that data elements from different systems truly describe the same information is to obtain the name and definition (for both systems) from an authoritative enterprise data model and metadata repository. The fleet logistics metadata repository is described in **Section 6.** Ensuring that the model, the entities, and the data element definitions describe the real-world information is the responsibility of analysts, information system engineers, data administrators, and data stewards.

Even in non-automated processes, different CG commands, each ship, and the two coasts have developed subtle differences in how they define seemingly clear terms. The nautical axiom, "different ships, different splices" cannot be condoned in data administration or system integration. Reliance on aliasing and data mapping to reconcile data from unlike systems is time-consuming, and results in commingling of data values that may be significantly dissimilar in denotative meaning, level of detail, or specificity. Combined data from these unlike systems may thereby cloud the data quality of the rolled-up report or query.

To avoid the problem altogether, data stewards and subject matter experts must determine the best sharable name, attributes, and domain for each standard data element, and then system developers must use this metadata to build integrated, standard systems. Then the data values can be shared, reliably and without further analysis, across all standard systems. The key criterion is whether the values from all standard systems using a given standard data element can be shared and combined freely.

Transparent Data Sharing

The DA program establishes a common architecture from which shareable database and application systems can be developed. By "shareable" data we mean data stored in an information system that can be transferred or accessed by another, separately developed information system transparently, that is, without analysis, interpretation, mapping, or conversion, while maintaining data quality. Transparent sharing of data requires that both systems have been designed and built using the same (standard) logical data model, data element names, and data element definitions. A consistent and proactive data administration program ensures that the information collected and stored in all standard fleet logistics information systems will be shareable within the Coast Guard, with other Government agencies, and with suppliers and customers as needed.

Continued on next page

1.4. Background, Continued

Strategic Data Planning

Information systems work together when they are founded on a common corporate data model, and when they use the standard definitions in preference to local, independently-developed variations. Strategic data planning advocates separation of data from the applications that create and process the data, establishment of subject area databases, and agreement on validated standard metadata definitions. In most approaches, proactive data administration starts with strategic data planning.

Strategic data planning recognizes the enterprise's data as a resource that is separate from the enterprise's organizations, functions, locations, or software systems. In addition, the strategic planners estimate the scope of the corporate data resource thirty years or more into the future, and attempt to predict which other organizations will be included in data-sharing arrangements. These decisions must be made or endorsed by the enterprise's senior management and major stakeholders.

Enterprise Data Model

Often a strategic data plan is built upon an enterprise data model, which describes the categories of information (entities) and the relationships of that information, as it is used throughout the enterprise. Experts in the enterprise's various categories of information provide complete and professional definitions, attributes, and domains for the data elements under their stewardship. When the enterprise data model is implemented with data element detail (the attributed data model), then designers of individual systems can select from the central standard (the enterprise data encyclopedia) the definitions they need to build their respective application data models and physical databases.

Application Design from Enterprise Model

As the application designers select standard data elements that meet their respective systems' requirements, they may find a few data items that are not yet included in the enterprise data encyclopedia. At that point, the designer must prepare a request for a new or modified data element definition, and submit it for review and disposition by the data administrator and the appropriate data stewards. That is the point where an application developer would use the Instruction (and in fleet logistics applications, the DAPAP manual) to create and submit a standard data element name and definition.

Continued on next page

1.4. Background, Continued

Incentives for Standard Systems

The DA program must provide incentives that will ensure compliance with DA processes. Leadership toward the goal of transparent data sharing must come from each command, division, and program. To provide the benefits of transparent data sharing, a set of incentives such as the following must be implemented:

- Submitters of metadata change requests must demonstrate that the requested data element (or modification) does not currently exist in the fleet logistics metadata repository.
- Submitter must show that the candidate data element will be used in a system that utilizes a subset of the fleet logistics enterprise data model.
- Candidate data elements will be reviewed by the appropriate CG or other subject matter expert as part of the data stewardship program. The definition, attributes, and name, as returned by the data steward, will be complete, conform to applicable regulations, and will ensure that the data values will be shareable among the widest possible range of organizations and systems.
- Candidate data elements and other metadata change requests must be reviewed by someone (contractor or Federal employee) who is responsible for the technical quality of metadata submittals.
- Only systems whose logical data model and attributed data model are subsets of the fleet logistics enterprise data model will be certified as standard fleet logistics information systems.
- Only standard CG information systems are eligible to read and contribute data online to and from the fleet logistics corporate information resource; all others must request and submit data in batch mode on magnetic media, for filtering and conversion.

Clearly, some of these measures are inter-dependent, so that the whole enforcement and incentive system works to encourage design of standard systems.

Continued on next page

1.4. Background, Continued

Key Roles of CM and Data Stewardship

Whether fleet logistics DA builds an enterprise data model (top-down) or collects and catalogs standard data elements (bottom-up), the metadata will change over time. As a dictionary of standard data elements or as an integrated data model, configuration management must be an active part of the data administration program. As current isolated systems are upgraded, most will find an advantage in sharing information with other systems and organizations, and so will seek to standardize their metadata. As each system submits metadata, many of the initial standard definitions will require rethinking to accommodate the wider perspective.

An effective data stewardship program will minimize repeated revision of data element definitions by providing authoritative and independent review. This ongoing process of informed review, assessment of impact of changes, coordination with other organizations, and correction of discrepancies will require proactive configuration management and data stewardship efforts that are integrated with administration of metadata standards.

Configuration management (CM) will provide a central version control and release point for software and metadata. Version numbers assigned by CM provide the link between versions of application software and the data definitions associated with each system.

1.5. Related Documents

Introduction

The fleet logistics DAPAP provides a set of processes and standards that meet CG and other agency data administration standards. The following references were used in preparation of this manual.

Coast Guard Documents

COMDTINST 5224.8, *Coast Guard Total Quality Management (TQM) Organizational Structure and Training Strategy*

COMDTINST 5230.41, *Information Resource Management*

COMDTINST 5230.42, *Data Element Naming Standards*

COMDTINST 5230.44, *Annual Coast Guard Information Resources Management (IRM) Plan*

COMDTINST 5230.45, *Information Systems Technology Architecture*

COMDTINST 5231.2, *Planning Approval for Automated Information Systems (AIS)*

COMDTINST 5500.13, *Automated Information System (AIS) Security*

COMDTINST 5510.21, *Information Security Program*

Other Government Standards

Defense Information Systems Agency, *Technical Reference Model for Information Management*, Version 1.2, May, 1992

DOD 8320.1 (1991), *DoD Data Administration*

DOD 8320.1-M-1 (5/92), *Standard Data Element Development and Maintenance Procedures*

FIPS PUB-156, rev. 5/89 (ANSI X.3.138-1988), *Information Resource Dictionary System (IRDS)*

MIL-STD-498 (5 December 1994), *Software Development and Documentation*

NIST Special Publication 500-173 (October 1989), *Guide to Data Administration*

NIST Special Publication 500-208 (March 1993), *Manual for Data Administration*

OMB Circular A-130 (Revised 1994), *Management of Federal Information Resources*

Continued on next page

1.5. Related Documents, Continued

Other Publications

ANSI/IEEE Std 1016-1987, *Recommended Practice for Software Design Descriptions*

ANSI/IEEE Std 1074-1991, *Standard for Developing Software Life Cycle Processes*

ANSI/IEEE Std 1209-1993, *Recommended Practice for the Evaluation and Selection of CASE Tools*

Bracket, Michael H., *Data Sharing: Using a Common Data Architecture;* New York: John Wiley & Sons, 1994

Ganti, Narsim, and William Brayman, *The Transition of Legacy Systems to a Distributed Architecture,* New York: John Wiley & Sons, Inc., 1995

King, Judy, *Evaluating Database Management Systems;* New York: Van Nostrand Reinhold Co., 1981

Martin, James, *Information Engineering;* Englewood Cliffs: Prentice Hall, 1989

Martin, James, and Joe Leben, *Strategic Information Planning Methodologies;* Englewood Cliffs: Prentice Hall, 1989

Redman, Thomas C., *Data Quality: Management and Technology;* New York: Bantam Books, 1993

Von Halle, Barbara, and David Kull (ed.), *Handbook of Data Management;* Boston: Auerbach Publications, 1993

1.6. Organization of this Manual

Introduction

This document is made up of 12 sections plus appendices, and is organized for easy reference and maintenance. The figure on the next page illustrates this organization and the relationships between the sections.

Section Contents

The following table describes the content of each section.

Section	Section Title	Description
1	Introduction	Describes the purpose, scope, applicability, and content of the manual.
2	Fleet Logistics Data Administration Program	States the goals, objectives, and structure of the Fleet Logistics data administration program.
3	Support Development and Integration of Data Models	Shows how to integrate application data models into an enterprise logical data model, the foundation for effective information sharing.
4	Standardize Data Elements	Provides a consistent process for defining and naming data elements, and a process for submitting, reviewing, and modifying DE names and definitions.
5	Share Data by Mapping and Migration	Shows how to share data between fleet logistics standard systems and other nonstandard systems without compromising data quality.
6	Maintain Metadata Repository	Provides the operating concept for a repository. These general principles will be completed later when a repository tool and system are selected.
7	Control Changes to Metadata	Provides a process for DA to collect and analyze other (legacy, other organization) metadata for planning and consistency purposes.

Continued on next page

1.6. Organization of this Manual, Continued

Section Contents (continued)

8	Ensure Data Quality	Shows how proactive design and definition can ensure the quality of data values.
9	Implement Data Stewardship	Returns control of data definition to the users by providing a system of subject matter experts and data stewards for all information classes.
10	Roles, Responsibilities & Relationships	Describes the functions that are performed, identifies who must perform them, enumerates the responsibilities of the various roles, and describes the relationships between roles.
11	Data Life Cycle Methodologies`	Describes the evolution of data components through their life cycle as presented in the Fleet Logistics Life Cycle Methodology and describes the support provided by the technical infrastructure for the program.
12	Data Administration Dictionary System	Summarizes the functions of the CG data encyclopedia (DADS).
Apx A	Information Systems Concepts for DA	Provides an introduction to the terms and concepts used in this manual.
Apx B	Class Word Descriptions	Lists and defines the authorized fleet logistics class words.
Apx C	Data Element Attribute Descriptions	Explains the attributes to be tracked for each standard data element.
Apx D	Forms	Contains forms required for or beneficial to execution of procedures in Section 3 - 11
Apx E	Glossary	Provides definitions for data administration terms and abbreviations.

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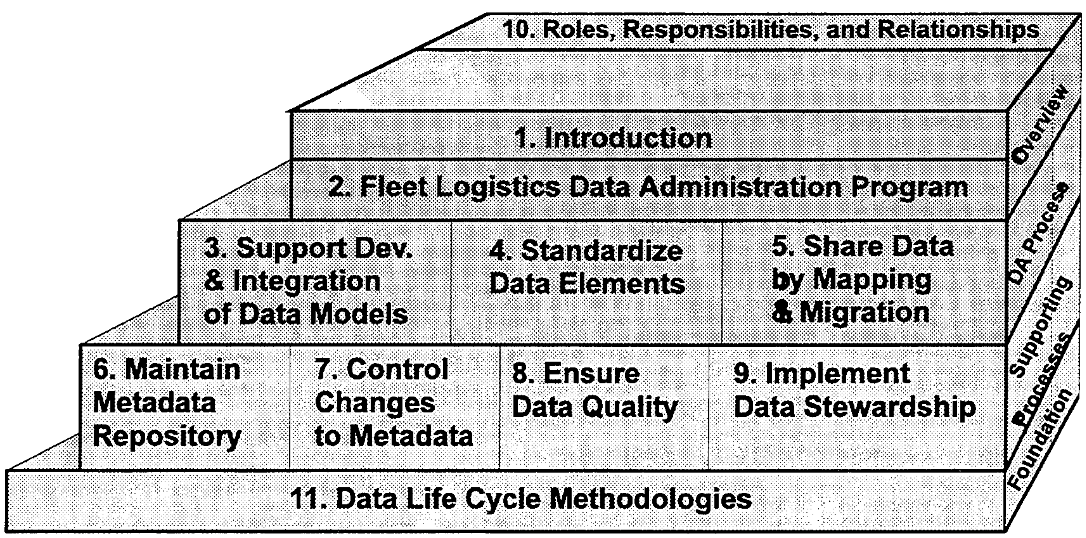
1.6. Organization of this Manual, Continued



Functional Relationship of the Sections

The DAPAP sections fall into the following general categories:

- DA program overview
- DA central processes
- Supporting DA processes
- System development foundation

Figure 1-2 shows the relationship of the manual's sections to these categories. The DA function supports the life cycle of new and upgraded information systems. Four supporting processes include the metadata repository, the change control process, data quality criteria, and the stewardship program. DA has three primary processes, which are data modeling, data element standardization, and reconciling legacy data with the fleet logistics standard. The first two sections summarize the DA program. Each section allocates responsibilities for the processes described, and Section 10 compiles those responsibilities for easier reference. The appendices provide tutorial information, a glossary, worksheets and forms, and other reference material.

Figure 1-3 shows the sections recommended for initial reading by segments of the intended readership.

Figure 1-2. Visual Table of Contents

Continued on next page

1.6. Organization of this Manual, Continued

Reader Guidance

The following table suggests which DAPAP sections would be most useful to the reader who has specific purposes or responsibilities.

DAPAP Reader Information Guidance

DAPAP Section:	IS Program Management	Mission Area Management	Application Users	Data Administrators	Data Stewards, SMEs	Database & System Administrators	Security Analysts	System Integrator	Other
1. Introduction	✓	✓	✓	✓	✓	✓	✓	✓	✓
2. DA Program	✓	✓	✓	✓	✓	✓			✓
3. Data Models	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. Std. Data Elements	✓			✓	✓	✓		✓	✓
5. Share Data (Map & Migrate)	✓		✓	✓	✓	✓	✓	✓	✓
6. Metadata Repository				✓	✓			✓	✓
7. Change Control		✓	✓	✓	✓		✓	✓	✓
8. Data Quality	✓	✓	✓	✓	✓	✓	✓	✓	✓
9. Data Stewardship			✓	✓	✓				✓
10. Roles & Responsibilities	✓			✓					✓
11. Data Life Cycle Methodologies	✓	✓		✓	✓	✓	✓	✓	✓

Figure 1-3. Reader's Guide

SECTION 2

FLEET LOGISTICS DATA ADMINISTRATION PROGRAM

2.1. Overview

In this Section

This section states the objectives of the fleet logistics data administration (DA) program and presents the phases in which the program is being implemented.

Topic	Section
Overview	2.1
Data Administration Goals and Objectives	2.2
Program Overview	2.3
Program Components	2.4
Program Implementation	2.5

A summary of the information systems engineering concepts behind this data administration program are provided in **Appendix A.**

Why a Fleet Logistics DA Program?

Information systems that are developed to meet individual program needs often lead to management and information system problems, including those of conflicting, erroneous, and redundant data, and gaps between program-specific systems. The Information Resource Management (IRM) program implemented in COMDTINST 5230.41 utilizes the CG's infrastructure of standard information technology to establish cross-program information systems. The fleet logistics functions within the CG will benefit from this IRM approach.

The various fleet logistics functions and organizations share as much data with organizations outside the CG as they share with other CG systems. Therefore, fleet logistics systems must be designed and standardized to share data with this wider community in addition to meeting CG data sharing requirements. . Data administration (DA) is the process for coordinating and optimizing data definitions, for use in standard systems to produce shareable data.

Continued on next page

2.1. Overview, Continued

Vision

The fleet logistics DA program provides a set of processes, mechanisms, and guidelines that lead to standardization of data structures and formats. Information systems that define, name, format, and store their data using these guidelines will be registered as meeting the fleet logistics metadata standard ("standard systems"). Authorized users of standard systems will be able to use data without regard to which information system creates or stores specific records or fields. Data can be shared across systems without additional analysis or conversion.

Figure 2-1 shows the concept of creating more usable information from the available data by applying data standards. Data are the raw values, such as numbers, dates, and text strings. A collection of data becomes information when it is placed in a meaningful context. If the context is consistent for the data generated by many systems, then all the data generated by these systems becomes usable by all authorized parties. Utilization of the data resource is cost-effective for application systems because each system can use (does not have to re-generate) data created by other systems. Fleet logistics operations require effective information sharing between equipment configurations, vessel status, procurements, supply, maintenance, and work order management, for example. An added benefit, which adds considerable cost savings, is the ability to analyze the available data across systems. This wider view of the data enables planners to make more rapid and better-informed decisions, and to allocate CG resources where they are needed.

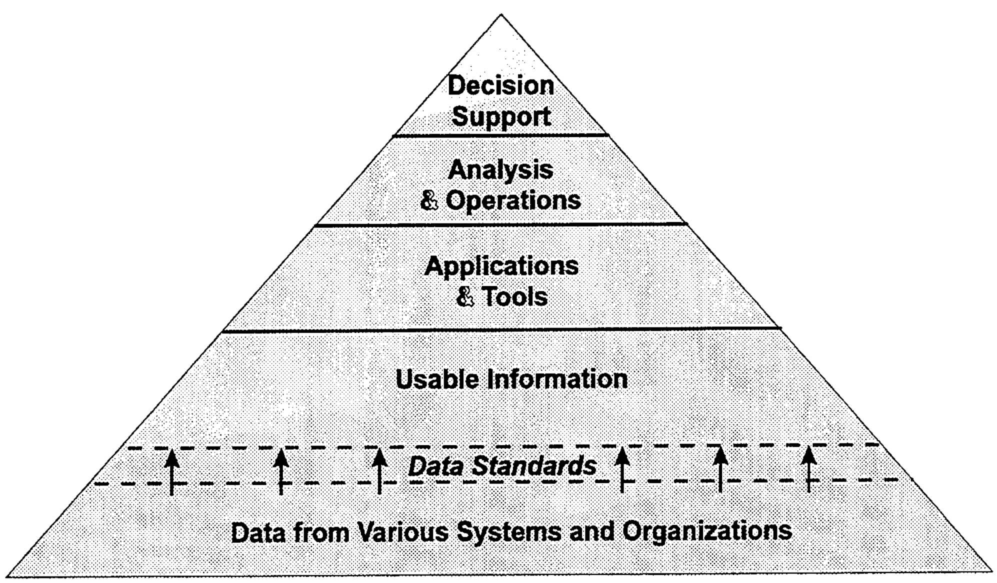


Figure 2-1. Data into Information through Metadata Standards

Continued on next page

2.1. Overview, Continued

Relationship of Data Standards

Figure 2-2 shows the relationship between the guidelines presented in this manual and the CG, DoD, commercial, and international standards cited. Fleet logistics data administration uses Coast Guard, other Government agency, and commercial data standards. This is one of several CG enterprises that shares data with specific categories of other organizations (and so each enterprise has its respective subset of data requirements). At this time, the fleet logistics enterprise does not share data with international organizations, and so does not need to tailor its data requirements to international standards directly.

Scope of Data Standards to Ensure Enterprise-Wide Information Sharing

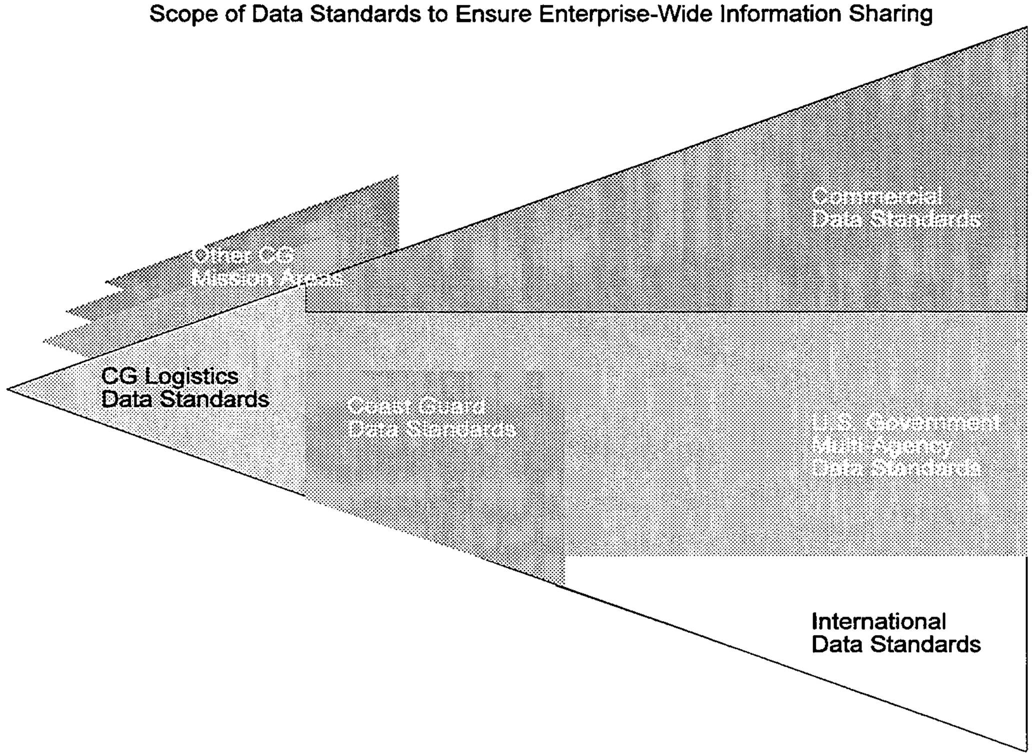


Figure 2-2. Relationship of Data Standards

Relationship with CG DA

Fleet logistics information systems are required to share data with other CG systems in addition to sharing data with other fleet logistics, other Government agency, and private sector systems. For this reason, the fleet logistics DA program is designed to meet CG as well as other agency and industry metadata standards.

To ensure that data values created by fleet logistics cross-program information systems are shareable with other CG systems, the fleet logistics DA will coordinate definitions of entities, data elements and other metadata with the CG Data Administrator.

2.2. Data Administration Goals and Objectives

Overview

The mission, goals, and objectives described in this section were approved at the outset of the development of this DA program. The DA program is designed to achieve this mission and to meet these goals and objectives.

This section presents the goals and objectives of the fleet logistics DA program. The next section describes the DA program that is designed to meet these goals and objectives.

Fleet Logistics Data Administration Mission

In support of the CG missions of supply, maintenance, shipboard configuration management, and related activities, the mission of fleet logistics DA is:

To manage and ensure the quality of fleet logistics data in order to enhance:

- *The understanding and definition of information requirements*
- *The development of automated and integrated logistics systems*
- *The provision of usable, reliable, and accessible data.*

Goals and Objectives

The DA program is focused on the achievement of five goals, each supported by a number of objectives. These goals provide the following:

- A means for a logistics-wide shared data resource
- A means to identify, document, and maintain data requirements and data structures
- Improved accessibility and ease of use of data resources
- Methods to ensure data accuracy, security, integrity, and synchronization
- Processes and facilities to support effective data administration.

These goals and their respective objectives are presented in the following table.

1.	**Provide the means for a logistics-wide shared data resource (common building blocks).**	
	a.	Define and provide standard data elements
	b.	Enforce the use of standard data elements in engineering logistics systems.
	c.	Track the use of standard data elements in applications and subject area databases.
	d.	Provide for data interchange between systems and among organizations, e.g., protocols, data standards, national and international standards levels.
	e.	Reduce redundant data.

Continued on next page

2.2. Data Administration Goals and Objectives, Continued

*Goals and Objectives (**continued**)*

2.	**Identify, document, and maintain data requirements and data structures. (metadata)**	
	a.	Define data modeling standards.
	b.	Model fleet logistics business processes and information requirements.
	c.	Integrate data models into a central repository.
	d.	Plan long-range, conceptual-level information requirements for the CG fleet logistics enterprise.
	e.	Track and control the relationships between fleet logistics conceptual, logical, and physical data.
	f.	Establish and conduct a data stewardship program, by information class.
	g.	Establish processes for submittal, review, and disposition of data definitions and data requirements.
	h.	Provide for efficient migration of data from legacy to successor systems.
	i.	Establish a common glossary of terms to support data standardization.
3.	**Improve accessibility and ease of use of the data resource.**	
	a.	Provide inquiry and reporting capabilities through accessible data definitions.
	b.	Facilitate data accessibility across locations, applications, and platforms by providing standards and mechanisms.
4.	**Ensure data quality (accuracy, security, integrity, and synchronization).**	
	a.	Define procedures to control consistency and accuracy of data definitions
	b.	Define policies and procedures required to protect data.
	c.	Provide rules and processes for assigning data stewardship responsibilities.
	d.	Maintain links between data models.
	e.	Provide consistency of CG data definitions with those of allied agencies and private-sector suppliers.
	f.	Consolidate data synchronization requirements and determine and resolve the internal and external effect of changes.
	g.	Provide for conversion and validation of legacy data.
	h.	Provide the means for analysis of data access and data use.

Continued on next page

2.2. Data Administration Goals and Objectives, Continued

Goals and Objectives ***(continued)***

5.	**Provide processes and facilities to support effective data administration.**
	a. Establish a fleet logistics data repository. b. Provide processes for defining standard data objects. c. Educate the information system developer, data steward and mission area communities in effective and consistent data administration practices. d. Provide technical support, tools, and infrastructure for data administration functions. e. Provide mechanisms to exchange data definitions with other agencies. f. Provide for ongoing evaluation and improvement of the engineering logistics data administration program.

2.3. Program Overview

Introduction

This section summarizes the functions, processes, and resources of the fleet logistics DA program. The next section describes these in greater detail, and provides links to supporting information in the remainder of the manual. The concepts presented here are essential to understanding DA processes and functions.

The fleet logistics DA program crosses organization lines with the purpose of providing a high-quality, easily usable information resource for all CG personnel whose work includes fleet logistics support.

Guiding Principles for Integrated Data Management

The fleet logistics DA program adheres to these guiding principles:

- Data is a shared resource that should be defined and structured independent of applications.
- Data should be treated as a primary and vital resource, independent of current technology and systems.
- Standard tools and facilities should be used throughout an organization to manage data.
- Users should be given the tools to specify and retrieve the information and reports directly from a common, integrated data environment.
- Management needs to be involved in the organization's data management strategy.

Architectural Framework

The data architecture is the basic structure of the data as it is constituted to meet specific requirements. Data architectures are represented in a framework having three levels. They are *conceptual*, *logical*, and *physical* levels. Use of this three-level framework provides a useful link between high-level unifying concepts, information systems engineering and its metadata concepts, and the design of physical databases for information systems.

This three-level architecture is implemented in requirements for the fleet logistics metadata repository, which is described in **Section 6.**

Conceptual Level of Data Architecture

The *conceptual* level of the fleet logistics data architecture is based on the following concepts:

- Subject Area
- Information Class

The conceptual data architecture describes the *kinds of information* used in the enterprise.

Continued on next page

2.3. Program Overview, Continued

Logical Level of Data Architecture

The *logical* level of the fleet logistics data architecture is based on the following concepts:

- Logical Data Model
- Entity
- Relationship
- Attribute and Standard Data Element

The logical data architecture describes each of the specific *categories* and *items* of data in the enterprise, and the *relationships* of each. This level describes the data independent of information system, CG organization, or business process because most data items are used by more than one system, organization, and/or process.

Physical Level of Data Architecture

The *physical* level of the fleet logistics data architecture is based on the following concepts:

- Physical Data Model
- Physical File / Relational Table
- Physical Data Field / Table Column

The physical data architecture represents the physical design of objects and databases in information systems, including any central ("data warehouse") server resource for reference data.

Levels and Scope of Data Models

Data models may be defined on different levels of detail (logical entity-relationship diagram, logical attributed data model, physical model).

Data models can also be defined for different scopes of interest or views, for example:

- Functional (*e.g.,* supply)
- Organizational (*e.g.,* Supply Center Curtis Bay)
- Application system (*e.g.,* CM+)
- Database (*e.g.,* Cutter System File)
- User view (*e.g.,* screen, report)
- Data flow in a process model (*e.g.,* alteration data)

In the current (legacy) systems, these data models may have inconsistencies between systems in their respective definitions of similar data entities, relationships, attributes, and physical data fields.

Continued on next page

2.3. Program Overview, Continued

Architecture Context for DA

Figure 2-3 shows three architectures that are the basis of any information system, and the views of the four major stakeholder groups. This figure shows the issues for implementing the fleet logistics data architecture, in the context of the larger information system development and maintenance effort.

		Data Architecture	***Functional*** Architecture	***Technical*** Architecture
Owner's View	**Conceptual**	Information Important to the Business Mission, Goals, Objectives Critical Success Factors Data Subjects, Data Classes	Functions / Processes Performed by the Business	Hardware, Software, Network Capabilities and Limitations Geographic Locations
Architect's View	**Logical**	Entity Relationship Diagram Integrated Data Requirements Entities, Relationships, Views	Function / Process Decomposition Diagram	Diagram of Business Units and their Relationships
		Attributed Data Model of Application/Database Tables, Unique Identifiers Attributes, Integrity Rules Risk/Quality/Synch. Analysis	Data Flow Diagram Process Dependency Diagram	Application Information Systems Interfaces Distributed Systems Data Exchanges
Builder's View	**Physical**	Database Design Files, Fields, Indexes , Edits, Update Propagation Triggers	Structure Chart Data Map, Migration Plan	System Architecture Hardware,Software,Network Configuration
		Formal Data Design Coded Data Structures Data Validation Code	Application Programs	Network Architecture Network Addresses Communication Protocols Physical Network
User's View	**Operational**	Actual Data Values in Records, Reports and on Screens	Function/Action Menus Operational Actions	Data Dictionary Std. Names, Definitions, Attributes Where-Used

Figure 2-3. Architectural Context of DA Program

Continued on next page

2.3. Program Overview, Continued

DA Program Functions

The functions of the fleet logistics DA program are to plan, define and provide a data administration infrastructure to support fleet logistics business processes and use of the corporate information resource. Therefore, the data administration infrastructure includes the following components:

1. Data administration operational procedures
- Support integration of data models
- Standardize data elements
- Support legacy data mapping and migration
- Ensure data quality
- Operate repository
- Maintain process models and other information definitions

2. Methodology-dependent data development deliverables by phase:
- Analysis - conceptual entity-relationship diagram
- Design - logical data model
- Construction (coding) - physical data model
- Maintenance - data definition change requests, change impacts

3. Modeling techniques
- Data administration guidelines for data modeling
- Review of data models and other metadata deliverables

4. Computer-Aided Software Engineering (CASE) tools:
- Centralized fleet logistics metadata repository with utilities
- Data modeling tools
- Reverse engineering tools
- CASE tool export/import utilities
- Data quality engineering tools (*e.g.,* data quality filters)

5. Procedures for data administration operational services
- Review cycles
- Support of the data stewardship program

6. Standards for data modeling and data definitions
- Quality criteria
- Metadata standards

7. Data administration education, training, and coaching services
- Education and outreach
- Technical support
- Repository information services

Continued on next page

2.3. Program Overview, Continued

DA Working Relationships

Figure 2-4 shows the working relationships between fleet logistics data administration and the various user, developer, stewardship, and other organizations. The goal of reliable, shareable data is achieved through the cooperation of these groups.

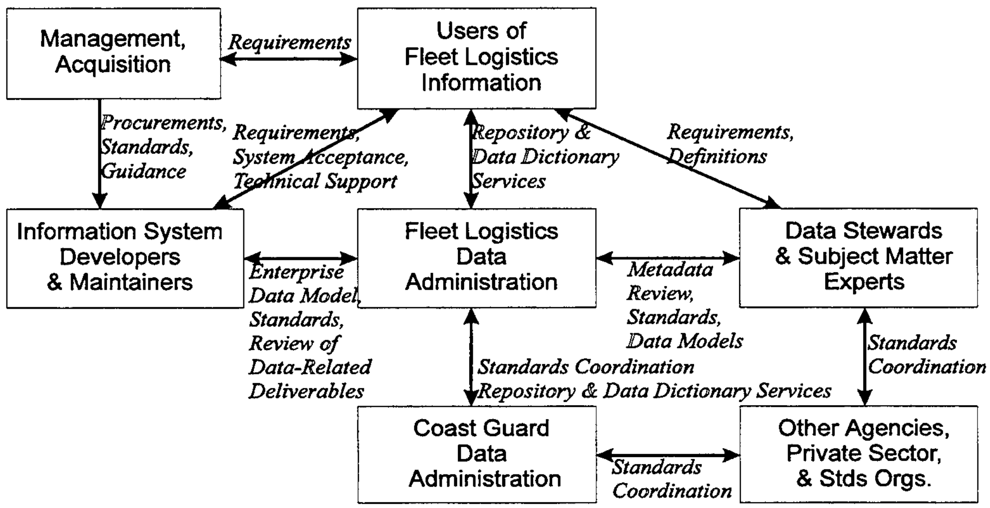


Figure 2-4. Working Relationships for Effective Data Standardization

DA Program Participants

Fleet logistics data administration (DA) involves six communities of interest:

- *Users* of fleet logistics-related information, especially those who require information (such as aggregated reports) created by more than one system
- *Developers and maintainers* of information systems
- *Acquisition and management staff* who plan, procure, and implement information systems
- *Database administrators, network administrators, technical support, security specialists, and others* who support the ongoing operation of CG information systems
- *Data stewards and subject matter experts* who represent CG functional areas and users of specific classes of information, and who recommend improvements to the enterprise's data definitions
- *Data administrators* who provide data standards support, facilitation, reviews, decisions, reports, and repository services.

Most DA processes require participation of, or cooperation from, two or more of these communities.

2.4. Program Components

DA Functions

Data administration functions are coordinated through the fleet logistics DA, but are performed by people in various organizations, including Engineering Logistics, Acquisition, and cutters' crew. Figure 2-5 appears complex, but it represents the information flow among the various DA functions. Each function (represented by an oval in the figure) is explained following, with references to more detailed descriptions elsewhere in this manual.

USCG Fleet Logistics Data Administration Processes

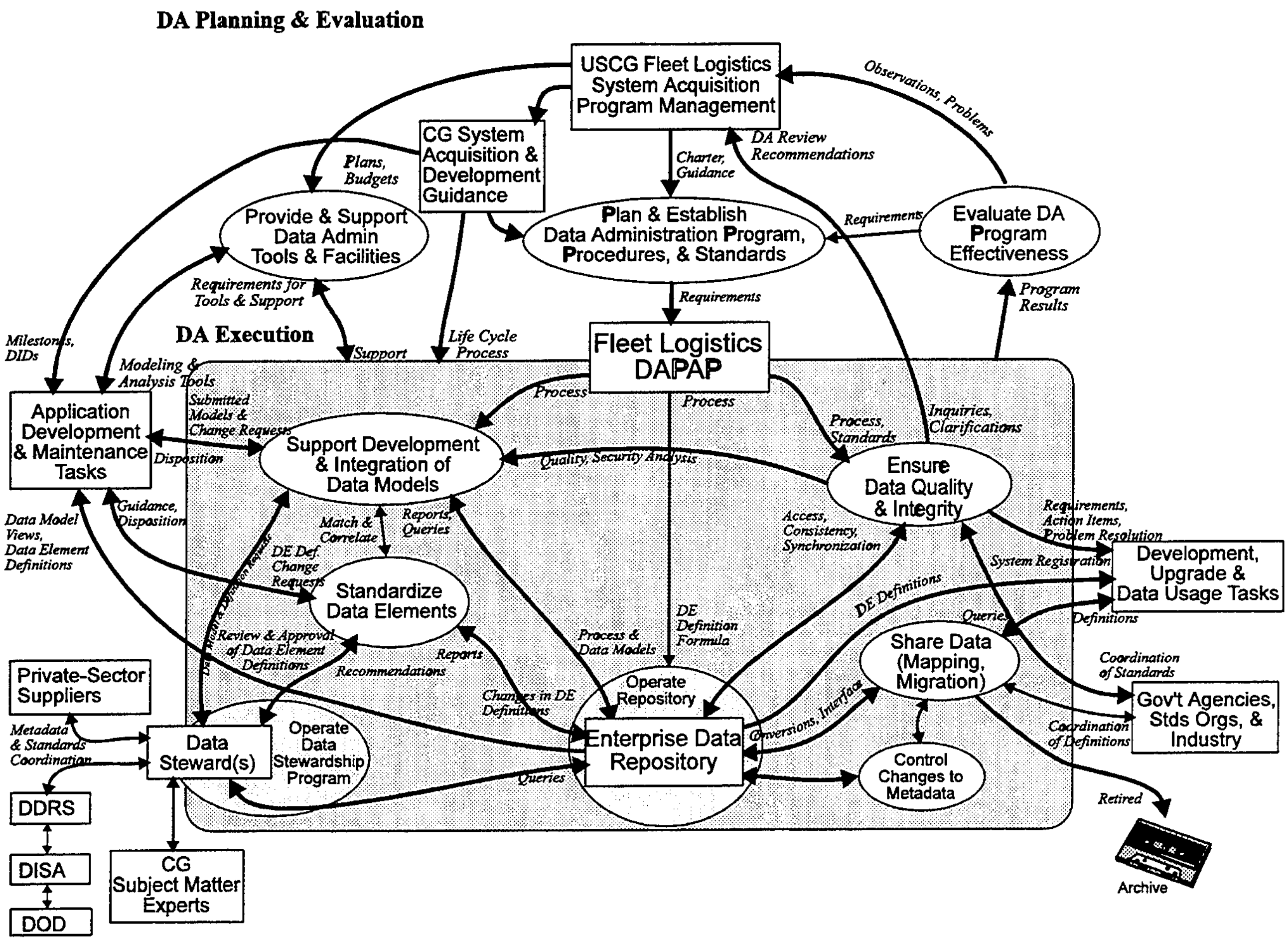


Figure 2-5. DA Functions and Processes

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2.4. Program Components, Continued

DA Program Management

This function consists of the following activities:
- Plan DA program strategy and tasks
- Acquire and organize DA resources
- Control DA tasks
- Evaluate and improve DA program effectiveness
- Provide leadership and advocacy for data standardization and sharing.

DA Program Staff

DA program staff consists of CG personnel who are assigned to operate and manage the fleet logistics DA program. This function is the point of contact for DA information, clearinghouse for review of metadata-related deliverables, approval authority for standard metadata, steward for DA resources, and principal advocate for transparent data sharing. This function has primary responsibility for the quality, efficiency, and effectiveness of the fleet logistics DA program.

DA Infrastructure

This function consists of the following activities:
- Plan target integrated data administration infrastructure
- Plan data administration methods, models and roles for fleet logistics life cycle
- Develop data administration policies, procedures, and standards
- Work with Acquisition personnel to include effective metadata requirements in system requirements and data item descriptions (DIDs)
- Coordinate with other agencies, industry groups, and standards organizations to define fleet logistics data so that it can be shared when needed.
- Establish data stewardship responsibilities
- Provide and support data administration tools and facilities, including a reliable, complete and accessible metadata repository
- Provide data administration training and consultation services

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2.4. Program Components, Continued

DA Tools, Facilities, & Support,

The technical infrastructure for the DA program includes the means to integrate, model, analyze, convert, store, and review metadata. This infrastructure includes the following categories:

- Computers and communications equipment
- Modeling and analysis software
- Prototyping, rapid application development, and SQL query software
- Data quality monitoring and filtering software
- The software used for the metadata repository, including configuration management (CM), request status tracking, and review facilitation tools
- The standards, test suites, and benchmarks for evaluating standard system candidates
- Training materials and facilities

Parts of this infrastructure are operated by DA program management, while other parts are operated by other organizations in the fleet logistics community. The distinguishing factor that makes a tool or facility part of the fleet logistics DA infrastructure is the commitment to allocate a major part of its use to facilitating transparent data sharing in the fleet logistics community.

Data Models

The focal point for the fleet logistics data standard is the enterprise logical data model. This logical data model is the framework that implements the information classes and high-level entities, and provides reference points for relationships, business rules, and standard data elements. In addition to the enterprise logical data model, DA also collects data models from nonstandard, candidate, and other-agency systems, and uses these models to better understand how information is used by various CG functions. **Section 3** provides processes for preparation, submittal, and review of data models. **Section 8** describes the quality criteria to be used for reviewing data models.

Data Element Standardization

In an established, ongoing DA operation, definition and refinement of standard data elements (DEs) is the most frequent activity. Standard data elements are the bridge between the enterprise data model (representing the fleet logistics view of how all of its information resources are used) and the physical design of information systems (representing that application's view of a subset of the enterprise's data). The quality and timeliness of standard data element definitions will directly affect the speed and ease with which the fleet logistics enterprise reaches its goal of transparent data sharing. **Section 4** provides processes for preparation and review of proposals for new data elements and for requests for changes to current standard data elements. **Section 8** provides the quality criteria by which the submittals will be reviewed.

Continued on next page

2.4. Program Components, Continued

Share Data from Diverse Systems

Data sharing cannot wait for all CG information to be converted into standard systems. In addition, some information resides in systems that the CG does not control, or which have been designed to meet other standards. Some data, therefore, will require mapping so that it can be shared. In all cases, the mapping should be from legacy system physical fields to fleet logistics standard data elements (physical-to-logical data mapping). The more significant and subtle problems in data mapping are with differences in definitions, domains, and business rules rather than with names and attributes. The map can be implemented by changing the required fields' definitions and/or attributes in the legacy system, creating a translator interface, or using a standard system as a "broker" to convert the data values to the appropriate format. Processes to map data in legacy systems for sharing, and to migrate legacy data to standard systems are provided in **Section 5, Share Data by Mapping and Migration.**

Maintain Metadata Repository

The fleet logistics metadata repository is the central information resource for the DA program. The most visible function of the repository is the enterprise data dictionary, which provides definitions, where-used reports, and subset/view logical data models to users and developers. The repository also maintains information class definitions, data stewardship assignments, candidate metadata changes, review status for metadata change requests, metadata for legacy systems, maps between legacy data and standard metadata, and implementation of applicable data standards. **Section 6, Maintain Metadata Repository**, describes this key DA resource.

Metadata Change Control

Changes to metadata are driven by changes in data requirements, and by improvement in understanding of business processes and information. The fleet logistics metadata repository tracks changes, both to standard metadata and to the metadata of other CG, other Government agency, and private-sector systems. **Section 7, Control Changes to Metadata,** provides processes for submitting and tracking changes.

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2.4. Program Components, Continued

Ensure Data Quality & Integrity

As with any other mission, quality is part of the fabric, not something added by one action. The quality components that improve the accuracy, completeness, timeliness, and dependability of the fleet logistics information resource each require attention and action by information system developers and maintainers, database and system administrators, users, data administrators, and data stewards. Aspects of the DA program that determine the quality of the information resource include the following:

- Ensuring compliance with data standards
- DA education and outreach
- Facilitation and technical support
- Criteria for metadata review
- Acceptance and registration of standard systems
- Modifications to and exemptions from data standards
- Control access to non-public information
- Risk analysis process
- Ensure system-wide data synchronization
- Ensure data quality and integrity
- Implement data integrity measures
- Establish consistent definition of terms across systems
- Improve the data quality program

These initiatives are described in detail in **Section 8, Ensure Data Quality**.

Data Stewardship

A data steward is responsible for understanding how one or more classes of information are used within fleet logistics business processes, and how data can be shared with other organizations. Using this understanding, the steward establishes authoritative definitions for logical entities and data elements, reviews requests for changes in data element attributes and definitions, and represents users of the information class. In these functions, the steward obtains support of subject matter experts for specific technical areas. An effective and proactive data stewardship program will place responsibility for accurate and complete metadata in the hands of the most expert users in each information class. **Section 9** describes the data stewardship program.

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2.4. Program Components, Continued

Evaluate DA Program Effectiveness

To gain acceptance in the developer and user communities, the DA program must be responsive, effective, supportive, and accurate. As with the data values the program describes, the standard metadata itself must be accurate, complete, timely, and dependable. DA business processes must be easy to implement, and must not place an undue burden (aside from their commitment to enterprise data sharing) onto developers and users. Metadata change request review cycles must be as quick and definitive as possible. The fleet logistics DA is responsible for the effectiveness of this program. The DA will maintain program effectiveness by:

- Monitoring the performance of the DA process
- Soliciting developer and user comments
- Providing training and technical support to participants
- Utilizing the available technology
- Improvement and refinement of DA business processes.

The sections describing primary DA processes each provide for improvement of those processes. These process improvement subsections are placed as the last pages of the respective sections.

2.5. Program Implementation

Purpose

This subsection provides a phased plan for implementing the fleet logistics DA program. Depending on resources, this strategy leads to full implementation of the fleet logistics DA program. The DA implementation phases make possible an efficient fleet logistics cross-program information system in achievable steps.

Working Assumptions

This approach assumes that a DA function is in place, and that the central DA services (such as metadata review, repository operation, standards coordination, technical support, and training) will be provided by that resource. It also assumes initiatives by Acquisition to tailor data-related Data Item Descriptions (DIDs) to include the metadata requirements outlined in **Section 11** and described throughout the manual.

Finally, it depends upon cooperation and commitment of the management of fleet logistics related organizations to provide data stewards, share their data and migrate their respective information systems toward the developing standard. If any of these assumptions prove to be untrue, the implementation strategy and schedule must be reconsidered.

Implementation Phases

Figure 2-5 shows the general phases for implementation of the fleet logistics data administration program. With prerequisite approvals, funding, and cooperation, the DA program can be operating in approximately two fiscal years by following the following phases and associated actions:

- *Approval of processes and responsibilities:* The foundation-laying steps that provide the basis for building the DA program
- *Funding and programming:* Allocating and developing the resources that the program uses
- *Deployment:* Moving from concept to action; enabling the people and configuring the resources to perform DA functions
- *Operation:* Performing the DA processes (described in this manual) that will build the desired information resource

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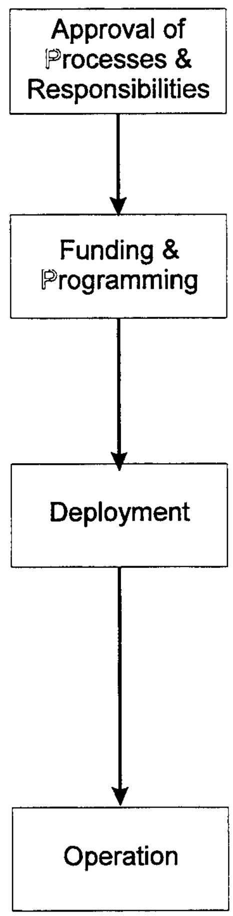
2.5. Program Implementation, Continued

Implementation Phases for the Fleet Logistics DA Program

Related Activites



Approval of Processes & Responsibilities

Develop DA Processes & Standards
Allocate Information Classes
Finalize Repository Requirements
Plan Repository Implementation
Plan & Develop DA Training
Develop Initial DA Budget

Funding & Programming

Allocate Responsibilities
Recruit Data Stewards
Staff DA Office
Initiate Enterprise Data Model
Approve Tailored DIDs
Procure Repository HW/SW
Develop Operating Budget

Deployment

Include DAPAP & DIDs in IS Procurements
Train Data Stewards & DA Staff
Establish Liaison w/ DoD
& Industry DA & Stds Orgs
Model Primary Business Processes (Stewards)
Populate Prelim. Enterprise Data Model
Stewards Recruit SMEs (by Info Class)
Inventory Data Where-Used

Operation

Expand & Refine Logical Data Model
Review Metadata Change Requests
Coordinate Data Standards with CG,
Other Agencies, and Industry
Provide Outreach & Technical Support
Monitor Quality of Data Values
Maintain & Share Metadata
Review Metadata & Deliverable Docs
Review & Register Std Systems
Provide Repository Services
Improve DA Processes

Figure 2-6. Implementation Phases for the DA Program

Continued on next page

2.5. Program Implementation, Continued

Approval

The approval phase establishes the foundation for the fleet logistics DA program by providing the authorization, initial funding, processes, and infrastructure to move the program forward. The approval phase includes following types of actions:

- Complete the selection and/or development of DA standards, processes, and requirements.
- Allocate, define, and fix responsibility for an agreed set of information classes.
- Refine requirements and plan implementation for the fleet logistics metadata repository.
- Approve the fleet logistics DA program and publish the DAPAP manual.
- Develop, approve, and fund a training plan to support the DA program.
- Approve and fund the repository platform (equipment, software, communications, and support).
- Tailor and submit DIDs and RFP language that support the metadata deliverables and review process.
- Develop training materials to support the DAPAP processes, repository, acquisition documents, standards, and related DA activities.
- Make the approved DA-related roles and responsibilities official.
- Develop and submit the initial DA budget.

In a two-year implementation cycle, for example, these actions would be completed by the third quarter of the first fiscal year.

Funding & Programming

The second phase launches implementation of the DA program. It prepares the program for deployment into the fleet logistics community. Launching the DA program requires the following actions:

- Allocate the approved responsibilities to organizations and individuals.
- Recruit one principal data steward (with support as-needed) for each information class.
- Initiate the fleet logistics enterprise data model.
- Approve and produce DA training materials.
- Approve and program the DA deployment budget.
- Staff and equip the DA office.
- Implement DA operations and develop the operation phase budget.
- Procure the repository equipment, software, communications, and support.

In a two-year implementation cycle, these actions should be completed by the first quarter of the second fiscal year.

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2.5. Program Implementation, Continued

Deployment

The deployment phase provides to the fleet logistics community the information, support, processes, and skills to execute an effective DA program. Deploying the DA program requires the following actions:

- Train data stewards and DA staff
- Establish liaison with DoD, industry, and standards organizations
- Include DA-tailored DIDs in fleet logistics IS procurements
- Model the primary fleet logistics business processes
- Inventory which information systems use which data items
- Populate an initial enterprise data model
- Recruit subject matter experts

In a two-year implementation cycle, these actions should be completed by the third quarter of the second fiscal year.

Operation

The start of the operation phase marks the start of "actual" data administration and the completion of preparatory work. Operation includes execution of the processes described in this manual. Note that operation involves much more than a DA office. The DA function provides support for users, developers, data stewards, system administrators, planners, and others to do their respective parts to achieve enterprise-wide sharable data. Operating the DA program requires the following actions:

- Coordinate data standards with CG, other Government agencies, industry, and standards organizations
- Participate in strategic data planning
- Provide outreach and technical support to users and developers
- Provide training to DA and acquisition staff, data stewards, and developers
- Review metadata change requests
- Review metadata and deliverable documents
- Review and register standard systems
- Refine entity and data element definitions through the data stewards and their respective user organizations
- Expand and refine the enterprise logical data model
- Provide repository services
- Monitor the quality of data values in the enterprise data resource
- Improve DA processes

To complete a two-year implementation cycle, these actions should be started before the end of the second fiscal year.

SECTION 3

SUPPORT DEVELOPMENT AND INTEGRATION OF DATA MODELS

3.1. Overview

Purpose

This section provides the concepts, guidance, and procedures to:

- Develop a conceptual or logical data model by developers, system maintainers, data stewards, and process improvement teams
- Submit the model to the fleet logistics Data Administrator (DA) for review
- Review it and resolve any discrepancies with current metadata standards
- Integrate it into the fleet logistics data model and the fleet logistics metadata repository
- Maintain the integrated logistics data model configuration
- Generate specific data model views and reports for application developers
- Coordinate and improve the data model development/integration process.

These procedures are used to:

- Describe the data and relationships in a previously undocumented processes, and to update or standardize metadata in documented processes
- Determine the subset (view) of the fleet logistics data model to download from the repository, as a starting point for the application data model
- Design a new or newly standardized information system
- Upgrade and standardize an existing system
- Identify and transmit an application data model or metadata change request to DA for review
- Define the mapping of data from a legacy system to the fleet logistics standard information resource.

In this Section

This section covers the following data modeling topics and procedures:

Topic	Section
Overview of Process and Responsibilities	3.1
Data Modeling Concepts	3.2
Develop and Submit Data Model (developer/maintainer, data steward, Quality Action Team)	3.3
Receive and Evaluate Data Model (DA)	3.4
Submit Changes to Data Models	3.5
Maintain Configuration of Data Models	3.6
Generate Data Models from the Repository	3.7
Coordinate Data Model Development and Integration	3.8
Improve the Data Model Development and Integration Process	3.9

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3.1. Overview, Continued

Procedure Cross-Reference

To describe the process of developing application data models in accordance with the enterprise logical data model, this section provides the following types of information:

Topic / Procedure	Audience	Refer to Subsection
Introduction to data modeling concepts and conventions of the DoD-compliant methodology	All readers	Data Modeling Concepts (Section 3.2 and Appendix A)
Develop a conceptual or logical data model and submit it to DA for review and standardization	Developers and system maintainers: analyst/modeler, system designer	Develop and Submit Data Model (Section 3.3)
Validate data model with users	All readers	
Receive data model from the system design team and review for standards conformance	Fleet logistics Data Administrator	Receive and Evaluate Data Model (Section 3.4)
Prepare and submit changes to a previously approved data model	Developer	Submit Metadata Changes (Section 3.5)
Integrate submitted data model into the fleet logistics data model resolving metadata differences	Fleet logistics Data Admin.,, Stewards	Integrate fleet logistics Data Model (section 3.4 and 3.6)
Make changes to metadata that has been previously submitted, checked, and integrated	Fleet logistics Data Administrator	Maintain Configuration of Data Models (section 3.6)
Generate specialized data models, user views, where-used reports, and other subset metadata from the repository	Fleet logistics Data Admin., Stewards, Developers	Generate Data Models from the Repository (section 3.7)
Initiate and coordinate the data modeling and integration process during system development	Fleet logistics Data Administrator	Coordinate Data Model Development and Integration (Section 3.8)
Capture, document, and submit issues and improvements to the data modeling process	Fleet logistics Data Admin., Stewards	Improve the Data Model Development and Integration Process (3.9)

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3.1. Overview, Continued

Specific Data Modeling Responsibilities

An effective data administration program has four key starting points: strategic data planning at the enterprise level, a proactive data administration program that maintains a current and valid metadata repository, an active data stewardship program, and commitment by the application developers to create a standard system and to use the enterprise data resource. The following table summarizes the responsibilities that are necessary to develop, standardize, and use data models.

Role	Responsibility	Description	Section
Data User Organizations	Strategic Data Planning	Establish requirements that ensure the new or upgraded system's data is sharable.	3.3, 5.2, 5.3, 8.1, 8.7,
Data User Organizations	System Acceptance	Accept new and upgraded systems only after transparent data sharing is demonstrated.	5.2, 5.3, 8.6, 8.8
Data Administrator	Standards for Deliverables and Acceptance	Ensure that information system solicitations, statements of work, CDRL items, and DIDs provide for data standards compliance and acceptance testing, and adequate metadata deliverables.	3.3, 4.3, 5.2, 5.3, 7.2, 8.3, 11.3, 11.4
Acquisition	System Acquisition	Include contractual language and CDRL items that ensure transparently shareable data.	8.6, 11.4
Developer, System Maintainer	Design	Build-in the enterprise data model and other org. data sharing requirements into preliminary design.	3.3, 3.7, 8.1, 8.10, 8.11,
Developer	Data Modeling	Obtain user access to the fleet logistics metadata repository.	6
Developer, System Maintainer	Data Modeling	During analysis, identify data items that correspond to existing standard data elements. Download subset data model from repository. Define new data elements for only the few truly unique data items.	3.3, 4.2, 4.3, 8.6, 11.3
Developer, System Maintainer	Change Control of Application Metadata	Keep the application's data model concurrent with the physical design, and submit all metadata changes to DA.	3.6, 4.5, 7.x

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3.1. Overview, Continued

Specific Data Modeling Responsibilities (Continued)

Data Admin.	Receive & Evaluate Data Model	Review conceptual, logical, and attributed data models and metadata documents at appropriate phases. Investigate & approve or negotiate requests.	3.4, 4.3, 4.4, 8.1, 8.6, 8.9, 11.3
Developer or maintainer	Prepare Metadata for Joint User-Developer Technical Reviews	Complete preliminary logical data model and/or data conversion plan, identify data sharing requirements and interfaces, and describe key data items for user validation.	11.3, 11.6
Data Admin.	Validate Metadata for Technical Reviews	Review preliminary logical data model; identify standard and unique data items;	11.3
Data Admin.	Facilitate Metadata Portion of Technical Reviews	Interpret the implications of the data model to technical reviewers, and obtain clarification of business processes and data requirements.	11.3, 11.4
Data Admin.	Identify Data Planning Issues for Management Reviews	Identify need for management decisions regarding strategic data planning, data sharing, interfaces, standardization, processes, and schedules.	11.3
Data Admin.	Support data standardization work	Provide standard metadata and technical support to developers & maintainers.	3.8, 8.3, 8.4, 8.5,
Data Admin	Control Changes to Standard Metadata	Review and track change requests; maintain enterprise metadata repository.	6.3, 7.2, 8.9,
Data Admin	Coordinate Metadata with CG Data Admin	Coordinate definition of new or changed metadata with CG Data Administrator.	3.4, 4.4
Data Admin	Accept Model and Register Standard Systems	After acceptance, register standard systems and authorize sharing of FL data.	8.8

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3.1. Overview, Continued

Specific Data Modeling Responsibilities (Continued)

Data Stewards	Understand Uses of Data	For the information class(es) assigned for stewardship, identify all uses of data, systems where it is used, data flow, and interfaces.	9.2, 9.3
Data Stewards	Review Change Requests	Review data entity and element change requests for usefulness, standards compliance, and impact on other systems.	3.4, 4.4
Data Stewards	Ensure Data Quality	Monitor data integrity, security, synchronization, etc.	8.13, 9.3
Data Admin.	Ensure Preservation of Metadata	Ensure responsibility for developer and DA backup of data models and other metadata.	10.5
Data Admin & Stewards	Improve DA Processes	Improve DA processes by monitoring data quality, IRM processes, data customers & suppliers.	2.5, 3.9, 4.6, 8.15, 11.6

DA Function on Development Teams

Each organization that is authorized to create or modify an information system must provide a data administration function. Typically this function is provided as part of system analysis. However, on a specific team the expertise might reside in the database design, quality assurance, or configuration management functions. Larger projects require a separate data administrator.

A development or software maintenance team's data administrator provides the following critical services:

- Point of contact for fleet logistics DA
- Advocate for transparent data sharing
- Author of metadata-related segments of deliverable documents
- Contributor to interface design
- Participant in analysis of data requirements and data flow
- Submitter of data models and metadata change requests

The designated data administrator should contact the fleet logistics data administrator as soon as possible after appointment to obtain necessary information, a user account on the metadata repository system, and training.

3.2. Data Modeling Concepts

Purpose and Objectives of Data Models

A data model graphically depicts "things" (entities or objects) of principal concern to an organization, and the ways they relate to each other statically (that is, the permanent relationships between the things, not the changes applied to their values or the processes through which they flow).

A data model is used first to describe the data the organization must track, and then to provide a common basis for interpretation and integration of the data throughout the life cycle of one or multiple information systems. It ensures that data is interpreted consistently across functional, organizational, and information system boundaries. Ultimately, data models are used to develop database schema during system design and construction.

Accurate data and process models are used to plan, prioritize, analyze, design, and construct information systems. These models are useful not only for original design, but also for re-use, migration, and maintenance of data. Data models are developed alternately and iteratively with process models, successively refining each in greater detail until they accurately represent the organization to the needed level of detail. Data modeling is the method and technique for defining and assessing the business area data requirements that will be supported in application systems, and is therefore the basis for effective data administration.

At the requirements analysis phase of the system development life cycle, the application's attributed data model is reviewed for consistency to the system process model requirements and for completeness of definitions of all data entities and their relationships. Submittals of standard data element requests are evaluated using the application's approved data model for reference.

Data Modeling Technique

A data modeling technique, also known as an entity relationship (E-R) or entity-relationship-attribute (E-R-A) diagrams is the principal technique used to identify and verify the organization's data. A data model diagram depicts an organization's objects of interest (entities), and the relationships that exist between those entities. It also reflects the business rules of the organization. At its lowest level of detail, it also tracks types of data kept about each object.

DoD-Compliant Methodology Conventions

Fleet logistic functions need to interface with DoD systems and with commercial systems that deal with other Government agencies. So, DoD-compliant computer-aided software engineering (CASE) methodology conventions are the recommended minimum standards for development and depiction of E-R data models for fleet logistics applications. DoD methodology includes terminology for E-R concepts, notation for E-R diagrams, and query capabilities for working with data models. A summary of this methodology's conventions is provided in following paragraphs and in Appendix A.

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3.2. Data Modeling Concepts, Continued

Components and Basic Concepts of Data Models

Data models have three components:

- *Diagrams:* A diagram or set of diagrams depicting the three basic data modeling concepts of: entities of the organization needs to track, relationships between these entities, and attributes of the entities.
- *Glossary:* A glossary (often called data dictionary) containing a complete and unambiguous definition of each entity, relationship, and attribute in the data model.
- *Business rules*: A written statement of the business rules depicted in each relationship of the model.

Data Modeling Conventions

Data modeling conventions for identifying, categorizing, defining, and integrating in data models the basic concepts of entities, relationships, and attributes are described in **Section 3.3, Develop and Submit Data Model.** These data modeling conventions are based on the DoD-compliant methodology conventions refined from the classical E-R modeling technique. Similar conventions exist for most other versions of E-R modeling techniques. Using this methodology, data modeling concepts, conventions, and terminology provides a common language among development teams, who may be using different analysis/modeling techniques and CASE tools. However, this document does not impose the graphical notation diagramming conventions because those are dependent on a particular CASE tool convention or software product.

It is the responsibility of the development or maintenance team to translate any internal terminology to the equivalent DoD-compliant CASE methodology language before submitting deliverables or sharing information with other teams.

Additional Explanation

Appendix A provides a summary of data modeling and examples of the concepts used in the following procedures. Further detail is available from the references cited in **Section 1.**

3.3. Develop and Submit Data Model

Purpose

This section describes the preparation of conceptual and logical data models for an application, and presents a recommended development process. This process consists of five parts:

- Develop conceptual data model
- Develop key-based logical data model
- Submit logical data model
- Develop attributed data model
- Submit attributed data model

Section 11 shows where these processes fit into the typical system development phases.

Responsibility

For a new or redesigned information system, the development team charged with application design is responsible for performing the tasks described in this subsection. Data models are also developed by data stewards to describe a business process, or by users who require a specialized view of the data. The individual who takes the lead in this data modeling effort should notify fleet logistics data administration (DA), and will serve as the point of contact for data administration issues. This individual should obtain a user account on the fleet logistics metadata repository system. Although the approved attributed data model is the critical deliverable product, the developer is encouraged to work with fleet logistics DA at each stage of data model development, to ensure compatibility of the application's data definitions, and to expedite acceptance of the Database Description Document (DBDD), Interface Description Document(s) (IDD), and data model. Refer to **Section 11, Data Life Cycle Methodologies** for specific metadata deliverables associated with development milestones.

Metadata and Design Reviews

Design reviews, especially user/developer joint technical reviews held early in the design phase, are valuable forums for validating and resolving data issues. Management reviews are an appropriate forum for presenting issues such as standards, data re-use, and data quality. These review forums cannot, however, take the place of the consistent data model and data element normalization process described in **Sections 3 and 4.**

As noted in **Section 11**, the system developer or maintainer should transmit the logical data model after resolution of comments from the preliminary design review (PDR) with the System Specification (SSS), preliminary DBDD and preliminary IDD at the end of the system design or high-level design phase. The developer or maintainer should transmit the attributed data model as part of the package (with SSS and System Requirements Specification, DBDD, and IDDs) at the end of the detailed design phase. DA accepts the application data model when all entities, relationships, and data elements are congruent with the fleet logistics enterprise data model.

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3.3. Develop and Submit Data Model, Continued

Levels of Data Models

There are three levels of refinement for a data model, each more detailed:

Entity-relationship conceptual data model: At this level, only the entities and relationships are shown. This model is generally used to show information about a broad subject area with limited depth of detail. This model may show non-specific relationships as well as specific ones. At this stage, the design team should investigate the metadata repository to match application data requirements with standard definitions, for as many entities as possible. Refer to **Section 6, Implement Metadata Repository,** for use of the metadata repository.

Key-based logical data model: In this model, keys for each entity are designated and shown. All non-specific relationships should have been resolved (normalized) at this point. Only specific relationships appear in this level model, identified with primary and foreign keys. At this stage, the design team should have incorporated all possible standard entity definitions, and identified unique entities for submittal as candidates.

Fully attributed logical data model: In this model, all attributes of each entity are shown. This is a highly detailed but narrowly scoped model that can be used for system construction and implementation. This model should reuse standard data elements as much as possible. All entity standardization issues should be resolved with the Data Administrator before approval. Approval of the fully attributed model is required before development can proceed.

Data Model Development Process

Development of a conceptual and logical data model for an application is generally a three-stage process with increasing levels of detail included to support the three levels of data model refinement.

Note that this process requires identification of data using standard entity and element definitions first, then validation of new definitions for definitions not found in the standard set. This sequence is required for development or upgrade to a fleet logistics standard system.

The acceptance criteria for deliverable data models are provided in **Section 8, Ensure Data Quality.**

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3.3. Develop and Submit Data Model, Continued

Develop Conceptual Data Model

This procedure results in the initial ER diagram, based on standard metadata. Use this information for preliminary design documentation. Determine the entities and the relationships between them reusing standardized definitions from the fleet logistics corporate/enterprise data model, using the following procedure:

Step	Action
1	***Determine Scope:*** Establish the scope (breadth) and level (depth) of the data modeling effort for this application. Use the business process/activity model (DoD methodology or equivalent) as a basis to establish this scope.
2	***Define View and Import Standard Metadata:*** Define the view of the data required for the purpose and scope of the model, and download a corresponding set of metadata from the fleet logistics DA repository. Load these entities and attributes into the modeling tool as a starting point.
3	***Collect Source Information:*** Use process model, high-level data architecture, requirements documents, analyses, functional procedures, training materials and other available information. Research all information, interfaces, and processes within the scope of the application. Identify all data items that are created, used, changed, or deleted.
4	***Match Source Data with Standard Metadata:*** Match data items with standard entities and data elements as much as possible. When small discrepancies are encountered, consult the appropriate data steward to validate the uniqueness of the local data. Most data items should map to standard entities and data elements.
5	***Determine Entities for Unique Data Items:*** For any data items that cannot be matched with standard entities and elements, define new metadata. Define candidate primary entities. Test that each is uniquely identifiable. Validate the uniqueness of each apparently unique entity and element with the appropriate data steward.

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3.3. Develop and Submit Data Model, Continued

Develop Conceptual Data Model (continued)

6	***Determine Relationships:*** Model all connection relationships, name and define each, and document each with business rules. Note differences from the relationships that were provided with the standard metadata. Validate the differences with the appropriate data steward(s).
7	***Prepare ER Diagram:*** Draw the entity relationship diagram for the application's view, using the validated metadata developed in the previous steps.
8	***Validate and Integrate Diagram:*** Use an extended, expert team to validate the model for accuracy and completeness. Integrate multiple views. Using the fleet logistics metadata repository, match each candidate entity to the closest standard entity, and reconcile in favor of standard. This version of the model can be used in functional requirements documentation.

Developer Access to Standard Metadata

The fleet logistics data administrator will provide technical support to load fleet logistics standard metadata as a starting point for a new or revised application data model. The project data administrator should contact the fleet logistics DA for additional information.

Online access to the fleet logistics metadata repository should be requested from the Fleet Logistics Center IRM Division. Include in the request the name of each requested user, with organization, job title, email address, and location.

Online access to the Coast Guard Data Dictionary System (DADDS) should be requested from the Coast Guard Data Administrator (G-TTC-3).

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3.3. Develop and Submit Data Model, Continued

Develop Key-Based Logical Data Model

This is the second, refining and validating phase of data model development. This step ends with submittal of the logical data model and draft DBDD. Add detail to entities and relationships, and determine a unique identifier and definition for each entity that eliminates redundancies, nonspecific relationships, and nonstandard definitions, as follows:

1	***Resolve all nonspecific relationships:*** Eliminate many-to-many relationships by introducing associative entities; define/document them. Define new relationships between the new associative entity and the entities associated by the old nonspecific relationship.
2	***Identify candidate keys*:** For each independent entity, list all attributes (or sets of attributes) that could serve to uniquely identify instances of the entity.
3	***Select primary key*:** For each entity, select from the candidate keys the best candidate and designate it as the primary key.
4	***Migrate foreign keys*:** After choosing primary keys, "migrate" these keys through relationships to become foreign keys in other entities. Primary keys in parent entities migrate "downward" to become foreign keys in child entities. Designate primary keys for dependent entities.
5	***Expand category hierarchies:*** Expand category hierarchies and establish category relationships for subtype entities.
6	***Refine and revalidate the model to application and to standard*:** Once detail has been added, reevaluate the model to ensure it is still syntactically and semantically correct. Refine the E-R diagrams and entity definitions. Indicate cardinalities for all relationships.
7	***Integrate key-based model into application data model:*** Submit this validated logical model to fleet logistics Data Administration for evaluation. Submit a copy of the validated key-based model and the revised application model to DA repository configuration management. This model version can be used in detailed requirements documentation, including the preliminary versions of the DBDD and IDD
8	***Develop and standardize primary key data elements:*** Define the primary key data elements as standard data elements. **NOTE:** Primary keys must be standard data elements. For primary keys that are not be defined as standard data elements, prepare a standard data element candidate request and submit to fleet logistics Data Administration.
9	***Submit Validated Logical Data Model:*** Prepare and submit the ER diagram along with the draft DBDD. For a development project, submit through the program office. For a user-developed application, submit these documents to DA for review.

Continued on next page

3.3. Develop and Submit Data Model, Continued

Develop Attributed Data Model

Once the logical data model and preliminary DBDD are approved, add the next level of detail, the attributes for each entity. Again, use standard attribute names and definitions first, and create new ones for validated unique requirements only. Complete the task of identifying all attributes for entities and defining metadata for each attribute/data element, as follows:

Step	Action
1	***Determine non-key attributes:*** Identify all non-key entity attributes. Record any known information about each, but emphasize identification.
2	***Identify category discriminators:*** Designate attributes that discriminate among instances of category entities.
3	***Integrate into the application data model:*** As with the key-based model, integrate the model back into the application model. Submit a copy of the key-based model and the updated application model to Configuration Management.
4	***Develop standard data elements:*** Once a model is fully attributed, each attribute must be rigorously defined as a data element (refer to **Section 4, Standardize Data Elements**). This version of the model can be used in the CSCI software requirements milestone review, and as a basis for the physical database design.
5	***Submit for Acceptance and Integration:*** Prepare and submit the attributed data model for acceptance by the fleet logistics DA: 1. Obtain development team management release, typically through a Quality Assurance a group. 2. Prepare transmittal forms and associated documentation. 3. Transmit through the program manager to DA. The preferred means of transmittal will be specified by DA. 4. Correct discrepancies when notified, and resubmit the corrected model. 5. When accepted, use the attributed data model as the basis for physical database and application design. 6. During software development, submit revisions as necessary..
6	***Submit Attributed Data Model and DBDD:*** Prepare and transmit the attributed data model along with the final DBDD and accompanying IDDs. For a development project, submit through the program office. For a user-developed application, provide design and database and interface description documents to DA for review.

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3.3. Develop and Submit Data Model, Continued

Data Model Submittal Package

The proposal package consists of the ER diagram, electronic version of the model in the prescribed format, and related hardcopy documentation (such as DBDD). The package should be of a size and complexity that the proposed data model/subset can be understood and placed in context with other models for related functions or entities. DA will specify the appropriate means for transmittal.

When a large model is being used for a proposal, a number of sets of proposal packages, each based on a partition of manageable size, should be prepared in accordance with the guidelines in this section. The partitions between the set of proposal packages do not need to contain model components that are all mutually exclusive. An entity could be proposed for more than one partition, when the entity has a large number of relationships which extend across the boundaries of the larger model.

Identification of Submittals

The data model submittal package includes the following components:

Component	Description
1	Application, project, or function name and identifier
2	Coast Guard sponsoring organization and point of contact
3	Function or project data administrator name and organization
4	Submittal date
5	Version number and date of the subset (view) standard metadata that was provided to initiate this modeling process
6	Version number and date of the enterprise data model the proposal is being compared to
7	Information systems within the CG with which the application shares data
8	Information systems outside the CG with which the application shares data
9	Information system(s) supported by the E-R Diagram
10	Model component count
11	CASE Tool (and version) used to generate the E-R Diagram

Utilize Standard Definitions

Standard definitions are available in the fleet logistics metadata repository. As more models are submitted, the number and variety of standard entity definitions will grow. When possible utilize a standard definition rather than developing a similar unique definition or subset. Enterprise-wide information sharing depends upon compatible data across systems. This principle applies both to the fleet logistics enterprise and the CG corporate enterprise.

3.4. Receive and Evaluate Data Model

Introduction

A data model is the basis for understanding and defining a system's data requirements through the concepts of data entities and their relationships. A data model is submitted by the system's development team as part of the Requirements Analysis and Design phase for the system's functions. This data model describes the data entities that will be used by the various application systems that will be developed. Review and acceptance of the data model is critical to effective analysis of data administration requirements.

These steps show how fleet logistics DA reviews and validates a submitted data model, and then integrates the data model into the fleet logistics metadata repository. These steps are important because the repository contains information prescribing how data is used in all fleet logistics operations.

One of the main goals of the fleet logistics DA effort is to provide for organization-wide use of the data resources that are maintained by various CG organizations for this purpose. Effective use depends heavily upon matching the definitions and names of similar data elements throughout the system. This matching task highlights duplications of similar data entities. It prompts for clarification of the important differences between distinctly different but similar-appearing entities. Matching the definitions and interfaces of data entities is the first step in this process.

Responsibility

Performing the duties described in this subsection is the responsibility of the fleet logistics Data Administrator or a designee of the Data Administrator.

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3.4. Receive and Evaluate Data Model, Continued

Data Model Submittal Package

The proposal package is used to propose data models and/or subsets based on a tightly integrated function, or contained in a single subject area, as a candidate for inclusion into the standard data resource. The model should have been prepared in accordance with the procedure provided in **Section 3.3.** The package should be of a size and complexity that the proposed data model/subset can be understood and placed in context with other models for related functions or entities. Quality criteria for review of a data model are provided in **Section 8.**

When a large model is being used for a proposal, a number of sets of proposal packages, each based on a partition of manageable size, should be prepared in accordance with the guidelines in this section. The partitions between the set of proposal packages do not need to contain model components that are all mutually exclusive. An entity could be proposed for more than one partition, when the entity has a large number of relationships which extend across the boundaries of the larger model.

System developers and maintainers should use this checklist to prepare the identifying information for each data model submittal package. Fleet logistics DA staff will use this list to check-in each submitted package.

Component	Description
1	Application, project, or function name and identifier
2	Coast Guard sponsoring organization and point of contact
3	Function or project data administrator name and organization
4	Submittal date
5	Version number and date of the subset (view) standard metadata that was provided to initiate this modeling process
6	Version number and date of the enterprise data model the proposal is being compared to
7	Information systems within the CG with which the application shares data
8	Information systems outside the CG with which the application shares data
9	Information system(s) supported by the E-R Diagram
10	Model component count
11	CASE Tool (and version) used to generate the E-R Diagram

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3.4. Receive and Evaluate Data Model, Continued

Review Submitted Data Model (General)

Fleet logistics DA reviews the submitted data model documentation for completeness and format, using the following procedure:

Step	Action
1	***Log-in package as received.*** - Note the date transmitted, version number and release date, title, number of separate diagrams, number of data entities, number of relationships, etc.
2.	***Evaluate the submitted model against related existing models.*** - Identify metadata conflicts. - Identify potential conflicts among the other models in-process that have not yet been integrated into the standard enterprise model.
3	***Check scope.*** - Does this data model represent a functional business area, the entire application or a single view? - Does this data model correspond to the previously submitted process model? - If the data model does not correspond to the process model, stop review here and request complete model from developer or maintainer.
4	***Check the entity relationship diagram.*** - Does the model meet the criteria described in **Section 8**? - Does it follow DoD-compliant CASE methodology notation? - Are all entities and relationships included and accurate? - Are all relationships normalized? - Note discrepancies on discrepancy report.
5	***Review aggregate entities.*** In simplified versions of the model, *do aggregate entities represent reasonable abstractions of the detailed model?*
6	***Are all attributes completely identified and documented*** - by name, definition, and type? - Are all attributes that can be defined using standard data element definitions so defined? - Are all nonstandard attributes necessary, unique, and likely candidates for standard data elements?

Disposition of Incomplete Submittals

When fleet logistics DA finds that a data model package is improperly or incompletely identified (see checklist above) or the model has incomplete or inadequate content (see procedure above), the DA will return the package (without evaluation or action) to the developer or maintainer for correction and resubmittal.

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3.4. Receive and Evaluate Data Model, Continued

Submit and Review Data Model (Entities)

Developers and system maintainers will prepare and fleet logistics DA will review the entities documented in this data model for completeness and format, using criteria in **Section 8** and the following procedure:

Step	Action
1	***Check all data entities.*** - Is each documented completely as described in **Section 3.2, Develop and Submit Data Model?** - Does each have a distinctive and appropriate primary key? - Are foreign keys migrated through the indicated relationships? - Does each definition match a standard entity definition?
2	***Verify the information class for each entity.*** - Do all entities fit into the current standard information classes? - Are proponents and functional experts available for each? - Do new information classes need to be established, definitions adjusted, or new functional experts recruited?
3	**Check all *independent entities.*** - Is each properly defined? - Is each uniquely defined?
4	**Check all *dependent entities.*** - Is the unique identification of its instances dependent on its relationship with one or more other entities? - Is the dependence documented in the relationship?
5	**Check all *associative entities.*** - Does each replace a many-to-many relationship? - Is the dependency in both directions documented in the business rules and in the relationship?
6	**Check all *Generic and Category entities.*** - Is each category (subtype) indicated by a clear and appropriate discriminator attribute?

Coordination with CG Metadata

For each entity and attribute (data element) that is new (not part of the fleet logistics standard data model), the fleet logistics DA will check for the existence of a similar, usable entity or attribute in the CG metadata repository. When possible, the fleet logistics DA will require use of the CG entity or element name and definition. Use of the CG entity or element may not be possible if the proposed new entity's or element's characteristics are significantly different from the one in the CG repository, or must have different characteristics in order to share data with other systems or organizations.

When the fleet logistics DA determines that a new entity or element is appropriate, the DA will submit the new entity or element to the CG DA for inclusion in the CG metadata repository.

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3.4. Receive and Evaluate Data Model, Continued

Submit and Review Data Model (Relationships)

Developers and system maintainers will prepare and fleet logistics DA will review the relationships documented in this data model for completeness and format, using the following procedure:

Step	Action
1	***Check all relationships.*** - Is each properly named ENTITY-VERBPHRASE-ENTITY? - Do the relationships reflect the business process? - Do the relationships indicate the best use of information resources? - Is the business rule for each relationship described? - Are parent-child relationships documented adequately? - Is cardinality indicated, and are the upper and lower bounds consistent with the business rules? - Is each relationship necessary? - Do relationships indicate the use of standard data resources when available? - Is each relationship necessary for the application?
2	**Check all *specific relationships.*** - Are the parent-child relationships documented accurately?
3	**Check that all *nonspecific relationships*** have been normalized by introducing an associative entity.
4	**Check that *recursive relationships*** are documented to permit following of a chain of relationships, with traceability in both directions.
5	**Check that *structural relationships*** are true component-assembly relationships, and that any multiple relationships are within the capability of the database management system to support.
6	**Check all *category relationships.*** - Is a category discriminator provided? - Are all entity type hierarchies appropriate and supported by the standard data definitions?

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3.4. Receive and Evaluate Data Model, Continued

Validate Functional Attributes and Business Rules

After issues of format, completeness, and methodology have been resolved (or noted as a discrepancy for later resolution by the developer or system maintainer), the functional aspects of each entity must be validated by the appropriate data steward(s).

The fleet logistics DA and the appropriate data stewards will assess functional attributes and business rules using the following process:

Step	Action	Responsible	Description
1	Assign Entities to Stewards	Data Administrator	Assign entities to data stewards by information class of the key attribute.
2	Prepare and Transmit	Data Administrator	For each set of entities to be assigned to a data steward, copy the hardcopy entity definition(s), prepare the transmittal sheet, and send the sets to the appropriate data stewards.
3	Evaluate and Recommend attributes	Steward, with Functional Expert(s)	For each assigned entity, check attributes. - Are entities and attributes used appropriately? - Is the key attribute for each appropriate? - Are all attributes standard data elements? - Do any nonstandard attributes merit creation of a new standard data element? - Do the standard domains of each attribute meet the needs of this application? - Are the business rules reasonable? (Refer to **Section 9**.)
4	Return Recommenda-tions	Steward	For each element recommend one: • Acceptance as submitted • Acceptance with specific modifications • Return to developer or maintainer to resolve problems Return recommendations and supporting material to the Data Administration office. (Refer to **Section 9**.)
5	Evaluate and Act on Recommenda-tions	Data Administrator	Review data steward's recommendations. With the agreement of the developer or maintainer, resolve problems that require only minor corrections. For issues that require attention by the developer, add to the discrepancy list.

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3.4. Receive and Evaluate Data Model, Continued

Prepare Discrepancy Report

After reviewing the model, DA staff will compile the discrepancy list using the Metadata Discrepancy Report (DR) form provided in **Appendix D**, or a similar on-line format. Assign each discrepancy a tracking number. For each discrepancy, cite the explanation, and add a sentence to instruct the developer or maintainer how to correct the problem. DA will send the discrepancy report(s) to the developer/designer, the application's program manager, to the designated metadata CM, and to the project's quality assurance manager.

Track Discrepancy Resolution

As DR replies and metadata re-submittals are received, DA will track the resolution until all discrepancies are resolved satisfactorily, using this procedure. The procedure applies to each receipt of corrections.

Step	Action
1	Receive and log corrected model, definitions, or other material.
2	Evaluate, especially against previous discrepancies. Resolve any metadata conflicts through the process described in *Review Submitted Data Model (General)*, steps 2-6, above.
3	Accept and close-out each corrected discrepancy. Keep all documentation and correspondence that resulted in resolving the discrepancy. Label and store it by discrepancy tracking number(s).
4	Report the revised discrepancy list to the data administrator.
5	Notify developer or maintainer of acceptance of closed-out.

Accept Application Data Model

When all discrepancies have been resolved, the fleet logistics DA will accept the data model, using the following procedure. Resolution of the final item on the discrepancy list initiates this acceptance action.

Step	Action
1	Check the discrepancy list for unresolved or inconsistent issues.
2	Notify the Data Administrator that all entities, elements, and relationships in the application data model are approved to incorporate into the fleet logistics enterprise data model.
3	Release the version of the standard enterprise model that includes the changes initiated by this application. Forward the change notice to the appropriate data stewards, the organization that generated the request and to the CG Data Administrator (G-TTC-3)
4	Increment the version of the enterprise model, and transmit a copy to the repository CM. Also transmit a copy of the approved application model to the repository CM.

3.5. Submit Changes to Data Models

Introduction

As the design is reviewed and refined, and during the development process, the requirement to revise an application's data model will occur. These steps describe the process for updating of the approved and integrated standard data model and keeping the application's current model aligned with the standard model.

Responsibility

The system developer or maintainer, data steward, or information user requesting the data model change should perform the steps outlined in this subsection.

Prepare Metadata Changes

The physical transfer of changes consists of submitting the properly identified metadata documentation to fleet logistics DA. Preparation is important to reduce unnecessary correction and re-definition during the request review process. Use the following checklist for each revised entity, to ensure smooth and accurate merging, and to expedite acceptance of the revised model:

✓	Check for:	Criterion:
	Metadata conflicts between proposed entity and existing entities in the data model.	Relationship of entity to contiguous entities.
	Conflict with current information class the entity would be part of.	Definition of information class.
	If an independent entity, proper definition.	Is it uniquely defined?
	Relationship with parent or child entities.	Is it properly defined?
	Relationship with associative entities.	Does this relationship replace a many-to-many relationship?
	Relationship with Generic and Category entities.	Does this entity fit into that Generic or Category entity?
	Data quality factors	Has all data quality (validation, synchronization, access, etc.) information been provided for each change? What is the data quality effect on other standard systems?
	Impact on other standard systems.	Do any of the proposed changes to standard metadata require changes to other standard systems? What is the cost and benefit of each change?

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3.5. Submit Changes to Data Models, Continued

Data Model Submittal Package

A complete change request package consists of the ER diagram, electronic version of the model in the prescribed format, and related hardcopy documentation (such as DBDD and IDDs). The package should be of a size and complexity that the proposed data model subset can be understood and placed in context with other models for related functions or entities. Changes from the previously approved version (or standard metadata) should be marked clearly. A Metadata Submittal cover sheet is provided in **Appendix D**.

Identification of Submittals

The data model submittal package includes the following components:

Component	Description
1	Application, project, or function name and identifier, and abbreviation (if any)
2	Coast Guard sponsoring organization and point of contact
3	Acquisition or funding organization and point of contact
4	Function or project data administrator name and organization
5	Submittal date
6	Version number and date of the subset (view) standard metadata that was provided to initiate this modeling process
7	Version number and date of the enterprise data model the proposal is being compared to
8	Information systems within the CG with which the application shares data
9	Information systems outside the CG with which the application shares data
10	Information system(s) supported or affected by the requested change(s)
11	Model component count
12	CASE Tool (and version) used to generate the E-R Diagram

Submittal Procedure

After checking for complete metadata changes, submit the revision using the following procedure:

Step	Action
1	Release the request per the project's operating procedure..
2	Prepare transmittal forms and associated documentation.
3	Transmit through the program manager to fleet logistics DA.
4	Correct discrepancies when notified, and resubmit the corrected details.
5	When accepted, use the approved attributed data model as the basis for physical database and application design.

3.6. Maintain Configuration of Data Models

Introduction

This series of procedures shows how to make changes, estimate the impact of changes, and implement changes to the metadata repository.

Configuration management of data models occurs at two levels: versions of the application models and versions of the standard enterprise data model. Operations of (and user access to) the fleet logistics metadata repository are described in **Section 6.** Processing of changes to metadata is described in **Section 7.**

Responsibility

Generating and submitting a change request is the responsibility of the developer, maintainer, steward, or information user who recognizes the need. Reviewing and acting on the request is the responsibility of the fleet logistics DA. The version numbers for an application model are assigned by the application system's configuration manager. The version numbers for the fleet logistics standard metadata are assigned by DA repository administrator. .

Configuration Management of Metadata

The repository administrator ensures that any changes requested to or data inquiries from the fleet logistics application and standard enterprise models are in relation to the most current version of each of those models. This assures system developers, system maintainers, data stewards, and users that any data entity they are referencing is current and approved. Changes to the fleet logistics data model, conversely, may require update of systems and applications which use that portion of the standard data model.

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3.6. Maintain Configuration of Data Models, Continued

Metadata Repository

Changes that have been approved by the DA are recorded in the fleet logistics metadata repository. The following is a brief description of the CASE repository that is the underlying platform of the data repository.

The fleet logistics repository is comprised of a Data Dictionary and Data Encyclopedia.

- The *Data Dictionary* is defined as the storage site (logical and/or physical) of data structure definitions, including the listing of which systems have instances of which standard data elements.
- The *Data Encyclopedia* is defined as the storage site of system parameters, such as data structure definitions, process definitions, Data Flow Diagrams, and other items pertinent to the development, operation, and maintenance of computer systems software and use of the standard information resource.

The fleet logistics metadata repository is defined as the collection of all information pertaining to the encyclopedia plus: pre-planning documentation, baselines, group charters, project management information, correspondence pertinent to the development process, repository CM information, and any other information related to the process of generating the computer system during its entire life-cycle.

Operation of the fleet logistics metadata repository is described in **Section 6**.

Active and Passive Repositories

The fleet logistics metadata repository is a "passive repository" from the system developer's, maintainer's, and user's point of view. . In such repositories, the analyst "checks out" pertinent information for his task from the master copy of the encyclopedia, performs his work on that information, and then checks it back into the encyclopedia. For fleet logistics standard metadata, the developer or maintainer checks out the application's view or subset of the standard data model, applies it to the application, and then requests changes that will reconcile the completed application model to the standard data model. The fleet logistics DA will make the changes to the standard enterprise data model after review and approval.

Data models at the application system or business process level are likely to employ an active encyclopedia, where the developer or analyst directly works on the master copy of the encyclopedia. The change request process is designed to bring the completed application (local) metadata into congruence with the fleet logistics standard metadata by resolving differences that arise during analysis and development.

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3.6. Maintain Configuration of Data Models, Continued

Online Access to Repository

Developers and maintainers of fleet logistics information systems, data stewards, and users of enterprise data are likely to need access to current standard metadata. Use this procedure to obtain user access to the fleet logistics metadata repository.

Step	Action
1	Prepare Repository User Request (form supplied in **Appendix D**).
2	Submit request to fleet logistics DA office.
3	After notification letter is received, log in, change the account's password, and set user options.
4	Perform status requests, send email, and download metadata as provided in your profile of user privileges.
5	When your need for access to the repository is ended, notify the repository system administrator to terminate your account.

Repository User Privileges

Users of the fleet logistics metadata repository are typically assigned the following account privileges:
View status of submitted metadata change requests (for user's system(s))
View list of registered standard systems
Perform "where-used" queries for standard data elements
Display and download user-specified metadata views

Fleet logistics metadata repository operations are described in **Section 6.** Users of this repository are likely to require CG-wide metadata also. The Coast Guard Data Administration Dictionary System (DADS) is described briefly in **Section 12.**

3.7. Generate Data Models from the Repository

Introduction

This series of steps shows how to select entities and package them into a view or subset. These views, whether on-line or in hardcopy form, are essential in helping the system developer or analyst to visualize the data model and its individual components. Physical diagrams can both validate an assumption concerning an entity, as well as illustrate any deficiencies in the design and placement of that entity within the data model. These instructions assume the reader has obtained a user account for the fleet logistics metadata repository system, as described in the previous subsection.

Extract Metadata Objects

Use this procedure to extract metadata objects from the repository when requested by a developer or other analyst.

Step	Action
1	Log on to the repository system, and select the front-end query tool for the standard metadata database.
2	Select the model or subset to view by model name and/or version number, or create a user-specified view.
3	Query by one of the following items: entity types entity name relationship types

Generate Requested Data Model

Use this procedure to generate a requested data model, such as an application model or user view.

Step	Action
1	Determine whether the model or subset extracted is the one appropriate to the analysis at hand.
2	Select the method to generate the data model - on screen, to a file, hardcopy, etc.
3	Save the requested view, if desired, for future reference.

3.8. Coordinate Data Model Development and Integration

Purpose

This series of tasks describes the proactive coordination and integration activities of fleet logistics DA, among the application systems that are in analysis and design phases. By monitoring and guiding the development of process and data definitions, interfaces, and uses of data, each system's metadata will be closer to standard when submitted. The goal of this effort is to minimize the amount of rework required after submittal of data models and data element definitions.

The role of this coordination and guidance task is to allow system designers the room to think creatively, but then to identify commonality among their process and data definitions. This metadata support permits designers to achieve metadata consistency and full use of the standard data resource before submittal. This will help to ensure a greater degree of success upon initial submittal of the data model.

This coordination role will be performed for systems that have been authorized for design, but have not yet submitted Database Definition Documents. It can be performed as part of the system design phase as described in **Section 8**.

Responsibility

Performing the duties described in this subsection is the responsibility of the fleet logistics DA or a designee of the DA.

Provide Coordination and Oversight

The following actions constitute the metadata coordination role:

1. Provide initial guidance and instruction regarding data standards and administration requirements.
2. Review each system's design documents to understand the uses of data in each development project.
3. Review each application's process, data, and control descriptions, decompositions, and models.
4. Guide developers, system maintainers, and users of standard data in the use of data modeling, documentation standards, and application of standard data definitions.
5. Recognize and verify opportunities for metadata commonality.

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3.8. Coordinate Data Model Development and Integration, Continued

Provide Initial Guidance

Fleet logistics DA will provide information as training or a series of briefings to the program management and development teams for each application. This proactive outreach role provides the development team (or data steward or data users) with data compatibility goals, sets achievable expectations, and shows the team how to use the standard data tools to speed up development. A standard set of briefing materials will be provided. These materials are described in **Section 8.**

Review Design Documents

Review each system's preliminary design documents, functional requirements documents, and database and interface design documents as they are submitted at the appropriate project milestones, to understand the uses of data in each development project. The review of data standards-related deliverables is coordinated by DA, with data steward participation.

Database Design Documents (DBDD) and Interface Design Documents (IDD) are the program milestone documents that include most data standards information. Software Requirements Documents, Functional Descriptions, and System/Segment Specifications include process definitions and are useful to evaluate data security, integrity, and synchronization requirements. As part of the coordination function is to show the development team how to include metadata in these documents, the DA's review of these documents ensures compliance at the appropriate milestones as described in **Section 11.**

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3.8. Coordinate Data Model Development and Integration, Continued

Review Process and Data Models

From process and data models in CASE tools, the DA analyst can understand the use of data in the application, and identify potential problems and opportunities. The process model provides a basis for security requirements/risk analysis, and for identification of potential data synchronization and integrity problems. The process model also shows opportunities for use of standard data, adaptation of standard processes and existing software, and development of data that is usable by other systems.

The data model provides the first look at data entities, with the opportunity to match the system's data requirements to standard data entity and relationship types. DA must facilitate matching to standard entities, and encourage limiting definition of unique entities to necessary cases.

Guide Developers to Implement Data Standards

A major challenge of a central data resource is the goal of compatible, portable, consistent, high-quality data from applications that are developed at different times by different teams using different tools. In addition, human nature leads most people to consider their own problem as unique, and their own perspectives as the best possible. In information system development, these forces combine to skew development into uniquely defined, specialized "stovepipe" systems. The current mandate for compatible systems and a central data resource requires aggressive and persistent guidance and support to each development team.

Verify Opportunities for Metadata Commonality

From the information gathered through review of materials and communication with designers, identify the potential opportunities for common definitions, use of existing data, and consistent interfaces. For each opportunity, reconcile the entities amongst the different design documents from both the standard data model and other systems which may currently be in development for identical, similar, and different entities, as well as identical or similar entities which have different relationships.

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3.8. Coordinate Data Model Development and Integration, Continued

Coordinate and Negotiate Definitions

Data Administration staff will coordinate the process of ensuring common metadata among the systems in design phases. When opportunities for commonality are found, the designated facilitator will:

Step	Action
1	Coordinate with the development teams to make a common item out of slightly different ones.
2.	Coordinate the negotiation among the concerned development teams, to achieve commonality without compromising requirements.
3	Recommend solutions that meet the needs of the CG information resource.
4	Call upon management of system developers and maintainers to make decisions that the principals may not have the authority to make.
5	Document the results of negotiations and findings.

Integrate Standard Definitions

The data steward for a particular data entity will facilitate agreement between two or more development teams regarding a data entity and/or data element definition, term definition, or interface. The designated DA staff will incorporate the newly agreed item into the fleet logistics enterprise data model and metadata repository.

3.9. Improve the Data Model Development and Integration Process

Purpose

As part of the review and negotiation cycles that are described previously, issues will be raised and refinements will be negotiated that will improve the data modeling and definition process. These improvements must be documented and incorporated into the DA system. The following procedures show how to document and submit the typical kinds of decisions, refinements, and lessons-learned as they become apparent.

Responsibility

The individuals who are working with development teams to standardize the models are in the best position to recommend improvements to this process. The standards and the process must improve continuously if it is to meet the changing needs of the fleet logistics community. Attention to this duty is as important as any other standardization task.

Identify Metadata Quality Issues

Metadata quality issues include conditions that harm the validity of a data standard, defeat security principles, and cause data to be useless or deficient across the data model.

The following procedures describe the general actions to address metadata quality issues.

Step	Action
1	Record and analyze those instances when metadata quality issues occur.
2	Identify the recurrent problems and determine the causes.
3	Prepare metadata changes according to normal procedures (see the sub-section "Submit Metadata Changes").
4	Submit metadata changes according to normal procedures (see the sub-section "Submit Metadata Changes").

Continued on next page

3.9. Improve the Data Model Development and Integration Process, Continued

Identify Requirements for Data Element Standardization

Refinements in data modeling practice that improve the clarity of the data will help system developers define and propose more useful data elements. The DA process must remain receptive to improvement and open to inclusion of new techniques and practices.

The following procedures describe the general actions to address deficiencies in, or to make improvements to, the metadata standardization process.

Step	Action
1	Record and analyze typical errors system designers, data stewards, and users make when proposing new data elements. entities, and definitions. Formalize requirements that are imposed by the fleet logistics data sharing community that may not be apparent from a subset view of the data.
2	Identify recurrent problems or inefficiencies in the submittal and review process, and determine the causes.
3	Review any "lessons learned" documentation from previous system design efforts and determine if any of these lessons apply to the problems identified.
4	From the data stewards' monitoring of data quality (refer to **Section 8**), identify any flaws in the data model or faults in data element definitions that cause or facilitate data errors.
5	Review the current academic research on data modeling and determine if any of the new thinking on data modeling applies to the problems identified.
6	Refine the structure the fleet logistics enterprise data model, if necessary, using the standard updating and CM procedures outlined in this manual.

Continued on next page

3.9. Improve the Data Model Development and Integration Process, Continued

Identify Requirements for New Information Classes

As the current data models and data standards are applied to fleet logistics business processes, old processes and/or assumptions may need to be updated or discarded. If a significant number of entities appear to be misplaced in their current information classes, or a functional organization has created a new division which controls certain entities, DA may need to create a new information class within the fleet logistics enterprise data model that reflects these new business conditions.

Careful DA review is important because the perspective of a business process or application may show the need for a new information class, entity, relationship, or other item, but the enterprise view may account for that requirement differently.

The following procedures describe the general actions to identify and create a new information class.

Step	Action
1	Verify that the new information class is unique within the model.
2	Prepare a new E-R diagram reflecting the information class (and/or other proposed change).
3	Construct key-based (logical) model for that portion of the data model.
4	Submit for DA review and response.

Identify New Terms for Metadata Glossary

New models, concepts, and business practices will probably give rise to new data entities, terms, and other items that need to be defined, as well as the refinement of existing definitions. The fleet logistics metadata glossary should reflect these changes, as well.

The following procedures describe the general actions to identify and create new terms for the glossary.

Step	Action
1	Create a new entity, key term, or other definition, using the standard procedures outlined in this document.
2	Submit for acceptance and integration, using the standard procedures outlined in this document.
3	Upon acceptance, Configuration Management enters the new definition into the standard metadata glossary.

SECTION 4
STANDARDIZE DATA ELEMENTS

4.1. Overview

Introduction

Data are the representation of facts, concepts, or instructions in a manner that is suitable for communication, interpretation, or processing by human or automated means. Data standardization is the application of formalized rules for defining and composing data. Just as an enterprise or organization must manage its other resources effectively, it must also effectively manage its data resources. Data standards allow for this effective management of data.

In this Section

This section contains the following data element topics:

Topic	Section
Basic Concepts	4.2
Procedures to Standardize Data Elements	4.3
Procedures to Approve Data Elements	4.4
Maintain Data Elements	4.5
Improve the Data Element Definition Process	4.6

Continued on next page

4.1. Overview, Continued

Relationship of Data Models and Data Elements

The data required by an organization can be graphically represented in data models (refer to **Section 3, Support Integration of Data Models,** and **Section 2.5, Architectural Framework for Information Systems,** for more details on Data Models and how they fit into the overall fleet logistics Data Architecture). Data models contain entities, the relationships between the various entities, and entity attributes.

Standard data elements are the representation of entity attributes (that is, the data requirements of an organization) in a form usable within either a manual or automated data application (such as a fill-in form). Each standard data element is associated with *one and only one entity from the standard enterprise data model.* The entity attribute becomes approved as a standard data element after application of data standardization procedures, such as those described in this section.

Advantages of Using Standard Data Elements

Use of standard data elements enhances interaction among information systems, facilitates increased data sharing, reduces data handling costs, and leads to better data accuracy, consistency, and timeliness. The data element standardization procedures in this section provide the framework necessary to maximize the data sharing opportunities throughout the fleet logistics enterprise.

4.2. Basic Concepts

Introduction

This subsection describes the basic concepts of data element standardization and the data element standardization process.

In this Section

This subsection contains the following topics:

Topic	Refer to Subsection
Objectives Achieved by Standardizing Data Elements	4.2.1
Definitions and Explanations	4.2.2
Data Element	4.2.3
Components of a Data Element Name	4.2.4
Data Element Life Cycle	4.2.5
Roles and Responsibilities in Standardizing Data Elements	4.2.6
The Process of Standardizing Data Elements	4.2.7

4.2.1. Objectives Achieved by Standardizing Data Elements

Background

Standardizing data elements achieves a number of the objectives described in **Section 2, Fleet Logistics Data Administration Strategic Plan, Subsection 2.1, Goals and Objectives of Fleet Logistics Data Administration.** In standardizing the way data elements are named and defined, uniform names and rigorous definitions are developed for all shareable data elements used within the fleet logistics environment.

Purpose

Standardizing data elements helps eliminate duplication and incompatibilities in the collection, processing, and dissemination of data, increasing their usefulness. It also helps meet the requirements for sharing data among the Coast Guard fleet logistics information systems and with systems outside of the fleet logistics environment.

Supported Objectives

The primary objectives achieved through standardizing data elements are:

1. Integrated operations among the various organizations of Coast Guard Engineering Logistics
2. Minimized redundancy
3. Maximum effectiveness in processing and storing data
4. Maximum integrity (accuracy and consistency) of data
5. Reduced cost and time to develop, field, and maintain information systems

These objectives are components of the broader objectives enumerated in **Section 2, Fleet Logistics Data Administration Program.** Thus, those broader objectives directly help achieve all five data element standardization objectives.

Examples of Support for the Objectives

1. All organizations would use the same definition, format, etc., for any given entity attribute.
2. Using a common data element would eliminate redundant definitions for the same entity attribute, reducing the cost to maintain data elements because a single standard element replaces multiple, separately maintained data elements.
3. The process of standardizing the data elements forces greater understanding of the data and how it is used in the business. This greater understanding can aid in articulating requirements.
4. Using a common data element improves the possibilities for constant synchronization for that element from one physical database to another.

4.2.2 Definitions And Explanations

Introduction

To understand data standardization, we should first define the concept of "data." The word "data" can and is used in a number of ways. Reviewing some of these uses will aid in clarifying this section's key phrase, "data element."

Use this section for definitions and for background information about:

- explanations of physical and logical data
- difference between physical and logical data
- data elements
- components of a data element

Physical Data vs. Logical Data

"Physical" and "logical" are terms used to describe different representations of data.

Physical data refers to the definition of data as it is contained in technological or physical configurations. These may be a paper form, automated database, or some other representation. The definition of the physical data takes into account the constraints of the physical environment.

Logical data refers to the definition of data as it represents the structure of or relationships among the various levels of data components, such as data entities and entity attributes (refer to **Section 3, Integrate Data Models**, for more information on data entities and entity attributes).

Continued on next page

4.2.2 Definitions And Explanations, Continued

Relationship between Physical Data and Logical Data

To derive logical data, existing values of physical data are analyzed for their:

- physical characteristics
- various business names
- use or purpose within the business

Based on this analysis, common, optimal structures (logical data) are formed. Logical data can be standardized through the application of approved data standards and rules. The "logical" representation of data is used to construct new or revised representations of data in an information system.

The following two subsections present examples of physical data and logical data.

Description of a Physical Data Field

For automated databases the term "field" is used to indicate a unit of physical data. A database is said to contain a field for each component of the physical data.

Example of Physical Data

For an automated database of employee data, for example, the fields of the physical data might be:

- name
- date of hire
- current job grade
- social security number, etc.

Such a database might be used to do the weekly payroll. Since only certain data about an employee is required to do payroll, this database would be a subset of the more encompassing logical representation which might include all job grades since date of hire. The descriptions of each of these fields would provide the physical characteristics peculiar to the automated database technology such as the physical sequence in which the fields are to be recorded.

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4.2.2 Definitions And Explanations, Continued

Definition of Metadata for Physical Data

Metadata is a set of attributes that describes and defines data. In the data standards world, this idea translates into the following cliché: metadata is data *about* data.

The metadata for physical data is a collection of characteristics that describe the contents of the field. Each physical data field is described by a set of these characteristics. Examples of characteristics are:
- name
- maximum length
- type
- code description

Description of Logical Data

Logical data refers to the components making up the rational structure of business data.

Example of Logical Data

As in the example for physical data, an example of logical employee data might be:

- name
- date of hire
- positions held since hire

How is this different from physical data? Physical representations may omit some components, such as "non-current positions." Or they may contain instances of only those components meeting certain criteria, such as only the names of employees hired after January 1, 1985.

The logical representation, on the other hand, accounts for *all* representations of the physical data.

Definition of Metadata for Logical Data

The metadata for logical data is a collection of characteristics that describe the contents of the particular component of the logical data. Examples of characteristics are:

- name
- definition
- identification of entity to which this logical data belongs

4.2.3 Data Element

Introduction

Logical data are represented in a data architecture by data entities and data elements. As is stated in **Section 3.2, Data Modeling Concepts**, all entities in data models have properties or characteristics which are used to describe and distinguish them. These characteristics are called entity attributes. Entity attributes form the basis for data elements. A data element, in fact, is an entity attribute which has been more rigorously defined with a set of data element attributes.

Characteristics of Data Elements (Data Element Attributes)

Each data element has its own set of characteristics called data element attributes. They identify and describe the data element, provide a rigorous definition, and specify its context. Examples of such attributes are:

- the name of the data element
- the definition of the data element
- a list of characteristics of the data element
- descriptions of the characteristics

A full set of these data element attributes are listed in **Appendix D, Data Element Attribute Descriptions.**

Terminology

The following table defines the general data terms we use in data standardization, showing the relationship between the terms *entity attribute* and *data element attribute.*

Term	Description
Entity	A thing, fact, or concept that is important to an enterprise and for which data is collected
Entity attribute	A characteristic of an entity, such as "customer's street address;" when defined for use in applications, it becomes a data element
Data element	A more rigorously defined entity attribute. An example *is "Coast Guard* customer's street address," which requires a name in a standard format, definition in a specified format, as well as other components
Data element attribute	A characteristic of a data element, such as the *maximum number of characters*, or the *data type*

4.2.4 Components of a Data Element Name

Introduction

A crucial attribute of every data element is its name. The data element name is the primary attribute that a data element user will use in locating a data element that s/he wants to use in system development. As data standardization dictates, the name must be unique and follow a prescribed format. As defined by Coast Guard requirements, a data element name within the DA community may consist of up to the following five components:

- modifier preceding the prime word
- a prime word
- modifier(s) following the prime word
- a class word
- qualifier(s)

The following table shows these components as they appear in a data element name, shows their placement within the data element name, tells the number of instances allowed for each, notes whether the component is required or optional, and notes any special requirements for that component. The data element can have, at a maximum, 9 components. These components are described in detail in the topics below.

	Modifier Preceding Prime Word	**Prime Word**	**Modifier(s) Following Prime Word/ Class Word Modifier**	**Class Word**	**Qualifier(s)**
Number	0...1	1	If the Modifier preceding the Prime Word = 0, then 0...4 If the Modifier preceding the Prime Word = 1, then 0...3 In any case, 0...1 Class Word Modifier	1	1..2
Presence	Optional	Required	Optional	Required	Optional
Requirement	Adjective or noun	Must be 1st or 2nd component, must be before Class Word	Adjective or noun	A Class Word cannot be used as a Prime Word or a Modifier	

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4.2.4 Components of a Data Element Name, Continued

Naming Convention

A data element naming convention is critical to the success of a data administration program. A naming convention can facilitate:

- greater efficiency of data handling
- cost savings in reduced computer time
- reduced confusion among both staff and management.

Naming conventions for fleet logistics follow the guidelines set forth for the *Coast Guard COMDTINST 5230*.42A, Section 3, and the *Department of Defense in DoD Data Element Standardization Procedures* (DoD 8320.1-M-1), January 1993, Chapter 3.D, *Data Element Naming.*

Prime Word

Within the framework of a data model, a prime word is equivalent to the name of an entity identified in a data model. A prime word identifies and describes the object (entity) being defined and characterized by a data element. It is a person, place, thing, or event.

For example, fleet logistics might need to maintain information about vendors, so an entity named *vendor* would exist in the fleet logistics data model (**see Section 3, Integrate Data Models,** for more information on data models). The prime word for any entity attribute (and, by extension, any data element) that is associated with this entity would therefore also be *vendor.* By including the prime word in a data element name, the data element identifies precisely the entity to which it refers.

Coast Guard-specific prime words are centrally controlled and maintained by the Coast Guard Data Administrator. Fleet logistics DA coordinates the Coast Guard prime word list with the prime word lists of DoD and other customer and supplier organizations for use within fleet logistics. Proposals for new prime words must be based on an expansion of the fleet logistics data model and submitted for approval (refer to **Section 3.4, Receive and Evaluate Data Model** for more information on the coordination of the CG data model and data element development, and to **Section 4.4, Procedures to Approve Data Elements,** for more information on the data element approval process). Words used as prime words in some data element names may be used as modifiers in other data element names.

Example: *Vendor*

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4.2.4 Components of a Data Element Name, Continued

Prime Word Modifiers

Prime word modifiers are optional nouns or adjectives which further refine and categorize the prime word. Because higher-level entities and sub-entities on a data model describe super-categories and sub-categories of entities, either the higher-level entities or sub-entities (or a combination of both) are used as the modifiers to the respective prime word.

For example, fleet logistics might be interested in the mailing address of a vendor. There would therefore exist a sub-entity to *vendor* called *mailing-address*.

Example: Vendor *Mailing-address*

Note that if there are multiple modifiers, they are placed left-to-right within the data element name from specific to general.

Example: Vendor *Headquarters Mailing-address*

Also note that only one Prime Word Modifier may be placed *before* the Prime Word.

Class Word

A class word identifies and describes the use and purpose of data. In the data element name, a class word designates the type of information maintained about the associated prime word. Examples of class words are *code*, *name*, and *quantity*. Additionally, a data element's associated class word establishes the *domain* into which the data for that data element fits.

Determining the category or class of data should be the first step in developing a data element name. Refer to **Section 4.3.4, Identify and Define Data Element Attributes,** the discussion *Identify the Class Word in the Data Element Name*, for more information on that step in data element name development.

Because the categories they describe are broad, there are relatively few class words. The instances that a data element developer will need to create a new class word will be relatively few. Proposals for new class words must be submitted to fleet logistics DA for approval. A list of currently approved class words are in **Appendix C, Class Word Descriptions**.

Example: Vendor Mailing-Address *Name*

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4.2.4 Components of a Data Element Name, Continued

Class Word Modifiers

A Class Word Modifier is an optional adjective or noun that is used to further define or describe a Class Word. When used in a data element name, a Class Word Modifier must distinguish one data element from another and normally will narrow the range of allowable values established by the Class Word. This Class Modifier is taken from an appropriate data model entity attribute.

Example: Vendor Mailing-Address *City* Name

In this example, the Class Word Modifier *City* is modifying the Class Word *Name*, restricting the possible range of values for the data element to names of cities.

Combining Prime Word Modifiers and Class Word Modifiers

When Prime Word Modifiers are placed *after* the Prime Word, or Class Word Modifiers, or a combination of both, the total number of these components cannot be greater than 4.

Example: Vendor *Headquarters Mailing-Address American City* Name

In this case, there are 2 Prime Word Modifiers (*Headquarters* and *Mailing-Address*), and there are 2 Class Word Modifiers (*American* and *City*).

Qualifiers

Additional modifiers, called *qualifiers*, may be used in a data element name to further categorize a Class Word. The current CG data element naming standard permits the use of qualifiers, but DoD standards do not. While qualifiers do not define the structure of the domain of the class word, qualifiers limit the types of class words very specifically.

Example: Vendor Mailing-Address City Name *English*

The word "English" specifies that the city names for Coast Guard vendors we are looking for are only in English.

NOTE: DoD data standards do not recognize the use of qualifiers in the data element naming convention. Therefore, to facilitate data sharing with DoD organizations, fleet logistics data element names should ***avoid use of qualifiers.*** The information described by the qualifier would most likely be described in the definition of the data element.

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4.2.4 Components of a Data Element Name, Continued

Review

The following is a summary of the data element name components using sample data element names:

	Modifier Preceding Prime Word	Prime Word	Modifier(s) Following Prime Word/ Class Word Modifier(s)	Class Word	Qualifier(s)
Number	0...1	1	0...4	1	1..2
Presence	Optional	Required	Optional	Required	Optional
Example 1		Vendor	Mailing-Address City	Name	
Example 2	Coast-Guard	Vessel	Type	Code	
Example 3		Item		Temperature	Celsius

4.2.5 Data Element Life Cycle

Introduction

Data elements evolve through a series of standardization phases. Each data element submitted for standardization are assigned one of the following status values as it goes through the approval process: ***developmental, candidate, approved/disapproved, installed, modified, archived.*** The changes in status mark the progress of a data element through its life cycle. The status of data elements is recorded in the fleet logistics data repository as one of the attributes of the data element.

Stages of a Data Element's Life Cycle

The following table identifies and describes each of the stages of the life cycle of a data element. These stages are being adopted by the fleet logistics program.

Stage	Description
Developmental	This status is assigned to a data element which is under development and not yet ready to be submitted as a *candidate*. At this level, it will not be considered for approval by either the functional or technical reviewers. The requirement for a data element is normally identified during data modeling or through analyzing new functions, such as those precipitated by new legislation. Data elements in a *developmental* status can be entered into the fleet logistics repository for coordination and information exchange while they are still being developed.
Candidate	This status is assigned to a data element that has been fully developed and submitted for acceptance as a standard data element. *Candidate* data elements are evaluated by the assigned data steward and by fleet logistics DA for suitability as a standard.

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4.2.5 Data Element Life Cycle, Continued

Stages of a Data Element's Life Cycle ***(continued)***

Stage	Description
Approval	Approved data elements can exist in two states: *approved*, and *disapproved.* *Candidate* data elements that pass functional and technical reviews become a*pproved.* Only approved data elements should be used for development of information systems. Data elements that have been coordinated through the standardization process can be disapproved for the following reasons: • A data element with the same definition already exists. • The development of the candidate is not yet complete. • One or more required data element attributes are missing or inappropriately specified.
Installed	Fleet logistics configuration management (CM) will specify an installation date for each approved data element based on the recommendation of the data steward assigned to that data element. As of the installation date: • information systems must accommodate the new data element • organizations authorized to supply data values will be responsible for entering and maintaining the standard version of the data • the standard data element will be used to support information exchange requirements
Modified	Approved data elements that are currently being considered for change are considered *modified* data elements. The process for approving modifications to data elements is identical to the one for approving *candidate* data elements.
Archived	Installed data elements are archived when they are superseded or no longer support a current data requirement. The elements will be used for cross reference purposes and to assist in compiling or recovering information that spans several versions of the fleet logistics data repository.

4.2.6. Roles And Responsibilities In Standardizing Data Elements

Introduction

This subsection provides a summary of the roles and responsibilities required to perform the procedures to standardize data elements.

Responsibilities

The major responsibility in a data standardization effort belongs to the *system developer* and/or *system maintainer*. The system developer and/or system maintainer's responsibility is to:

- Match as many as possible of an application's entities and data element definitions to entities and data elements (entity attributes) in the fleet logistics enterprise data model, and in turn
- For each entity attribute found in the enterprise data model that potentially matches one in the application, the system developer and/or system maintainer should select or define a standard data element definition that will be used in the system/application

Doing these two tasks provides the following two benefits:

1. The work to standardize the small number of data elements in the application not found in the data model is manageable.
2. The data of this application are more likely to be shareable and useful to the organization as a whole. The standard data element definition is the basic unit for data sharing.

The following table lists each role, identifies the responsibilities of that role, and indicates the procedures detailing those responsibilities.

Role	Responsibility	Procedure
System developer and system maintainer	Identifies (from approved data model) entity attributes for which matching standard data elements are needed. Prepares a request for a new data element.	Sections 4.3.-4.5.1
Data Administration	Checks completeness and quality of requests. Assigns information class and data steward. Processes a request for a new data element.	Sections 4.5.2 - 4.5.3
Data steward	Verifies necessity and uniqueness. Assigns appropriate subject matter expert.	Sections 4.5.2 - 4.5.3
Subject matter experts	Verify business rules, terms, and definitions.	Sections 4.5.2 - 4.5.3

4.2.7 The Process Of Standardizing Data Elements

Introduction

The stages of standardizing a data element are *identification, standardization, approval, and integration.* This process ensures that the data element is unique and in compliance with the procedures, rules, and guidelines outlined in this manual.

Process diagram

The following diagram, Figure 4-1:

- Depicts the activities which make up the process of standardizing data elements
- Notes in which section(s) in this manual the stage of development is discussed

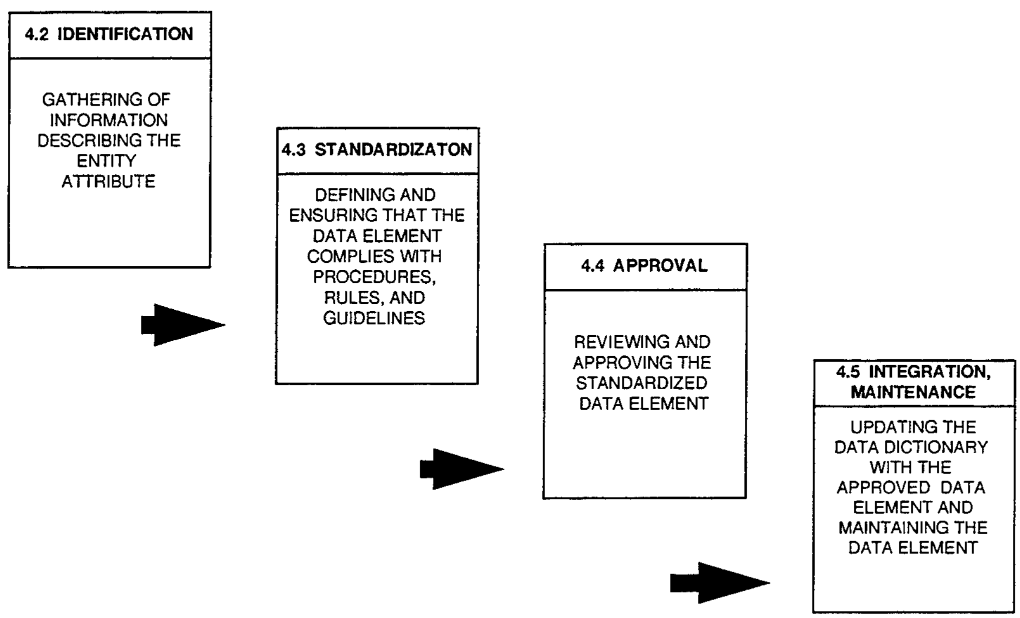

Figure 4-1. Phases of Data Element Life Cycle

4.3 Identify Data Elements

Introduction

This subsection describes the procedures for standardizing data elements. Tasks within these procedures are performed by fleet logistics DA, system developers, system maintainers, data stewards, and subject matter experts.

Purpose

This subsection describes the procedures to be used when data elements are being considered for adoption as approved standards.

Contents

In this subsection each of the following procedures is presented in detail.

Title	Section
Develop Standard Data Element	4.3.1
Identify Data Element Requirements	4.3.2
Review the Data Model and Data Repository	4.3.3
Identify and Define Data Element Attributes	4.3.4
Standardize Data Element Name and Definition	4.3.5
Apply the Definition Rules	4.3.6
Develop Other Attributes of a Data Element	4.3.7

4.3.1 Develop Standard Data Element

Introduction

Requirements for data are identified by consumers and suppliers of information who need to make decisions or conduct operations. Systems developers who support the consumers and suppliers may also identify requirements as initial analysis and data identification progresses.

The data elements that represent data requirements are not developed by data administrators or by business operations personnel working in isolation. Rather, they are developed by business operations people working together with functional experts and data administrators to assist in defining and meeting the data requirements of the business.

A review of standard data elements in the fleet logistics DA repository and the Coast Guard Data Administration Dictionary System (DADS) can often result in identification of a data element which already meets the requirement for the system under development. For example, it may be discovered that the original requirement is already being met within fleet logistics, and the development task would then be to make the data available to the person or organization needing it at the time.

Fleet Logistics Data Models

It is the intent of the data modeling and data standardization process that data standardization should begin only after the data model is essentially complete, and that the standardization process should only be in the context of the data model. After the set of data elements for a system are complete, new data elements and entities should be integrated into the data model.

Data elements named within the context of the fleet logistics DA data model will facilitate naming data elements, help avoid duplication, and support consistency throughout Engineering Logistics and the DoD. Refer to **Sections 2.4, Architectural Framework for Information Systems for Fleet Logistics,** and **3.1, Support Integration of Data Models,** for more information on data modeling concepts and the fleet logistics data model.

Standard Request Form

Requests for making additions to the data repository or for making changes to an existing data element are submitted on Form 1, *Fleet Logistics Data Element Request* (see **Appendix D, Section D.1, Data Element Development Worksheet and Data Element Request,** and **Section 6, Implement Metadata Repository,** for more information on the data repository).

Continued on next page

4.3.1 Develop Standard Data Element, Continued

Roles

Because the system developer and/or system maintainer has the primary responsibility for requesting additions or changes to data elements, the system developer and/or system maintainer is responsible for completing the *Standard Data Element Request Form* (see **Section 4.3.3., Review the Data Model and Data Repository**) and for submitting it to fleet logistics DA for validation and processing. The criteria for reviewing data element requests are provided in **Section 8.** If there are problems with the form, fleet logistics DA will return it to the system developer and/or system maintainer for correction, completion, and re-submittal.

Process

The process of creating a request to add or change a data element has the following four steps:

Step	Action	See Section:
1	Identify Data Element Requirements	4.3.2
2	Review the Fleet Logistics Data Model and Metadata Repository	4.3.3
3	Identify and Define Data Element Attributes	Appendix C
4	Verify Data Element Name and Definition	4.2.4

4.3.2 Identify Data Element Requirements

Introduction

Before developing standard data elements for a new system, it is helpful to have a complete understanding of the data requirement for each data element. To gain this understanding, a data element developer should gather all available documentation that may provide information for, or assist in, initially identifying data elements for a system under development, as described in the topics below.

Data Element Development Worksheet

When gathering information for data element development, use the *Data Element Development Worksheet* (see **Appendix D, Section D.1, Data Element Development Worksheet and Data Element Request**, for a facsimile of the Data Element Development Worksheet). This worksheet is almost identical to the *Data Element Request Form*, and helps to record and organize data item findings as during the Data Element development process.

Reference Material

Appropriate references and resources include the following:

- Functional information resources that might exist
- Functional data models and process models that might exist
- Functional data dictionaries that might exist
- Federal Information Processing Standards (FIPS)
- "Dictionary of Business Terms"
- An unabridged dictionary
- U.S. Military Dictionary (Dictionary of Military Terms/Acronyms)
- Coast Guard application dictionaries that may exist
- Roget's Thesaurus
- Notes from interviews with business and systems analysts
- Coast Guard Publications, Manuals, Directives and/or Instructions
- System documentation
- Technical writing guides

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4.3.2 Identify Data Element Requirements, Continued

How to Identify Data Element Requirements

Follow the steps in the table below to identify data element requirements.

Step	Action
1	Document the need for data elements discovered in any of the sources named above. Record any existing names, codes, definitions, field lengths, data value names, sources of data, and other relevant information. This information provides a knowledge base to be used in defining and constructing individual data elements.
2	Analyze requirements documentation to understand the way the information will be used in a proposed system. Functional descriptions also contain information requirements.
3	Analyze existing information system documentation to weed out impertinent data and to determine the fundamental data requirement.
4	Determine data requirements by separating any usage information from the data and determine the fundamental data element to be constructed.

Sources of Requirements for Data Elements

The need for new data elements may be discovered during:

- Information system development
- Various phases of information engineering (e.g., during the construction of functional data models)
- Examination of existing related data dictionaries, functional publications, data element descriptions, system documentation, systems specifications, existing databases, reports, forms, user manuals, and other data stores

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4.3.2 Identify Data Element Requirements, Continued

How to Research Data Element Requirements

Follow the steps in the table below to research data elements with the goal of separating the identity of the data (what it is) from its application/system (how it is used). This is a fundamental goal of data standardization.

Step	Action
1	Develop a well bounded domain definition and, if required, a comprehensive list of data values for the data element to be developed. This domain definition will act as the *working definition* for data element development. In the subsequent steps of data standardization, the developer may find the need to refine this working definition. When determining the domain definition, bear in mind that the data element definition should: a. have one single meaning b. have homogenous and exclusive values c. not have any codes that are themselves confusing
2	Examine documentation sources for definition and data value information.
3	Identify the scope of the data element from functional regulations or directives.
4	Interview any available functional/subject matter experts for detailed information needed to develop standard data elements.

Upon Completion

Upon completion of the above steps continue with the next the procedure, **Review the Data Model and Data Repository (Section 4.3.3).**

4.3.3 Review the Data Model and Data Repository

Introduction

Once the developer has gathered the data element requirements for system development, s/he review the fleet logistics enterprise data model to determine where there are matches between:

- the data requirements and the data entity attributes in the data model
- the data requirements and the existing data elements in the metadata repository

If other systems have been developed using the fleet logistics DA methodology described in this manual, a review of the fleet logistics metadata repository should result in finding most of the standard data elements that will be required by the new system. The developer will need to propose new standard data elements for any data requirements that s/he has identified that do not have a matching standard data element in the repository (refer to **Sections 4.3.4** through **4.3.7** for more details on creating data element names and sending them through the approval process).

Procedures for Reviewing the Data Model and Metadata Repository

To determine the existence of standard data elements to use for a new system, perform the following steps. The criteria for assessing the quality of a data model are provided in **Section 8, Ensure Data Quality**.

Step	Action
1	Perform a systematic search through the entire fleet logistics data model to identify data entity attributes.
2	Determine which entity attributes have already been developed into standard data elements by checking the fleet logistics data repository (check all *candidate*, *approved*, *installed*, and *archived* data elements). The remaining (probably few) attributes may be mis-defined, require more information, or may be candidates for requesting new or modified standard data elements.
3	Using the data requirements determined in **Section 4.3.2**, create standard data elements for any remaining data items, using the procedures described in **Sections 4.3.4 through 4.3.7** (refer to the DoD and/or other Federal repositories for help in creating data elements that are not yet part of the fleet logistics standard).

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4.3.2 Identify Data Element Requirements and Data Repository, Continued

Procedures for reviewing data model and data repository ***(continued)***

4	Compare the standard data elements found in the fleet logistics data repository to the application's information requirements. Match as many data requirements to standard data elements as possible. If a standard data element is found that for the most part matches the data element identified for the local application, note that standard data element for use in the new application system and discard the locally created data element. If there are some attributes that should be modified in or added to the standard data element found through the current effort, refer to the procedures discussed in **Section 4.5, Maintain Data Elements.**
5	If analysis does not identify a fleet logistics standard data element that matches the data element created from the set of application data requirements, submit that data element as a *developmental* candidate as described in the procedures in **Section 4.4, Procedures to Approve Data Elements.** Again, after the development and registration of the initial standard fleet logistics systems, any new application's list of unique data element candidates should be relatively small.

4.3.4 Identify and Define Data Element Attributes

Introduction

This subsection discusses the procedures for creating and defining data element components. Topics include:

- Class Word and Definition
- Class Word Modifier
- Prime Word and Definition
- Prime Word Modifier(s)
- Qualifiers
- Other Attributes

When creating a data element, follow the topics below in the order that they appear. **Subsection 4.2.4, Components of a Data Element Name,** identifies and describes the various parts of the name of a data element that are referred to below.

Identify the Class Word in the Data Element Name

A class word defines the general category of data that is stored in a data element. To identify the class word, follow the steps below:

Step	Action
1	Using the working domain definition developed in **Section 4.3.2**, identify the category of data (*class word)* associated with the entity attribute for which the data element is being developed (e.g., code, name, or amount). This will come from the class word name list in **Appendix B, Class Word Descriptions.**
2	If you are not able to identify the appropriate class name, pick the one that comes closest, or request assistance from fleet logistics DA.

Example of Class Word Name

For example, in the case where it is more convenient to use the numbers 1 through 12 to represent the months, the class word would be *code*, a combination of one or more numbers substituted for a specific meaning.

Continued on next page

4.3.4 Identify and Define Data Element Attributes, Continued

Identify Class Word Modifier

The addition of modifiers to further describe and restrict the category of data to be collected is optional. A maximum of 1 modifier is allowed. If a class word modifier is necessary, the system developer and/or system maintainer should reference the entity attribute designation.

Combine the class word modifier and the selected class word to form the *generic element name.*

Refer to **Section 4.2.4, Components of a Data Element Name**, items *Prime Word Modifiers* and *Class Word Modifier* for a discussion of the rules for combining modifiers within a Data Element Name.

Example of Generic Element Name

For the class word *code* in the above example, *month* would be an appropriate modifier. Hence, the fully described generic element name would be *month code.*

Modify Domain Definition

Begin by refining the *domain* definition defined in **Section 4.3.2** into a narrative statement using the class word and/or modifiers (generic element) just selected.

The structure of the definition of a data element is described by its associated generic element name. CG data standards require that the class word appears in the data element definition. With these two things in mind, an easy way to begin wording a data element definition is to start the definition with a phrase describing the class word. The table in the topic below, *Definition Beginnings*, lists in alphabetical order the class word name and a suggested phrase that would begin its associated data element's definition.

The *class word modifiers* found within the definition structure represents optional words that can be incorporated to clarify the data element's definition and further distinguish it from another similar data element.

The Generic Element Definition Structure

Make modifications to the generic element definition structure by refining the domain definition of the data element as follows:

Continued on next page

4.3.4 Identify and Define Data Element Attributes, Continued

The Generic Element Definition Structure **(*continued*)**

Step	Action
1	Select the beginning of the definition from the table below in the topic *Definition Beginnings*.
2	Formulate a definition for the class word and modifiers.
3	Make the definition a logically sequenced, grammatically and structurally correct, simple sentence definition.
4	Edit and refine the generic element name according to acceptable English writing conventions and the definition rules described in **Section 4.3.6**.

Definition Beginnings

The following list of definition beginnings is found in Appendix A of the *DoD Data Element Standardization Procedures, DoD 8320.1-M-1, January; 1993.*

If the class name is...	then begin the definition with...
AMOUNT	The (modifiers) amount of ...
ANGLE	The (modifiers) angle between ... for a ...
AREA	The (modifiers) area measurement of ...
CODE	The (modifiers) code that represents/denotes a ...
COORDINATE	The coordinate identifying the (modifiers) location of ...
DATE	The (modifiers) date of /when/on which/ a ...
DIMENSION	The (modifiers) dimension of/from ...
MASS	The (modifiers) mass of ...
NAME	The (modifiers) name that designates ...
NUMBER	The (modifiers) number assigned to represent ...
QUANTITY	The (modifiers) quantity of ...
RATE	The rate of (force, speed, pay, etc.,) of ....
TEMPERATURE	The temperature of ...
TEXT	Text that (describes/defines) ....
TIME	The (modifiers) time that designates the occurrence of ...
VOLUME	The (modifiers) volume of ...
WEIGHT	The (modifiers) weight of ...

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4.3.4 Identify and Define Data Element Attributes, Continued

Qualifiers

The following steps should be followed when adding a qualifier to a data element name.

Step	Action
1	Add the qualifier to the generic element name.
2	Refine the working definition for the generic element by adding a representation of the qualifier to the end of the generic element definition. For example, *The temperature in Celsius of ...*
3	Make the definition a logically sequenced, grammatically and structurally correct, simple sentence definition.
4	Edit and refine the definition according to acceptable English writing conventions.

Prime Word Name

Follow the steps below to select the prime word for the data element under development.

Step	Action
1	From the fleet logistics data model identify the entity that is appropriate for the data element being developed. Note that the data element will be equivalent to the entity attribute.
2	Record the entity name as the prime word name for this data element.

Example of Prime Word

Assume that a system developer and/or system maintainer is creating a data element for the "name of a vehicle." Looking at the fleet logistics Data Model, the developer finds a data entity called *vehicle*. The system developer would choose the data entity name *vehicle* as the *prime word* to go with the class word *name*. The result would be the selected prime word and class word components forming the data element name *vehicle name*.

One way to search for the appropriate prime word in a data model is to bear in mind that the prime word represents the logical grouping (data entity) in the model to which the data element (and associated data entity attribute) belongs.

Continued on next page

4.3.4 Identify and Define Data Element Attributes, Continued

Prime Word & Modifier Name

Prime Word modifiers may be added to further describe the prime word for this data element. When used, up to 4 prime word modifiers are allowed, but try to keep them to a minimum so as to be as precise and unique as possible. The modifiers can be selected from the list of entity names in the data model that either represent up to two levels higher than the prime word/data entity, or that represent a sub-entity.

Refer to **Section 4.2.4, Components of a Data Element Name**, for a discussion of the rules for combining modifiers within a Data Element Name, and for developing the modifiers.

Example of Prime Word and Modifier Name

Using the example from above in discussing the Prime Word, the system developer and/or system maintainer may determine that the prime word *vehicle* may not fully describe the object being categorized. If this were the case, the system developer and/or system maintainer may find a higher level entity or sub-entity and use it as a *modifier*. In this case, the system developer and/or system maintainer might come up with *land vehicle name* as the data element name.

Definition of Prime Word and Modifiers

The following steps are to be followed to develop the definition.

Step	Action
1	Review the definitions of the entity in the source data model and the associated attribute for which the data element is being developed and relate it to the fleet logistics data model.
2	Formulate a definition for the prime word with its modifier(s).
3	Make the definition a logically sequenced, grammatically and structurally correct, simple sentence.
4	Edit and refine the definition according to the standards of English writing, and apply the definition rules as described in **Section 4.3.6.**

Continued on next page

4.3.4 Identify and Define Data Element Attributes, Continued

Upon Completion

When the above steps have been completed for defining the components of the Data Element Name, proceed to the next **Section, 4.3.5, Standardize Data Element Name and Definition.**

4.3.5 Standardize Data Element Name And Definition

Standardize the Data Element Name

Now that all of the components of the data element name have been identified and defined, follow the steps in the table below to combine them into a data element name meets standardization guidelines.

Step	Action
1	Draft the full name of the data element using the • class word and modifier (generic element name), and qualifier • prime word and modifier(s) as developed in the above procedures.
2	Apply the following rules to standardize the full name of the data element. Note: The following rules are based on rules found in DOD's *Standard Data Element Development, Approval, and Maintenance Procedures Manual* 8320.1-M-1 (May 1992). The full name of a data element: • will contain one class word • will contain one prime word • will describe only one concept • will be unique across all standardized data element names • should not contain plurals of class word or prime word • will use modifiers to clarify the name • must consist of alphabetic characters (A-Z) Exception: Numbers (0-9) may be used when part of a descriptive name Exception: Hyphens are permitted for generally accepted hyphenated words (e.g., in-house, follow-up) • should not contain names of – organizations – computer or information systems – directives – forms – screens – reports • should not contain titles of blocks, rows, or columns of screens, reports, or listings • should not contain abbreviations or acronyms unless the data element's full name exceeds 250 characters

Continued on next page

4.3.5 Standardize Data Element Name And Definition, Continued

*Upon Completion **(continued)***

3	If the full data element name exceeds 250 characters, use the following procedure to standardize the name. Reference: For lists of abbreviations and detailed rules on how to abbreviate a data element's full name, see **Section 4.3.4, Identify and Define Data Element Attributes,** item *Rules for Abbreviating Words*.. **Note:** If after following the procedures below the full name still exceeds 250 characters, then contact fleet logistics DA.

If...	then incorporate the abbreviation of the...
a common business term exists in the data element's full name	common business term
the full name still exceeds 250 characters	class word
the full name still exceeds 250 characters	prime word
the full name still exceeds 250 characters	modifiers

Definition Rules

Apply the definition rules, found in **Sections 4.3.6 and 4.3.7, Apply the Definition and Abbreviation Rules,** to assure uniformity, consistency, and intelligibility.

4.3.6. Apply the Definition Rules

Introduction

The final step in developing a definition text for a data element is to verify that the definition complies with the definition rules.

The following definition rules are based on rules found in DOD's *Standard Data Element Development, Approval, and Maintenance Procedures Manual 8320.1-M-1 (May, 1992).* Changes or additions to this list must be forwarded to fleet logistics DA for approval.

Standardize the Definition

Edit and refine the definition of the data element to comply with the following rules:

- The definition must explain WHAT the data is. The definition does not explain HOW, WHERE, or WHEN, it is used, or WHO uses it.
- The data element name must not be repeated verbatim in its own definition, although the words within the name are incorporated within the definition (the class word MUST be in the definition)
- The definition must have one and only one interpretation. The definition must not be ambiguous.
- The definition must be written in language common to all users within the organization.
- The definition must not contain acronyms or abbreviations.
- The definition should not contain processing or editing instructions.
- The definition should not refer to hardware, software, or language conventions or constraints.
- When the definition is imposed by an external source, that source must be included in the definition.

4.3.7. Develop Other Attributes of a Data Element

Introduction

In order to complete the standardization of a data element, the system developer and/or system maintainer must develop the other data element attributes in addition to the definition.

Other Attributes

Attribute values should be recorded for each of the remaining attributes for a data element. Refer to the detailed standard data element attribute descriptions in **Appendix C, Data Element Attribute Descriptions.**

Abbreviations

Abbreviations are used in the data element name components to:

- Develop a data element's ten character abbreviated name
- Shorten a data element's full name to comply with the 250 character limit.

Rules for Abbreviating Words

The rules for developing abbreviations for words include the following:

- The abbreviation of a modifier should begin with the first letter of the word.
- The order of characters in the abbreviation should parallel the order of the letters in the word.
- The abbreviation of a word is generally created by removing:
  — vowels (except the first letter of a word)
  — double consonants from fully spelled words.
- Use commonly accepted abbreviations in their customary form.

Note: These rules are based on rules found in DOD's *Standard Data Element Development, Approval, and Maintenance Procedures Manual*, 8320.1-M-1. May 1992.

Upon Completion

After all the data element attributes have been determined for a new data element that does not appear in the fleet logistics data repository, submit the set of data element attributes into the approval process. **Section 4.4, Procedures to Approve Data Elements**, covers the submission and approval processes.

4.4 Procedures To Approve Data Elements

Introduction

This subsection describes the procedures to be used when data elements are being considered for adoption as approved standards. The purpose of this section is to provide the

- details for submitting the *Data Element Request* Form
- procedures for approving or disapproving the Request.

Refer to **Appendix D, section D.1**, for a facsimile of the *Data Element Request* Form.

In this Subsection

The following topics are covered in this section:

Topic	See
Submit the Data Element Request	4.4.1
Preliminary Review	4.4.2
Formal Review	4.4.3

4.4.1 Submit the Fleet Logistics Data Element Request

When to follow this procedure

After the identification process has been completed, the data element must be documented and submitted for approval. This includes documentation of the element's attributes and of administrative information.

Review and Submit Request

Follow the steps in the table below to fill out and process the request form.

Step	Action
1	Complete the *Fleet Logistics Data Element Request* form. Refer to **Section 4.3, Procedures to Standardize Data Elements,** for detailed instructions for each entry on the form.
2	Review all the data entered on the *Fleet Logistics Data Element Request* Form to ensure compliance with the rules and procedures described in **Section 4.3** before submitting the *Request.* Discuss the data element with counterparts in the functional areas before submitting the *Request.* Refer to **Sections 8.3, 8.6, and 8.7** for a discussion and procedures for ensuring data quality when reviewing data elements.
3	Submit the form to: Fleet Logistics DA USCG Headquarters G-ELC [mail address]
4	If acknowledgment of receipt by fleet logistics DA is not received within 5 business days, contact fleet logistics DA to ascertain whether a resubmittal is required. If so, resubmit a copy of the original request.

Upon completion

When the above steps have been completed, perform the procedure described in **Section 4.4.2, Preliminary Review.**

4.4.2 Preliminary Review

Introduction

Developmental data elements will be reviewed in accordance with procedures for adherence to technical and functional requirements before being considered as a *candidate* or modified standard data element.

Roles

Fleet logistics DA and the data stewards have the responsibility to validate the completeness of the request form and to verify that the contents comply with the standards and with all functional requirements. If there are problems with the form, the DA will return it to the system developer and/or system maintainer for correction, completion, and re-submittal.

Procedure

Follow the steps in the table below to verify the validity of a request.

Step	Action
1	Review *developmental* data elements for adherence to the following technical and functional requirements: • The data element requirement must be derived from an approved data model. • The definition of the data element must fully describe the data requirement and convey only one concept. • The data element name must conform to the data element naming standards described in **Section 4.3.** • The mandatory data element attributes must be fully described. • The class word name associated with the data element must be an approved class word. Refer to **Sections 8.3, 8.6, and 8.7** for a discussion and procedures for ensuring data quality when reviewing data elements.
2	Return to the originator any data element that does not meet the criteria in **Section 4.3** with the reason(s) for the rejection.
3	For data elements that meet the criteria: • Confirm that a suitable data element does not already exist by reviewing all standard data elements in the repository that have the same or similar names or descriptions. (This includes archived standard data elements.) • If the data element attributes are identical or similar to a standard data element in the repository, return the *developmental* or modified data element to the originator for further review of existing standard data elements.

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4.4.2 Preliminary Review, Continued

Procedure ***(continued)***

Step	Action
4	As discussed in section **3.4, Receive and Evaluate Data Model**, submit developmental or modified data elements to fleet logistics DA for a review of the metadata repository for the existence of any similar, usable data elements.
5	Enter the validated developmental data element into the repository as a *candidate* or modified standard data element to begin the approval process. The designated data steward of each of the *candidate* standard data elements and the fleet logistics DA will be notified that new *candidate* or modified standard elements are awaiting their review.

4.4.3 Formal Review

Introduction

Fleet logistics DA and the data steward of the candidate or modified data element must approve or disapprove the data element within 10 workdays of notification that the candidate data element has been submitted for review. Requests for time waivers must be sent to fleet logistics DA with reason why more time is required. fleet logistics DA will allow a minimum of 7 workdays before approving a data element to permit adequate time to review and comment on the data element.

Review Procedures

Fleet logistics DA and the designated data steward will conduct concurrent reviews of candidate standard elements as described in the table below.

Step	Responsibility	Action
1	Fleet Logistics DA	Reviews the candidate or modified data element within 10 workdays and determines that the candidate standard data element conforms to fleet logistics DA policy and does not conflict with existing standard data elements.
2	Fleet Logistics DA	Reviews the data element attributes for completeness and conformance with current technical requirements.
3	Fleet Logistics DA	Validates the data element by confirming conformance to the fleet logistics data model.
4	Fleet Logistics DA	Provides reason for either approval or disapproval of data element in the *Standard Data Element Review Comment* Text field attribute for the data element (see **Appendix D** for more information on this and the other data element attributes). Disapproved data elements need to be resolved by the designated data steward.

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4.4.3 Formal Review, Continued

*Review Procedures (**continued**)*

Step	Responsibility	Action
5	Data Steward	• Reviews the candidate or modified standard data element within 20 workdays for consistency within the functional area and for conformance with cross-functional integration requirements. • Validates the data element attributes to ensure that the data element is functionally accurate and complete. • If the data steward believes that some other data steward should be responsible for the data element, that change will be made and a comment explaining the rationale will be provided. The 20 day review period begins again any time the data steward is changed.
6	Data Steward	• Coordinates with appropriate subject matter experts to ensure that the data element will meet all functional data requirements. • Coordinates efforts to resolve any technical deficiencies. • Must review the functional area data model and assess the impact of the new data element. • If another data steward believes that the data steward designation was incorrectly made, a comment should be immediately generated to the assigned data steward and to fleet logistics DA for resolution.

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4.4.3 Formal Review, Continued

*Review Procedures (**continued**)*

Step	Responsibility	Action
7	Data Steward	Must coordinate modified standard data elements with the other data stewards and functional counterparts who will be affected by the change to the existing data element. Users of the existing standard data element are indicated by the information systems registered in the repository as applications of the standard data element.
8	Data Steward	May still elect to approve the data element even if concurrence is not obtained from all respondents. All non-concurrences must be noted in the repository for review by fleet logistics DA.
9	Data Steward	Notifies fleet logistics DA by annotating the reasons for rejection in the repository if s/he determines that the data element is not consistent with or conflicts with, existing standard or modified data elements within the functional area.
10	Data Steward	Recommends approval of the data element if no conflicts exist. Notifies fleet logistics DA by annotating the approval in comments on the data element in the repository.

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4.4.3 Formal Review, Continued

*Review Procedures **(continued)***

Step	Responsibility	Action
11	Fleet Logistics DA	• Evaluates the recommendations from the technical and functional reviews and obtains consensus on a final recommendation within 10 workdays after completion of the technical and functional reviews. • If the technical and functional review recommendations are not the same, Fleet Logistics DA will coordinate with the data steward to resolve the conflict. • If the conflict cannot be resolved by Fleet Logistics DA, Fleet Logistics DA will forward the issue, together with respective recommendation, to the Director of Coast Guard Engineering Logistics for resolution. • If the conflict cannot be resolved at that level it will be forwarded to Senior Information Resources Management for final resolution.
12	Fleet Logistics DA	Review of the metadata repository for the existence of any similar, usable data elements.
13	Fleet Logistics DA	Changes the status of the data element to *approved* when the final recommendation is for approval.
14	Fleet Logistics DA	• Changes the status of the data element to *disapproved* when the final recommendation is for disapproval. • Notifies the data steward and the submitter of the data element of the disapproval. After notification of disapproval, the submitter may either delete the data element from the repository or make appropriate changes and resubmit the data element.

4.5. Maintain Data Elements

Purpose

Approved standard data elements can be implemented or modified for use in various applications or information systems, or they may be archived when no longer needed. Archived standard data elements may be reinstated for use.

The following maintenance procedures describe the processes for registering use of a data element by an application, modifying approved data elements, archiving standard data elements, and reinstating archived standard data elements. For more details on the change management and version controls functions of data administration, refer to **Section 7, Control Changes to Metadata**.

Receive and Record Requests

Fleet logistics DA uses the following procedure to receive and record requests for changes.

Step	Action
1	Check and log in submittal package
2	When all requested changes have been approved or resolved satisfactorily, integrate any approved changes into the standard data repository. Procedures for making changes are discussed in the topics below.

Registering Data Element Applications

All new information systems and migration information systems must be registered in the fleet logistics data repository. Upon system acceptance of a new information system and/or application, those standard fleet logistics data elements used by that system and/or application are updated accordingly.

Register applications of each standard data element according to the following procedures.

Continued on next page

4.5. Maintain Data Elements, Continued

Registering Data Element Applications ***(continued)***

Step	Action
1	For new applications and/or information systems and migration systems using standard data elements, do the following: a. Record the standard data element name for which the application is being registered. b. Record the standard data element component code. c. Record the identification of the application (*Automated information software system identifier*). d. Record the name of the application (*Automated information software system name*). e. Record the standard data element access name.
2	The following information is required to assist in the evolutionary transition to the use of standard data elements for migration systems not using standard data elements: a. Review the repository to identify the standard data element corresponding to the existing system's data element. If no standard data element exists, go sub-step b. If a standard data element does exist, do the following. • Record the application for which the data element is being registered. • Record the *standard data element component code.* • This completes the process of registering the data element. b. Record the identification of the application (*Automated information software system identifier*). c. Record the name of the application (*Automated information software system name*). d. If there are any variances between the attribute values of the data element for which the application is being registered and the attribute values of the standard data element, follow the procedures for a *Modified* data element (see **Section 4.2.3, Data Element Life Cycle, item Stages of a Data Element's Life Cycle**, for a discussion on the *Modified* stage for a data element). This includes recording the data element attributes that do not correspond to the standard data element.

Continued on next page

4.5. Maintain Data Elements, Continued

*Registering Data Element Applications (**continued**)*

	e. Record a *standard data element access name.* • *Data element access names* provide the direct link between the standard data elements defined in the repository and the application of those standard data elements in automated information systems. • The length of access names (i.e., identification of data fields in database and file structures) is important to analysts, designers, and programmers who must produce documentation and program code using standard data elements.

Modify Existing Standard Data Elements

When a system developer or maintainer or data steward determines that a data element should be modified, first review the standard data elements in the repository to verify that the change needs to be made. Another standard data element may exist that meets the purpose. When a change request has been determined to be the best way to meet the information requirement, follow the applicable procedure in either **Section 4.3.1, Develop Standard Data Element,** or **Section 4.3.2 , Develop Other Attributes of a Data Element.** The conventions, rules, guidelines, and procedures that apply to developmental data elements also apply to proposed modifications of standard data elements.

The current version of the standard data element being modified will be archived upon approval of the modified standard data element. Refer to the item below, *Configuration Management of Metadata*, for more details on configuration and version control as performed by fleet logistics repository CM.

Archiving Standard Data Elements

Standard data elements may be changed to an *archived* status based on the recorded use of the standard data elements. The archived standard data elements are retained in the repository for historical reference and possible reinstatement based on changing functional information requirements. Standard data elements are changed to an archived status through the following procedures.

Step	Action
1	Fleet logistics DA will identify standard data elements that are no longer used or needed by information systems based on changes in functional information requirements and notify the appropriate data steward.

Continued on next page

4.5. Maintain Data Elements, Continued

*Archiving Standard Data Elements (**continued**)*

Step	Action
2	Based on the recommendation of fleet logistics DA to archive a standard data element, the data steward will assess the functional or technical need to retain the standard data element.
3	If the data steward determines that the standard data element should not be archived, the data steward will notify fleet logistics DA to retain the standard data element in the repository in its existing status rather than archiving it.
4	If the data steward determines that there is no technical or functional need to retain the standard data element, the data steward will notify fleet logistics DA to change the status of the standard data element to an archived standard data element. There will be a general announcement in the repository when this is to occur.
5	Fleet logistics DA will notify the affected data stewards of standard data elements to be deleted from information systems supporting the respective functional areas based on the using functional areas, systems, and applications registered in the repository. When the data stewards and fleet logistics DA establish the effective date for deleting a data element from an information system(s), the data steward for the data element will notify other data stewards of the affected data element(s) and information systems and the effective date for deletion.
6	Fleet logistics DA will delete the affected information system(s) from the list of users registered in the repository on the effective date for deletion.
7	If no information systems remain on the list of users registered in the repository for a standard data element, fleet logistics DA will notify the appropriate data steward and recommend that the standard data element be archived.

Reinstating Archived Standard Data Elements

A review of the repository during the data element developmental or modification process may locate an archived standard data element that is suitable for use. In such a case, the archived standard data element should be reinstated. Archived standard data elements may be reinstated for use through the following steps.

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4.5. Maintain Data Elements, Continued

Reinstating Archived Standard Data Elements ***(continued)***

Step	Action
1	Notify the appropriate data steward that an archived standard data element exists and recommend that the archived standard data element be reinstated as a standard data element.
2	The data steward will review the archived standard data element for applicability and accuracy.
3	If the archived standard data element is accepted by the data steward, the data steward will notify fleet logistics DA that the archived standard data element is to be reinstated and the effective date for reinstatement.
4	Based on the approval and notification by the data steward, fleet logistics DA will change the status of the archived standard data element to an approved standard data element.
5	After the archived standard data element has been reinstated as an approved standard data element, the application using the reinstated standard data element must be registered in the repository.

Configuration Management of Metadata

Fleet logistics DA ensures that any changes requested are in relation to the current version of a data element in the fleet logistics data repository. This assures system developers, system maintainers, and users that any data element they are referencing is current and approved. Any changes to data elements will update systems and applications which use that data element, as controlled and maintained by fleet logistics repository administrator. Refer to section **3.4, Receive and Evaluate Data Model**, for a discussion of this step.

CASE Repository

Changes that have been approved by the DA are recorded in the fleet logistics data repository. Details about the fleet logistics data repository are discussed in **Section 3.1.6, Maintain Configuration of Data Models**, subsection *CASE Repository.*

Install and Release Metadata Changes

Use this process to propagate metadata changes to relevant users and to other concerned parties:

Continued on next page

4.5. Maintain Data Elements, Continued

Install and Release Metadata Changes **(continued)**

Step	Action
1	Log in the new changes and assign version numbers.
2	Apply changes to the model as needed and determine the impact on applications.
3	Notify those systems applications which make use of the metadata change.

4.6. Improve the Data Element Definition Process

Purpose

As part of the review and negotiation cycles that are described above, issues will be raised and refinements will be negotiated that will improve the data element approval process. These improvements must be documented and incorporated into the data administration system. The following procedures show how to document and submit the typical kinds of decisions, refinements, and lessons-learned as they become apparent.

Responsibility

The individuals who are working with development teams to standardize the elements are in the best position to recommend improvements to this process. The standards and the process must improve continuously if it is to meet the changing needs of the fleet logistics community. Attention to this duty is as important as any other standardization task.

Identify Metadata Quality Issues

Metadata quality issues include conditions that harm the validity of a data standard, defeat security principles, and cause data to be useless or deficient across the data model.

The following procedures describe the general actions to address metadata quality issues.

Step	Action
1	Record and analyze those instances when metadata quality issues occur.
2	Identify the recurrent problems and determine the causes.
3	Prepare metadata changes according to normal procedures (see **Section 4.5, Procedures to Maintain Data Elements**).
4	Submit metadata changes according to normal procedures (see **Section 4.5, Procedures to Maintain Data Elements**).

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4.6. Improve the Data Element Definition Process, Continued

Identify Requirements for Data Element Standardization

New research on data modeling principles may show the current design of the data elements to be deficient. Refinements in the design of data elements improve the clarity of the data will help system developers and/or system maintainers define and propose more useful data elements.

The following procedures describe the general actions to address deficiencies in the data element standardization process.

Step	Action
1	Record and analyze the errors system designers make when proposing new data elements.
2	Identify the recurrent problems and determine the causes.
3	Review any "lessons learned" documentation from previous system design efforts and determine if any of these lessons apply to the identified problems.
4	Review the current academic research on data modeling and determine if any of the new thinking on data modeling applies to the identified problems.
5	Restructure the data model, if necessary, using the standard updating and Configuration Management procedures outlined in **Section 7, Control Changes to Metadata.**

SECTION 5
SHARE DATA BY MAPPING AND MIGRATION

5.1. Overview

Introduction

This section addresses how and when to map metadata from an existing, isolated (legacy) information system to standard metadata. Using standard metadata as the common reference saves time because the mapped data can then be shared with any standard fleet logistics information system. The DA program focuses on moving information resources from the current (multiple isolated systems) data environment to the future (enterprise-wide standard) data environment. This section addresses the near-term problem of sharing data between legacy and standard systems, and of migrating data values from a legacy system to a standard information system.

In this Section

This section contains the following topics:

Topic	Section
Overview	5.1
Map Data	5.2
Migrate Data	5.3
Establish and Maintain the Legacy Data Element Inventory	5.4

Data Mapping *vs.* Migration

This section covers two similar but distinct ways to share data:

- ***Data Mapping:*** Matching a data field in a legacy system (definition and attributes) to a standard data element name, definition, and attributes. The "map" is the document that shows the translation between legacy system fields and standard data elements.
- ***Data Migration:*** Matching a data field in a legacy system (definition and attributes) to a standard data element name, definition, and attributes. The "map" is the document that shows the translation between legacy system fields and standard data elements.

So, use *data mapping* when the data is to remain in a legacy system, but some fields must be shared with other systems through redefinition or use of an interface or broker system. Use *data migration* to move legacy data values to a standard system.

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5.1. Overview, Continued

Ad-Hoc Data Mapping

Do not map data from one legacy system directly to another legacy system, without reference to the enterprise data model. Such ad-hoc mapping is counterproductive because it will have to be done again when the legacy system(s) is(are) standardized. Mapping with reference to the enterprise data model starts the process toward standardization and identifies significant problems in data definition.

Logical to Physical Mapping

The recommended style of mapping is a logical-to-physical linkage of the data elements. This type of map links the legacy (physical) data element to the appropriate standard data element in the fleet logistics logical data model. The attribute name from the fleet logistics logical data model is given to the appropriate legacy data element. Logical-to-physical mapping is applied to legacy data elements that must be standardized (for sharing, reference, compatibility with imported data or other requirement). In most cases, the legacy data values must then be checked and edited ("cleansed") for conformance to the standard data element's domain, definition, and attributes.

Sharing Standard Data

Central to the objectives of the target fleet logistics data environment as described in **Section 2.3** are the reuse and sharing of fleet logistics data. The following table links the goals, objectives, and DA operations that support data conversion.

Goal	Objective	Operational Service
Provide the means for a fleet logistics shared data resource (Goal 1)	Provide for data interchange between systems and among organizations	• Manage Data Models • Standardize Data Elements • Data Mapping
Improve accessibility and ease of use of the data resource. (Goal 3)	Facilitate data accessibility across locations, applications, and platforms by providing standards and mechanisms.	• Manage Data Models • Standardize Data Elements • Data Mapping

Legacy data element mapping is a higher-level operation to migrate data from a current (legacy) data environment to the target (standard, shared) data environment. Data migration is accomplished through an iterative standardization process that reconciles the legacy data with standard metadata, then physically moves the data values to the standard system.

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5.1. Overview, Continued

Responsibility

To map data for sharing or to migrate data to a standard system, participation by all components of the developer and mission area communities is critical. The following components have specific responsibilities:

- *System Development and Maintenance*: Obtain the current enterprise data model and data element definitions. Define the legacy data items in terms of standard data element definitions. Prepare requests for new or modified data elements when no matching standard data element definition can be found or adapted. Write and submit a Data Conversion Plan and other data-related deliverable documents, and revise if necessary. The system analysis, interface development, database design, and transition/integration teams must participate in this effort.

- *Data Administration*: Ensure that each system upgrade procurement Statement of Work includes a data conversion plan for legacy data, and labor categories for data administration. Ensure that all legacy data elements are mapped to standard data elements, and that all legacy data values that should be migrated to the successor system are successfully moved. Provide rapid response time and sufficient support to facilitate timely system upgrade or data conversion. Provide helpful reviews of submitted metadata and design documents. Provide clear and consistent dispositions of requests. Update and distribute standards information in a timely manner. Participate in review of metadata-related deliverables and in system acceptance testing.

- *Data Stewardship*: Remain familiar with the data in nonstandard systems that utilize the steward's assigned information classes. Anticipate data standardization and conversion problems. Review candidate data element requests and standard data element modification requests in a timely but through manner. Ensure that each project's "data cleansing strategy" for preparing data values effectively prepares legacy data to be shared with the enterprise. Act as an advocate for the users of the assigned categories of information.

- *Program Management:* Ensure that data element mapping is accomplished and approved before permitting physical database design or software coding to start. Ensure the participation of DA representatives in review of metadata-related deliverables and in acceptance testing. Ensure that conversion of legacy data (successful migration) and/or construction of a reliable broker/interface (effective mapping) constitutes a key segment of the system acceptance test. Ensure that the appropriate data quality checks are performed.

5.2. Map Data

Introduction

This subsection shows how and when to map shareable data that resides in a legacy system. Use this process when the data will remain in the legacy system, but must be shared with other CG systems. Also use this process to map standard data that will be used by a legacy system.

The resulting map can be used to:
- Rename and reformat data fields in the legacy system to standard data element names and formats
- Create a conversion table that matches legacy system fields to standard data elements
- Build a broker system or interface module that translates the legacy system fields to standard data elements, alters the format of inbound or outbound data values accordingly, and filters data values for conformance to standard domain and attributes.

The Mapping Process

Data mapping is the process of associating data elements in legacy systems with the designated migration systems or migrating near-term initiatives. The legacy data element map is a bridge connecting legacy data elements to functional processes and associated data models. Mapping may require modification of the legacy system's data definitions, data structures, or application software to support the standard data element definition.

Legacy data element mapping is necessary to ensure that all materials, equipment, and facilities represented by the legacy data elements are linked to their replacement system. Data mapping is also necessary to position legacy data elements for standardization by linking existing data elements to the standard logical data model. It is useful for accurately assessing the data impact and scope of near-term initiatives, migration systems, and functional process improvements.

Objective

Legacy data element mapping addresses:
1. Legacy data elements mapped to migrating data elements to facilitate data conversion and/or data exchange between the information systems. This preserves investment in the data resource and ensures logistics operational effectiveness during system and data migrations.
2. Legacy data elements mapped to new approved functional data models. This positions legacy data elements, which are non-standard data elements, for future standardization.

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5.2. Map Data, Continued

When to Map

An isolated information system can serve its users adequately without mapping, upgrading, or standardizing, as long as system requirements remain unchanged. Previous-generation systems were designed to operate self-sufficiently, without taking data from or contributing data to a shared information resource. Current CG information resource management policy, mandates for efficient operation, and business process improvement all point toward sharing of information resources. Therefore, mapping (rather than migration to a standard system) can serve as a temporary measure to support data sharing when the following conditions are true:

- The requirement for data sharing is occasional
- The data values are shared in batch mode, and can be filtered or checked before use
- The shared data is to be used as reference/lookup files only
- This data sharing requirement is a test of whether the data in question should be shared
- The mapping is relatively straightforward, and will not require extensive changes to the legacy system's application software
- The mapping will not introduce inconsistency between files, value errors, or data integrity problems
- More extensive analysis is not appropriate because a replacement standard system is in planning or development.

In addition to required standardization, starting the mapping process early will avoid errors that might develop under deadline pressure. Each current fleet logistics information system is encouraged to initiate the process of mapping its current data structures and data element definitions to enterprise standard metadata.

Mapping Functions

For each field in the legacy system's database, list the legacy field's name, attributes, domain of values, and business/validation rules, and the file or table where it resides. For those fields that correspond to a standard data element, indicate the standard data element name. The remaining fields may require closer analysis to determine whether the field can be adapted to match a standard data element, if the standard data element attributes or definition should be modified, or if a new data element should be proposed.

Mapping requires modification of the legacy system's data structure (and updating the application software), or creating an interface module that converts and checks inbound and outbound data values.

A worksheet for preliminary analysis and tracking of all legacy data items is provided in **Appendix D.**

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5.2. Map Data, Continued

Key Responsibilities

The key responsibilities involved in data mapping are:
1. Establishing and maintaining a legacy data element inventory.
2. Resolving conflicting legacy data element names and definitions.
3. Identifying redundant legacy data elements.
4. Associating mapping data elements with data elements.
5. Associating legacy data elements with candidate standard data elements.
6. Implement approved map in the legacy system, by modifying the software and data structures or creating an interface module.
7. Edit and check ("cleanse") data values for attributes, domain, business rules, etc., so that data values will be shared reliably as intended.

When Not to Map

A system that, due to the level of changes or requirement for data sharing, must be redesigned using the enterprise data model is not a candidate for mapping. The system's logical and physical data model must be designed from the enterprise standard data model when any of the following are true:
- Substantial upgrade of the software, equipment, or communications
- Significant changes in the users' business processes
- Changes in legal or regulatory requirements affecting the system's data
- Requirement to share data routinely with other CG information systems

Do not map legacy data elements used for controlling internal system processing. This data, usually consisting of scratchpads, internal counters, and system performance indicators, is of no interest to fleet logistics users on other systems and so it need not be shared. Standards for internal data may, however, be useful for other purposes such as reusable software.

To standardize an application system in accordance with the fleet logistics enterprise data model, refer to **Section 3, Develop and Integrate Data Models,** and **Section 4, Standardize Data Elements**.

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5.2. Map Data, Continued

Data Mapping Process

The following table shows how to identify data mapping requirements, accomplish the mapping, and start to share standard data.

How to Map a Legacy System to Standard DEs

Step	Action	Process
1	Identify Requirement	Identify in the source and destination system(s) the data fields that must be shared, and the additional data fields that are affected (changed, used, combined) by the selected data items in their respective systems. A worksheet for identifying shared data is provided in Appendix D.
2	Assess Legacy System	Obtain and review the legacy system's Database Design Document and the analytical work that led to the system's logical and physical design. Review the system's data model to verify the implications of changing the selected data items. Determine the other changes required to support changes in the attributes of the selected data items.
3	Analysis	Obtain and review the current enterprise data dictionary. Identify the standard entities and data elements that appear to match the selected data items in the legacy system. Also identify the selected data fields for which no match can be found in the enterprise data dictionary.
4	Map Standard Data Elements	For fields that can be described by a standard data element, note the adjustments to be made in the legacy system (application software, data tables, or interface module).
5	Request New Std. Data Elements	For fields for which no match can be found, create a Request for Data Element Definition, as described in Section 4. This definition may require adjustment after DA review.
6	Map New Std. Data Elements	Using the approved version of the data element definition, map the newly approved data element to the appropriate field. Indicate necessary modifications.

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5.2. Map Data, Continued

Data Mapping Process (continued)

7	Submit Plan	Submit to fleet logistics DA a Data Conversion Plan. The plan must: 1. Identify all data to be shared, by standard and proposed data element names and attributes 2. Show how the shared data will be generated or used in the legacy system 3. If data will be processed by an interface or broker module, describe the processing method and demonstrate conformance to standard metadata 4. Show how the data values will be cleansed and validated for sharing, and how the mapping strategy will be validated and tested.
8	Modify Software	After approval of the Data Conversion Plan, modify the application software to accommodate and support the mapped fields. Preferably, modifications will be to the application software. If necessary, modifications can be applied to an interface module that brokers data between the application system and other systems.
9	Test & Adjust	Test the validity of the mapping by using, for each data item, test data that represents the full extent of the domain of the standard data element.
10	Validate & Register	Fleet logistics DA will review the test results and register the mapped system for sharing values for the specified standard data elements.
11	Share Standard Data	Use the standard process for bringing a new system online.

Triggering Event

The data mapping process is initiated by the need to identify, describe, match, and document data elements in legacy information systems which must share data with other (standard or legacy) fleet logistics information systems.

Principal Results

The documents resulting from the mapping exercise are:
1. Legacy data element inventory (refer to **Section 5.4**).
2. Legacy data element to standard data entity map.

Save these documents for use when the legacy system is upgraded to a standard system.

Continued on next page

5.2. Map Data, Continued

Implementation Roles

1. Fleet logistics DA is the steward of the legacy data element inventory and owner of the approved data element map. The inventory and map will be placed under configuration management.
2. The users of the legacy system "own" the legacy data elements. As soon as possible, the legacy data elements should be converted to standard data elements and responsibility turned over to the data steward for the appropriate information class.
3. The roles involved in the legacy data element mapping process are:
   - Fleet logistics data administration
   - Data stewards and subject matter experts for the appropriate information classes
   - Functional project manager
   - Technical developer.

5.3. Migrate Data

Introduction

This subsection shows how to move data from a legacy system to a standard system, making the changes to ensure the data is usable by standard systems.

Data Conversion Plan

As part of the plan for upgrading an existing system (Milestone 1), the user organization and/or developer shall submit a Data Conversion Plan. Additional information regarding the Data Conversion Plan is provided in **Sections 8** and **11.** The Data Conversion Plan shall include the following information:

- Description of the current data structure and data entity definitions
- Identification of standard data entities that will meet the equivalent functional need
- Identification of current data entities for which no satisfactory standard entity has been found, and the recommended disposition (new entity, expand definition of a standard entity, or request waiver for the entity).
- Indication of update cycle for each entity that requires synchronization
- Indication of data ownership and access criteria for each classified entity and for data that requires restricted access.
- Definition of validation formulas for critical data that requires systematic validation.
- Identification of data from the standard resource that could be used in this application
- Identification of data from this application that could be contributed to the standard resource.
- Strategy for editing and checking (cleansing) the data values for data sharing.
- Proposed new data structure
- Proposed migration path from current data structure (and external data interfaces) to the new standard data structure (and external data interfaces).

After authorization of the system upgrade, the Data Conversion Plan will become the preliminary Database Description Document (DBDD).

Data Migration Process

Figure 5-1 shows a simplified data migration process. The simplification is useful for describing its principal steps. The process begins by mapping the data elements of the legacy system(s) to the data elements of the migration system or near-term initiative. The map in the Data Conversion Plan facilitates the cleanup of the legacy data elements and identifies redundant and ambiguous data items. Then the developer cleanses the data values to meet the standard data element definitions. The final step is to move the data values from the legacy system to the standard system.

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5.3. Migrate Data, Continued

Data Migration Process

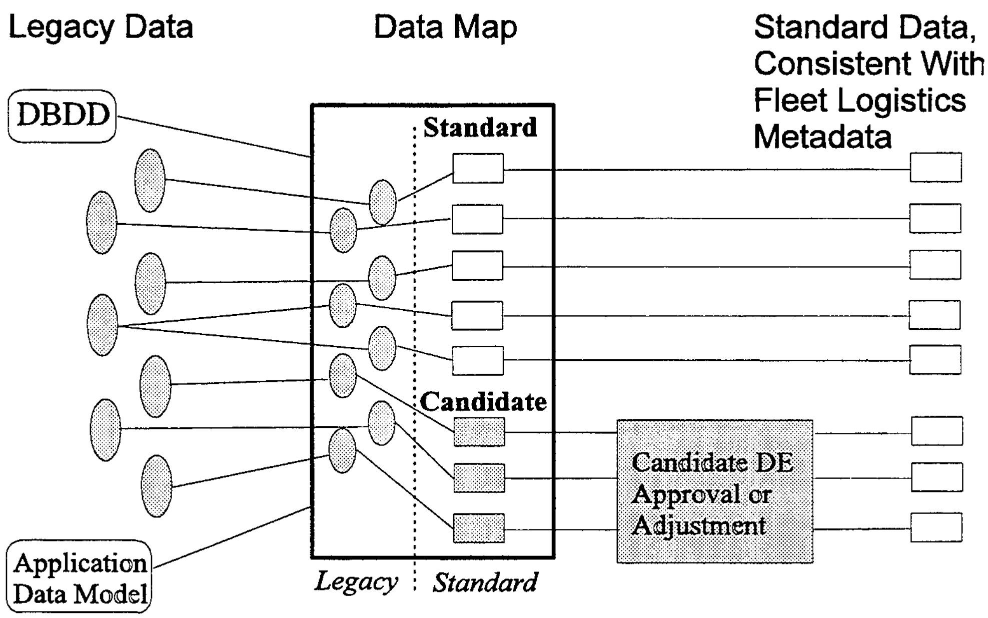

Figure 5-1. Data Migration Process

Triggering Event

The data migration process is initiated by the need to identify, describe, match, and document data elements in legacy information systems which are being replaced by standard information systems. The focal point of this process is the developer's Data Conversion Plan, and the supporting data element requests (if any).

Data Migration Approval

The list of data elements to be migrated will be submitted and approved as a Data Conversion Plan. For data elements the developer identifies as new or requiring revision, the developer or maintainer will submit a data element request, as described in **Section 4.** The developer or maintainer submits candidate standard data elements to fleet logistics DA, for the data element's technical approval and for integration into the enterprise data model. The data steward for the appropriate information class reviews the request as described in **Section 8.** Once the DA determines that the data element satisfies all technical and functional criteria, it is approved as a standard data element.

This process may iterate several times for migration data. During this process the data is separated from the particular application. When the process is completed, the data elements are standardized and independent. They are maintained as a part of the logistics enterprise data environment.

5.4. Establish and Maintain the Legacy Data Element Inventory

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Introduction

Data element mapping and data migration both require development of an inventory of legacy data elements (data fields in a physical database, along with their definitions and attributes). When data in a legacy system is to be shared, this inventory is the basis for identifying which data items (values in physical fields) will be shared (and therefore mapped to standard DEs). When data is to be migrated, the inventory is the basis for determining how data values are to be modified to conform to standard data element definitions.

In addition, the collection of inventories from various legacy information systems document how

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Inventory the Legacy Data Elements

Once the decision is made to map legacy data elements, the first step is to create an inventory of legacy data elements for those systems being replaced. The inventory is an identification of the data element, its associated data model (if one exists), and other information about the data element. This may require the collection of system documentation, file layouts, record layouts, procedures, job control steps, physical database descriptions, or copybooks. Document the business rules that are represented in the user procedures and software processes.

The data element mapping team should prepare the data element inventory for the DA repository.

Develop the Inventory

The developer or maintainer will develop the legacy data element inventory, using the listing of the application's data structure (files or tables, fields or columns, and attributes) as a starting point. Add to each data item the business rules (from user procedures and software algorithms) for creating, updating, and deleting that item, and any access restrictions for reading the item. If requested, DA will provide guidance for completing the inventory.

When completed, the developer or maintainer will transmit the inventory to fleet logistics DA. The DA will review the inventory, and may request additional information or modification before accepting it.

After the inventory is accepted, DA is responsible for maintaining it. The initial inventory is a legacy data element baseline, which DA will place under configuration control. Modifications after acceptance will be submitted item-by-item, using the process for a standard metadata change request.

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5.4. Establish and Maintain the Legacy Data Element Inventory, Continued

When to Start

The process of assessing and evaluating the legacy data elements begins after the inventory has been established. The assessment begins by determining which legacy data elements will be mapped. This determination is made according to the priorities of the functional project manager and fleet logistics DA.

Establish Name

If the data element name and description (in the legacy system) is abbreviated or unclear, the technical developers and the functional project managers have to resolve this ambiguity. This may require giving the data element a long, business oriented name and/or definition.

Resolve Ambiguities

Systems that were designed by different teams at different times for different purposes often have fundamentally different views of the data. These design assumptions often cause problems in data mapping and migration. One of the most difficult and critical tasks in mapping or migrating data is resolving these differences. These discrepancies must be resolved before legacy data can be mapped to standard metadata. This process may be helpful in resolving differences in names and definitions:

Step	Who	Action
1	Developer or Maintainer	Compare the data elements to identify conflicts. Data element conflicts take the following form: • Same name and definition (redundancy). • Same name, different definition (homonyms). • Same definition, different name (synonyms; potential redundancy). • Same name and definition, different entity association (synonyms; potential redundancy).
2	Developer or Maintainer, with DA	Resolve conflicts identified in Step 1. Given the complexity of resolving a large volume of data element conflicts, an automated tool to support this process is highly desirable.
3	Developer or Maintainer	Document the decision process for future reference.
4	Developer or Maintainer, with DA	Test the decision on a large sample of actual data values from the legacy system. Are the results compatible with the standard DE definition and attributes?
5	Developer or Maintainer	Incorporate the validated decision into the Data Conversion Plan.

SECTION 6
MAINTAIN METADATA REPOSITORY

6.1. Overview

Introduction

This section identifies functions that the repository tool users perform on the CG fleet logistics metadata repository. This repository is the central link for all data administration services. It is the key to re-use of logical data models, physical data structures, and application software modules. The specific set of operations is dependent upon the particular repository tool. The fleet logistics repository tool has not yet been selected.*

The metadata repository is not just a data model receptacle, but a management system that supports development of additional data models, integrates data models from a variety of applications and CASE tools, and permits convenient management of all levels of metadata. A versatile repository provides a means for achieving information resource management and data re-use.

The following sections identify and describe advanced repository operations that are vital to providing DA operational services.

* **NOTE:** At this writing the platform and tools for the fleet logistics metadata repository have not been selected. This version describes the future repository's requirements and functions. Contact the fleet logistics DA for current information.

In this Section

This section covers the following topics:

Topic	Section
Metadata Repository Requirements	6.2
Operations on Data Models	6.3
Operations on Data Elements	6.4
Operations on Other Repository Objects	6.5
Repository Utilities	6.6

Continued on next page

6.1. Overview, Continued

Metadata

Metadata means literally "data about data." This term refers to the means of describing the things one must know about a body of information in order to describe it completely and systematically. A metadata repository, then, is a place where metadata can be stored in a systematic and useful form.

Formal metadata includes categories of information (information classes), subtypes (logical entities) within those categories, and the detailed information (atomic facts or data elements) contained in each subtype. It also includes the various relationships between the logical entities, including identification of primary and secondary keys that activate each relationship. For data elements, the repository stores the standard name, aliases, definition, attributes, and systems where each is used.

This level of precision in describing the body of information is critical for creating a complete, valid, and application-independent representation of the information in the enterprise.

Repository

A metadata repository manages the information that *describes the enterprise's data*, such as information classes, entities, and data elements. FIPS PUB 156 describes a repository as a specialized database "... used to control, describe, protect, document, and facilitate use of an installation's information resources." In contrast, a repository of data values (a data warehouse) is a central system where information about procurements, national stock numbers, or vessel data, for example, would be stored. The fleet logistics repository is a metadata repository, not a data warehouse. Values (instances) are stored in the several application systems that share data according to the fleet logistics standard.

The fleet logistics metadata repository function includes the data administration duties of

- Defining standard data entities and data elements
- Noting all the instances where fleet logistics information systems use these data elements
- Analyzing and validating the use of data
- Controlling the versions of each metadata item

The repository function also collects and tracks information about *all* fleet logistics information systems and data resources, including legacy systems. This is the "wider repository." The wider repository includes business process/activity models, data models and physical data structure documentation of legacy systems, regulations affecting data, and data standards from other agencies and supplier organizations.

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6.1. Overview, Continued

Use of the Repository

Fleet logistics DA operates and maintains the metadata repository. The metadata repository includes a dictionary that maintains information about standard logical entities, data elements, relationships, and attributes. *Data administration personnel* use the repository for analysis and strategic data planning, to record approved metadata, to register the use of data items in standard information systems, to understand the effects of proposed metadata changes, and to track the status of candidate data elements. *Data stewards* contribute to and validate the logical data model, and use the "where-used" function to understand the use of specific metadata. *System developers and maintainers* use the repository's standard logical data model as the basis for designing application systems, and mapping and migrating data from legacy systems. *Users* obtain names and locations for data needed for queries and reports.

Scope of the Fleet Logistics Metadata Repository

The fleet logistics metadata repository maintains information about the data in the CG fleet logistics enterprise, and information that is supplied to or provided by fleet logistics organizations. The repository's logical data model describes the enterprise's standard logical entities and standard data elements. In addition, the "larger" repository function also collects metadata from fleet logistics legacy systems and attempts to reconcile this metadata with the standard metadata.

6.2. Metadata Repository Requirements

Introduction

The fleet logistics metadata repository refers to both a tool and a DA function. DA provides administration and support for the repository. The repository is the central broker of information about the data in standard fleet logistics information systems. The repository tool is a database management system that maintains information about fleet logistics enterprise data, and thereby supports the metadata repository function.

Categories of Repository Requirements

The fleet logistics metadata repository will provide the following categories of support to the data administration program:

- Describe the enterprise's data architecture
- Store and retrieve metadata
- Provide multiple views of enterprise metadata
- Integrate data models from multiple applications
- Support multiple CASE tools
- Ensure consistency and completeness in standard metadata
- Track changes to metadata

The following paragraphs describe these requirements at a level intended for evaluation of repository tools and understanding of the essential function of a metadata repository.

Describe Data Architecture

The fleet logistics metadata repository implements and gives substance to the fleet logistics information architecture by providing the following:

- Maintain both physical and logical views of data and business processes.
- Enable the concurrent establishment of many different architectural constructs such as data, application, organization, business process, and technology, all being linked as necessary.
- Capture and represent the business meaning of the data, and the contextual relationships that transform data into information.
- Facilitate information exchange among internal and external information systems, CASE tools, system development tools, and other repositories
- Support evolution of data architecture, scope of the enterprise, and CG IRM policies

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6.2. Metadata Repository Requirements, Continued

Store and Retrieve Metadata

The fleet logistics metadata repository provides reliable storage of and versatile access to metadata by providing the following:

- Maintain data dictionary information, design data models, planning data models, process models, data flow diagrams, and functional decompositions
- Catalog, analyzes, correlates, and manages the enterprise-wide use of information resources
- Identify each information system in which instances of user-specified data elements are created, read, updated, or deleted (where-used)
- View, update, delete, and retrieves metaobjects; allow users to form aggregate repository objects that are specific to a particular need
- Capture, store, and access business rules, design decisions, and data validation and synchronization rules for logical entities and data elements
- Capture, store, and access data flow and system and user access for security risk analysis
- Capture, store, and access "planning objects" such as business process models, business goals, and organization missions.
- Capture, store, and access "implementation objects" such as forms, user procedures, application code, job control language or scripts, and batch jobs
- Capture, store, and access acquisition and development data such as system development deliverables, and the interrelationship between deliverables, tasks, and requirements

Provide Multiple Views

The fleet logistics metadata repository ensures that standard metadata is system-independent and is useful to all applications by providing the following:

- Provide shared, interactive data dictionary services, with user-selectable view and level of detail, through which users can identify sources of data throughout the enterprise and provide information sufficient for users to select desired items and formulate queries on selected data values
- Permit joint analysis of requirements by specialists with different backgrounds and viewpoints
- Identify sources of information to support business processes
- Provide standard names, definitions, and terms for queries and reports
- Provides modeling and usage data for planning and management of the information resource.
- Link logical data to logical processes to identify instances (applications)
- Identify standard data required by processes and applications.
- Map logical (meta)data to physical data (technology model)
- Provide correct foreign keys
- Resolve and integrate various views in a single source
- Support impact analysis for proposed changes to standard metadata

Integrate and Manage Data Models

The fleet logistics metadata repository enables DA to integrate, reconcile, and manage data models by providing the following:

- Document the relationships between organizations, locations, processes, and data in the context of operational business and data requirements
- Provide model integration services for models, structures, items, relationships, and user views at multiple levels, with requirements traceability; consolidate attributes and resolve differences in item specifications.
- Provide model management services including consolidation of attributes and resolution of differences in item specifications, while maintaining visibility of the different versions of model items and tracking which version is in use by which model
- Support evolution of the enterprise data model, and management at all levels of abstraction and/or detail
- Coordinate and integrate each model, structure, item, relationship, and user view, at the user-specified level of granularity, both internally and with adjacent higher and lower-level views, while maintaining identification of each requirement's origin
- Capture, store, and access data mapping and conversion rules to migrate from legacy systems to standard metadata

Note: The metadata import and export facilities of each CASE tool are different. They all exchange the same basic information, but there are important differences. Typically, business rules (constraints, triggers, access rules, synchronization, etc.) present problems when translating between CASE tools. When downloading a view to start an application data model, work with the DA repository administrator to determine which additional information must be added to comment fields or kept separately. Planning for developing and transferring this additional information will save time during data model review.

Support Multiple CASE Tools

The repository system's formats and interfaces should support the use of major industry-standard CASE tools and database management systems, thereby supporting the CG's need to utilize current technology on a competitive basis. The following requirements are intended to maintain the vendor-neutral quality of the repository:

- Export and import in a variety of popular CASE tool formats, attributed data models for user-specified views, and related metadata
- Support download of complete metadata for (subset) views, to populate an application data model, as the starting point for data-related analysis

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6.2. Metadata Repository Requirements, Continued

Ensure Consistency and Completeness

The fleet logistics metadata repository ensures the consistency, completeness, and quality of metadata by providing the following:

- Define and enforce rules and policies related to metadata (naming standards, integrity rules, foreign keys, attributes, etc.)
- Provides in software the rigor and cross-checking necessary to achieve a valid enterprise data model by enforcing modeling rules
- Ensures consistent methods, nomenclature, notation, and definitions
- Supports object-oriented, relational, and traditional data constructs
- Provide for online and batch entry of metadata change requests, track the process of review and decision by distributing to reviewers and capturing responses, report the status of each request, and facilitate the review process
- Reduce redundancy and provide a common foundation for shareable information
- By providing quality metadata, improves developer and user confidence in the enterprise data model

Track Metadata Changes

The fleet logistics metadata repository enables DA to track, manage, and report the status of metadata changes by providing the following:

- Provide configuration management for models, views, logical entities, and data elements, with capability to roll-back and spin-off views from user-specified versions of metadata
- Maintain visibility of different versions of model items, and tracking which version is in use by which model.
- Map version of metadata objects to versions of information systems where they are used
- Track submittal, review, and disposition of metadata change requests

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6.2. Metadata Repository Requirements, Continued

Repository Metamodel

The following E-R diagram, shown in Figure 6-1, shows the three levels of metadata in the fleet logistics metadata repository:

- *Conceptual data architecture:* describes the kinds of information that are of interest to the fleet logistics enterprise.
- *Logical data model:* describes the logical entities and data elements of the enterprise in a manner that is independent of any application system or physical database design.
- *Physical data model:* describes the implementation of the logical data model in the physical database designs of fleet logistics standard application systems.

This three-tier approach is described in greater detail in **Appendix A.**

Note: This model does not match any specific commercial repository software product. It represents the requirements for three levels of metadata needed by the DA repository function. Implementation may require a series of closely linked tools rather than use of a single product.

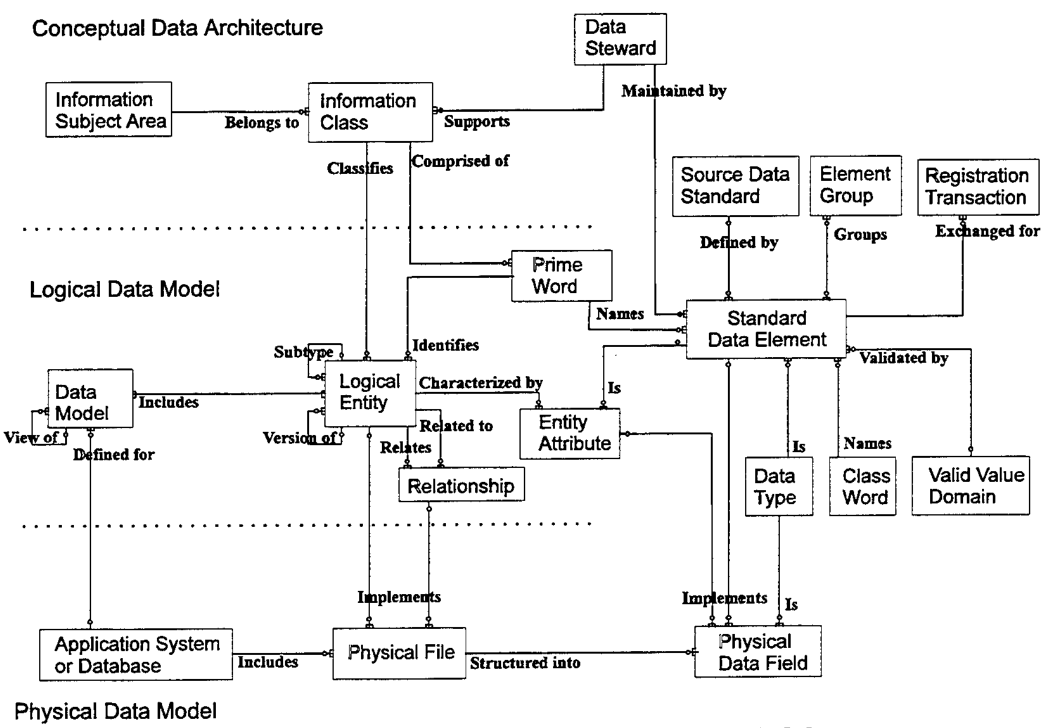

Figure 6-1. Three-Level Metadata Repository Model

The following paragraphs describe each of the elements of the metadata repository model.

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6.2. Metadata Repository Requirements, Continued

Repository Meta-Entities

The following items each explain one 'meta-entity' shown in Figure 6-1. Each paragraph provides a functional description of its respective meta-entity, and describes the functional relationships indicated in the diagram. The diagram represents a logical data model of the typical metadata repository and also reflects the working relationships of the various elements of the fleet logistics data administration program.

Information Subject Area

Subject areas are groups of information classes. Subject areas form the highest abstraction level of the conceptual data architecture. An information subject area relates to a CG function or mission area. A subject area may include one or several information classes.

Information Class

Information classes, and how information is allocated into classes, is the basis of the conceptual data architecture. An information class is a well-defined category of CG information. Each information class represents a top-level entity in the CG enterprise data model. Each logical entity belongs to one information class. Each information class is designated by a prime word, which must appear in the name of each data element that belongs to the information class. A data steward and subject matter experts (as needed) are assigned to support an information class.

Data Steward

A data steward is assigned to monitor one or more information classes, and is responsible for the technical validity and enterprise view of the data elements within the assigned information class. Each data steward is familiar with the CG information systems that create, update, or use information in the assigned information class. Stewards model the use and flow of that information, participate in the setting of standards and process improvement, recruit and coordinate subject matter experts, review metadata change requests, monitor data quality, and represent related user communities. These data stewardship functions are described in Section 9.

Logical Entity

A logical entity is the general term for a person, place, thing, concept, event, or activity about which the enterprise wishes to keep information. A logical entity is used for data modeling. A logical entity may have instances in specific applications where a different name is used in the physical database design, but is mapped to the logical entity. Pointers in this entity should provide for logical entity subtypes and versions. Logical entities are defined from an enterprise point of view. The difference between physical and logical data is explained in **Section 4** and **Appendix A**.

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6.2. Metadata Repository Requirements, Continued

Prime Word

In a data element name, the prime word refers designates the information class or high-level entity to which the data element belongs. It is typically the first word in a data element name. By the prime word the data element name indicates which data steward is the primary technical reviewer for the data element.

Entity Attribute

While a logical entity represent a general type of information (such as name, vessel, or purchase order item), each entity has one or more details (atomic facts) that make up the complete set of information about the entity. Each of these attributes at the logical level is, in the next phase, further defined to become a standard data element.

Standard Data Element

A standard data element is an entity attribute that has been more rigorously defined with a set of data element attributes. Along with business process modeling and logical data modeling, the definition of standard data elements provides the basis for reliable enterprise-wide data sharing. Section 4 describes the data element standardization process.

Source Data Standard

A source data standard is a clearly defined reference from which to obtain values for one or more standard data elements.

Element Group

An element group is a collection of standard data elements, either from an entity or from a number of entities whose relationship has been defined. An element group is a logical concept that is used by application designers to identify information that is associated in a specific view of the data, but may not belong to the same entity.

Registration Transaction

A registration transaction is an event where a version of a piece of metadata (such as a standard data element definition) is entered as a candidate definition, or is modified, approved, or archived. Each transaction record designates a change in status and version of a piece of standard metadata. This entity therefore serves both as a pointer to current data values and as a configuration management and audit trail tool.

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6.2. Metadata Repository Requirements, Continued

Data Type

Each data element represents data of a specific type, such as character, number, date, binary object, etc. The data type is an attribute of each standard data element.

Class Word

A class word is a required component of each standard data element name that indicates the general kind of information (identifier, text, number, or date, for example) that is contained in the standard data element's values.

Valid Value Domain

Each standard data element has as part of its definition a set of acceptable data values (domain). A data element's domain of valid values may be infinite (such as a numeric field of variable length) or specific (a set of transaction codes).

Relationship

The logical data model is composed of logical entities and definition of the relationships between entities. These relationships reflect the business rules that govern the values of specified data elements. This entity provides for definition of these links. It also provides for recording the implementation in physical databases of these relationships.

Data Model

The values of this entity identify the logical data models that are part of or derived from the enterprise data model. Its links identify the logical entities that each model includes. These models can represent different views of the same logical entities, and can be linked to application databases.

Application System or Database

The values of this entity are the names (and other identifiers) of each database or application system for which use of the standard metadata is recorded. Linked to "physical file," this information permits where-used analysis to determine the effect of proposed changes.

Physical File

A physical file is a data file (table) that contains data values. Typically, a group of physical files and the relationships between the data in these files constitute a physical database.

Physical Data Field

A physical data field is a physical occurrence of a standard data element (which is also an entity attribute). It is a column in a table or a field in a file.

6.3. Operations on Data Models

Introduction

The following functions are the minimum repository capabilities required to perform data model operations.

Obtain and Analyze a Data Model

Fleet logistics DA obtains metadata from outside sources and uses this information to develop standard logical entities and data elements, and to validate and enhance data element definitions and attributes. Processes for receiving, analyzing, and using metadata from other functions and organizations include the following:

1. Receiving a data model from sources other than the repository tool, such as a DBMS data dictionary, a database report, diagramming tool, or other CASE tool.

2. Translating the metadata from the tool in which it was developed, and importing the model into the repository's analysis software using standard or customized import procedures. This metadata is used by data administration staff and data stewards to develop, refine, and validate standard data element definitions, logical entities, and information classes.

3. After the metadata from an imported data model is incorporated and naming and definition differences are resolved, then this information can be used in analysis of the use of specific data by various standard, legacy, and other organizations' information systems.

Note that importing a legacy system's data model is for analysis only. This import and analysis task does not endorse the legacy system as a standard system, nor does it indicate acceptance of the legacy system's data element names nor definitions.

Utilizing Other Metadata

Refer to the sections, "Support Development and Integration of Data Models," "Share Data by Mapping and Migration," and "Maintain Other Models and Definitions" for additional information regarding utilization of metadata in the fleet logistics metadata repository.

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6.3. Operations on Data Models, Continued

Select/ Extract a Sub-Model

The repository software must support selection and/or extraction a set of repository objects (sub-model) based on specifications from an analyst, and generates a new sub-model from these objects for use in other development work.

Generate Data Model / Database Schema

The repository software must support generation of a lower level data model from the repository for the use in a development project.

Current standard models must be provided early in the planning and requirements-setting phases of a new development or upgrade project.

Provided with the current standard data model, developers should avoid creation of an independent, incompatible data model.

Develop Applications Using the Data Model

The repository software must support generating a subset of the standard enterprise data model from the repository for the use of an analysis, maintenance, or development project.

The available formats for delivery of electronic versions of the standard data model will depend on the capabilities of the repository tool, when selected.

6.4. Operations on Data Elements

Introduction

The following functions are the minimum repository function set required to manage standard data elements.

Create a Standard Data Element

The repository software must support creation, modification, deletion, and/or submittal of proposed data elements to fleet logistics DA for approval. The request tracking part of the repository must record the request life cycle stages as described in **Sections 3 and 4.**

Map Data Elements

The repository software must support mapping of standard logical data elements to the physical fields in legacy systems, with aliasing. This feature set should support the mapping and migration functions described in **Section 5**.

Analyze Data Element Conflicts

The repository software must support analysis of potential conflicts between data elements and entity attributes based on their similarities and differences. The repository tool will provide capabilities to identify data element conflicts which take the following forms:

- Same name and definition (redundancy), same name and different definition,
- Same definition and different name (potential redundancy),
- Same name and definition with different entity association.

6.5. Operations on Other Repository Objects

Introduction

The following functions are the minimum function set required to perform operations on repository objects other than data models and data elements.

Link Repository Objects

The repository software must link newly loaded repository objects (usually entities and relationships) to correspondent objects in other data models (higher level models or previous versions).

Clone Repository Objects

The repository software must support cloning of repository objects (usually entities, relationships, attributes) to correspondent objects in other data models.

Assign Repository Object Ownership

The fleet logistics standard data model is a passive repository, controlled by fleet logistics DA. The repository software must support multiple repositories, so that a project can extract the required subset (view) into a separate model for analysis. Within this subset view only, the repository software must support assignment of ownership of the repository objects to projects. This enables owners of the subset copy to make changes without affecting the standard metadata.

Register Metadata Issues

The repository software must support registration of inconsistencies within or between models. DA will use this feature to facilitate review of logical and attributed data models that are submitted by developers and maintainers.

Register Metadata Changes

The repository software must support registration of changes to the metadata, including requests for changes and release of approved changes.

Identify Change Impacts

The repository software must support identification of impacts of metadata changes within one or many models. This "where-used" report will be used by DA, data stewards, developers, and information users.

Propagate Metadata Changes

The repository software must support determination of inconsistencies between the submitted candidate model or model version and linked objects in the standard logical data model, and recommend necessary changes in the linked objects.

6.6. Additional Repository Utilities

Introduction

The following repository utilities optimize the performance of the required data repository functions. Repository tool users should make use of the query and report functions before making any changes to the current model and/or data elements. Electronic mail facilitates communications among developers and fleet logistics DA, helping to ensure that change proposals are more accurately prepared. The repository tool system administration functions are vital in ensuring that both the tool and the repository operate continuously and reliably.

Display Metadata for User Query

The repository software must support user queries of data elements and/or entities in the repository based on the following criteria:

- Class word
- Data element name
- Approval status
- Prime word
- Data steward

Generate Repository Reports

The repository software must support user generation of reports on the repository content. Reports are based on any or all of the following criteria:

- Class word
- Data element name
- Approval status
- Prime word
- Data steward

Electronic Mail

The repository software must support user communication through an electronic mail system. This mail system will facilitate informal discussion on current repository issues, resolution of small problems, coordination of meetings and reviews, and recognition of opportunities.

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6.6. Additional Repository Utilities, Continued

Repository Tool System Administration

The repository tool system administrator provides technical support to ensure the integrity of the tool. System administration functions for the repository tool include:

- Backup, archive, and recovery procedures in case of a computer crash or other technical difficulty
- User account administration (granting accounts, restricting access to the tool, and permission to create or modify subset views)
- Batch job support for large data input
- Ad-hoc technical support in the form of robust HELP, online manuals, and/or function-specific electronic performance support.

SECTION 7

CONTROL CHANGES TO METADATA

7.1. Overview

Purpose

This section describes the processes for identifying versions of and controlling changes to the various types of metadata in the fleet logistics data repository. It describes the working relationship between data defined under the standards for fleet logistics data administration (DA) and data defined elsewhere. Data defined elsewhere includes those:

- in existing systems,
- in systems developed in Coast Guard (CG) organizations outside of fleet logistics, and
- in systems of organizations outside of the CG.

In this Section

This section includes the following subsections:

Topic	Section
Overview	7.1
Metadata Change Control Process	7.2
Changes to Standard Process and Data Models	7.3
Updating Standard Data Element Names & Definitions	7.4
Changes to Application-Specific Metadata	7.5
Changes to Standard Term Definitions	7.6
Changes to Other Metadata	7.7

Continued on next page

7.1. Overview, Continued

Maintaining Metadata

Maintaining metadata is required in various tasks to propose, review, identify, and implement changes. In an enterprise-wide data resource, changes affect the entire community, not just one application system. The processes in this section show that diverse teams developing information systems can propose changes

- to the same enterprise data model,
- to standard data elements, and
- to definitions

and that the changes can be reviewed and implemented in an organized and controlled manner.

In addition, since metadata from legacy systems needs to be referenced, an abbreviated form of the metadata maintenance process is addressed.

Importance of Enterprise-Wide Consistency

For data to be shared reliably and usefully, the definitions and characteristics of entities and data elements must be absolutely consistent. In the long term it is intended to have all information systems comply with standards. In the meantime, data must be shared with existing systems, built to different standards or designed their respective data structures without regard to external standards. Sharing data among non-standard systems requires careful analysis of the metadata of those systems. Fleet logistics DA provides a repository for metadata, including metadata from systems that are not fleet logistics standard. However, these non-fleet logistics standard metadata will be identified as such, so that there is no confusion with the fleet logistics-standard metadata. This repository provides a central point for reference and interface work.

While interim solutions are necessary on occasion, the intent of the CG is to work toward open systems - that is, systems using standard, sharable data.

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7.1. Overview, Continued

Metadata Subject to Change Control

The term 'metadata' includes models, model objects, and definitions that are used to describe data. DA is interested primarily in the metadata that make up the standard for the fleet logistics standard information resource. DA also supports the fleet logistics community by providing a central point for storing and referencing metadata that describe data used by legacy systems, systems of allied agencies, and other non-standard information systems. The following types of metadata are subject to change control, and the revisions are used to keep the fleet logistics repository current:

- Standard process and data models
- Standard logical entities, relationships, and data element definitions
- Fleet logistics application-specific (non-standard) data and process models and model objects
- Standard term definitions

In addition, the following types of metadata can be put under change control in this repository, if desired by the developer/user organization:

- Metadata from systems of allied agencies
- Metadata standards of allied agencies, industry, and standards organizations
- CG-wide process and data models

Repository for Application-Specific Metadata

For systems that are not yet registered as standard systems, the fleet logistics DA repository will accept, for reference purposes only, process models, data models, schemas, physical database designs, definition of key terms, and other metadata. The purposes for keeping this information is to provide a central reference point for planning of future interfaces to non-standard systems, and to validate the completeness and applicability of standard definitions.

Definition of Standard Terms

For definitions to be comparable and to improve the success rate for comparing and reconciling data definitions, a set of standard terms shall be used where applicable. The current dictionary of standard terms is provided in **Appendix B, Class Word Descriptions**.

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7.1. Overview, Continued

Baseline and Version Control

The change control process calls for submittal of each validated version of the model to CM for archiving and version control. Each version of the model that is released for use outside the project team should be released through CM and assigned an incremental version number.

The first released, approved version of the attributed data model will become the data model's baseline, and will be numbered Version 1.0. Subsequent minor adjustments and corrections will be assigned minor version numbers (1.1, 1.2, etc.). Major redesigns will be numbered with the next major revision number (2.0, 3.0, etc.).

Who Requests Metadata Changes?

The most typical generators of change requests are development teams (who have uncovered or refined a requirement) or data users (who need an adjustment to meet information needs). Other potential contributors are the data stewards (whose business processes or regulatory requirements often change) and fleet logistics DA staff (who detect inconsistencies, propose new standards, and respond to changes in the standards of allied organizations).

7.2. Metadata Change Control Process

Purpose

This subsection describes the process to control changes to the various types of metadata included in the fleet logistics metadata repository.

General Responsibilities

To maintain the integrity and usability of metadata, any changes to it to create new versions must be controlled. This control is a shared responsibility. Developers prepare and submit valid versions, DA tracks the changes, the repository software assigns version numbers automatically; and DA makes available the current and valid versions of standard metadata. DA ensures that the change request is technically correct and then notifies CM of the readiness of the change for release. CM releases the change.

In addition, DA receives and catalogs copies of metadata from non-standard systems is for reference and planning.

Process Overview

Each type of metadata requires certain variations and emphasis of the basic management process. These variations are described in the following subsections. The common, basic process consists of the following steps:

Step	Action
1	Preparation - Developer prepares change request
2	Submittal - Developer transmits request
3	Receipt - Fleet logistics DA receives, logs, and checks request
4	Review - Request reviewed for standards, function, and effect
5	Disposition - Fleet logistics DA accepts, rejects, or requests modification
6	Release - Fleet logistics DA authorizes change; CM releases
7	Implementation - Change repository; notify community

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7.2. Metadata Change Control Process, Continued

General Process for Updating Metadata

This general process shows the fleet logistics DA approach to maintaining metadata. The detail for preparing, submitting, checking, and implementing changes for each type of metadata is provided in the remaining subsections.

Figure 7-1 shows the tasks associated with each of the metadata management phases.

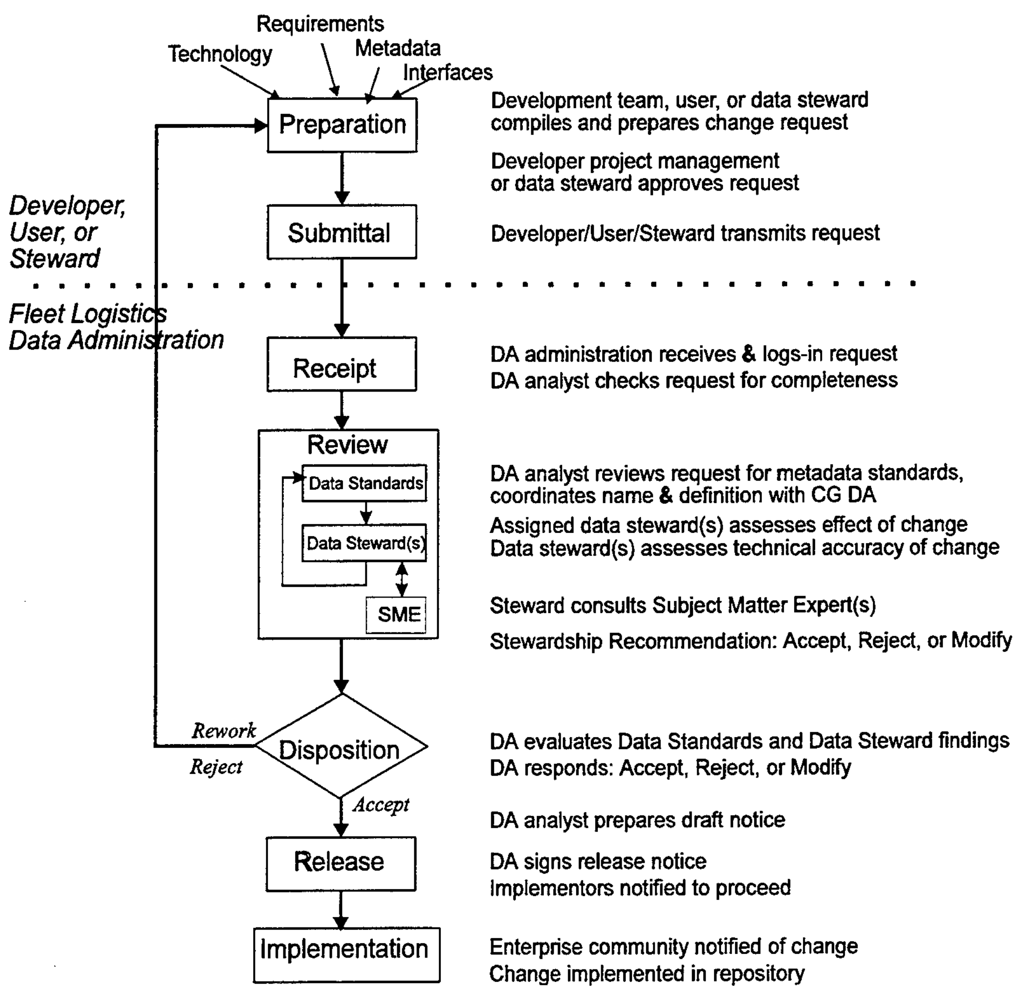

Figure 7-1. Change Request Review and Disposition Process

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7.2. Metadata Change Control Process, Continued

Preparation of Change Request

The decision to request a change in metadata can come about from a combination of:

- Changes or refinements in application requirements
- Changes in tools and software environments, or in requirements to move metadata between tools
- Metadata of systems from outside of fleet logistics with which a fleet logistics system must share data

The developer must consolidate the requirements into a specific set of changes, which the developer then submits as a change request. Generally, a change request contains the following types of information:

- Identification of the system and program that generated the requirement for the change
- Identification of the standard (or application-specific) metadata to be changed
- Complete description of the change, reduced to remove-and-replace steps
- Explanation of the requirement for the change
- Developer's estimate of the effect of the change, and the effect of not making the change
- Scheduling information

The format and level of detail for each of these types varies by type of metadata, as indicated in the following subsections. Each request package, however, must address each of these points.

Submittal of Change Requests

The developer should route metadata change requests through the application's program management and configuration management functions, so that the request reflects the requirements of the program.

The developer organization transmits the request package to fleet logistics DA.

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7.2. Metadata Change Control Process Continued

Analysis and Disposition

Upon receipt of a request package, DA performs the following intake process:

Step	Action
1	Log-in the package
2	Check package for completeness (return if incomplete)
3	Check the cited metadata for applicability of the requested change (Has it already been changed? Is the requester applying the change to the correct version? Does the "change from" information exist?)
4	Standards compliance: format and completeness (Does the requested change conform to the data standard(s) for the type of metadata?)
5	Discrepancy resolution (request correction of minor discrepancies by memo, electronic mail, or telephone; return package for major corrections)
6	Accept corrected request package for review. Notify DA and the requesting developer of the start of the review process

For submittals regarding application-specific (non-standard) systems, the review for completeness is the only step needed for acceptance. Only metadata that will be integrated into the fleet logistics enterprise model is subject to the review process.

Review

Review of the change request is intended to answer three questions:

- Will the change cause the metadata to remain standard or alter its level of quality? *(Standards review)*
- Does the proposed change enhance the accuracy, relevance, and usefulness of the standard entity, element, or definition? *(Data stewardship review)*
- What will be the effect on other systems, programs, and mission areas that use the same metadata? *(Impact analysis review)*

Fleet logistics DA coordinates these three reviews, and uses the results to act on the change request.

When this review finds standards, technical, or usage problems with the change request, DA will issue a Metadata Discrepancy Report for each item. The report form is provided in **Appendix D.**

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7.2. Metadata Change Control Process Continued

Standards Review

Data standards review is performed by fleet logistics DA. The purpose of this review is to ensure that the proposed change is consistent with data description, quality, and security standards. This is different from the preliminary check in that it examines the metadata before and after the proposed change, rather than just checking the format and content of the change request package. In addition, the standards reviewer identifies the data steward(s) that will perform the data stewardship review.

Standards review points are documented in **Sections 3, Support Development and Integration of Data Models, 4., Standardize Data Elements, and 8, Ensure Data Quality.** The standards reviewer assesses the effect of the proposed change from a metadata standards point of view, and provides a recommendation to fleet logistics DA.

A metadata change request will be distributed for stewardship review only after all discrepancies found in the standards review have been resolved.

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7.2. Metadata Change Control Process Continued

Data Stewardship Review

Data stewardship review is performed by experts within the mission area that supports the information class of the proposed change. The purpose of the data stewardship review is to assess the technical merit and the enterprise-wide effects of the proposed change from a mission area perspective. Some change requests will require assessment by more than one mission area.

The stewardship reviewer(s) should answer the following questions:

Step	Question
1	Do the proposed changes in definition, codes, fields, and/or other characteristics accurately describe the intended information, in its best use? "Best use" means effective implementation of CG policy and practice, achieving the objectives of the mission area, and best professional practice.
2	Does the change include and support business rules, access control, validity checking, and synchronization that will ensure the consistency, quality and reliability of the data values?
3	When the metadata is modified by the proposed changes, will the standard entity, element, and/or definition(s) still meet all regulatory, policy, quality, and security requirements?
4	What current, developing, and planned standard systems will this change affect, and what work must be done in these other systems to accommodate the change?
5	Taking into account the revision and release schedules of the other affected systems, program requirements, and other changes that are occurring or planned within the mission area, what is the most effective date for this change to be implemented?

The data stewardship reviewer(s) assesses the effect of the proposed change from a subject matter expert point of view and as a representative of the mission area that is responsible for the information class. From this assessment, he/she provides a recommendation to DA. The steward's findings may include one or more Discrepancy Reports.

Data stewardship review process is described in **Section 9.3**. A form is provided in **Appendix D** for data stewardship review response.

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7.2. Metadata Change Control Process Continued

Disposition

Fleet logistics DA reviews the recommendations and determines whether to accept, reject, or modify the proposed change:

- DA *accepts* the metadata change request by approving it and transmitting it to CM.
- DA *rejects* the request by returning it to the requesting organization with a note of explanation.
- DA indicates the need to *modify* a request by transmitting Metadata Discrepancy Report(s) to the requesting organization.

Only approved change requests are transmitted to CM.

Release and Implementation of Changes

Notice of the decision is transmitted to the requesting organization and to other stakeholders as needed. General notice of changes is made available to all interested individuals and organizations.

The DA transmits the approved metadata change request (after modification and review, if necessary) to CM for release. After release, DA transmits the change to the operator of the repository for implementation.

7.3. Changes to Standard Process and Data Models

Purpose

This section describes the specific preparation and review actions necessary to revise standard fleet logistics process and data models. The process for change request submittal, review, and disposition is described in the previous subsection. This subsection contains the additional information that is specific to revising process and data models.

Reasons to Request Changes in Standard Models

Process and data modeling is an iterative process. Each analysis and design task provides an opportunity to add more detail and insight to the current process and data models. Frequently new processes and data entities need to be described. When they cannot be described by existing standard processes, relationships, and entities, then revisions should be proposed.

The act of proposing a change does not by itself ensure acceptance of the precise definition and characteristics in the language of the submitter. Instead, it starts a process of attention by DA, functional expert, and data user communities. Out of this process will come a response that meets the original need, and may also address enterprise-wide issues that were highlighted by the original request.

Preparation and Submittal of Revised Models

Revision of a model is more complex than revision of one definition. To modify a fleet logistics process model or data model, one must propose additions or modifications to specific entities and relationships, not to the entire model. Evaluation by DA will be based on these individual changes. DA will determine the full impact of the change on the process or data model, and take appropriate steps for modifications on that level.

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7.3. Changes to Standard Process and Data Models, Continued

Data Standards Evaluation

DA will evaluate process and data model changes for compliance with CG data standards. Any discrepancies will be recorded and tracked by fleet logistics DA using the Metadata Discrepancy Report provided in **Appendix D**. DA will notify the Data Steward after data standards discrepancies have been reconciled.

Data Stewardship Evaluation

Data stewards will evaluate process and data model changes from the viewpoint of logistics-wide or CG-wide business processes, not from the viewpoint of the specific application system. The assumption by the Data Steward reviewer is that this change is in compliance with CG data standards.

Data stewards will complete a Data Steward's Review Response (provided in Appendix D) for each review request. In addition, a steward may complete one or more Metadata Discrepancy Report(s) when he/she identifies a specific issue or problem in a change request.

Disposition and Implementation of Changes

When accepted, changes will be incorporated into the fleet logistics DA corporate process model and corporate data model. These procedures are described in **Section 3, Integrate Data Models.**

After metadata changes have been implemented by fleet logistics DA, the repository operator assigns a version number to the change and notifies all systems affected by the change. These procedures are also described in **Section 3, Integrate Data Models.**

7.4, Changes to Standard Data Element Names and Definitions

Purpose

This section describes the specific preparation and review actions necessary to revise fleet logistics standard data element definitions. The process for change request submittal, review, and disposition is described in **Section 7.2, The Change Control Process.** This subsection contains the additional information that is specific to revising definitions of standard data elements.

Reasons to Request Data Element Definition Changes

Analysis of a business process may yield refinements in a data element definition, or extensions to a domain or attribute set.

Data element change requests can be submitted as:

- Add a new, unique data element (or a set of elements for a new entity)
- Modify an existing standard element
- Add a new relationship type, or modify the definition of an existing relationship.

A separate type of request is the request for exemption from compliance to the standard for a strictly internal, non-shareable element.

Preparation and Submittal of Changes

Because each standard data element belongs to one entity, clearly identify the entity to which the data element belongs.

Since some data element reviewers may not have regular on-line access to the fleet logistics repository system, all parts of the change request package must be reducible to hard copy, even for requests submitted electronically.

Data Standards Evaluation

DA will evaluate data element changes for compliance with CG data standards. Any discrepancies will be recorded and tracked by fleet logistics DA. DA will pass the change to the Data Steward after data standards discrepancies have been reconciled.

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7.4, Changes to Standard Data Element Names and Definitions, Continued

Data Stewardship Evaluation

Data stewards will evaluate data element changes from the viewpoint of logistics or the CG, not from that of the specific application system. The assumption by the Data Steward reviewer is that this change is in compliance with CG data standards.

Section 9.3 describes the data stewardship review process.

Decision and Implementation of Changes

Accepted changes will be available (with effective date noted) in the fleet logistics data repository within a reasonable time after acceptance.

Changes will be integrated into the fleet logistics corporate data model within a reasonable time after acceptance.

7.5. Changes to Application-Specific Metadata

Purpose

The process for change request submittal, review, and disposition of metadata is described in **Section 7.2, The Change Control Process.** This section contains the additional information that is specific to revising application-specific (non-standard) metadata.

What Metadata should be Submitted and Updated?

Other process and data models, set of definitions, or other metadata may be submitted for consideration to be cataloged and stored. As the resources of DA and the repository increase over time, the set of other metadata considered acceptable may also increase.

Preparation and Submittal

Updates can be submitted with the instructions to replace previous versions, or to store in addition to previous versions.

Disposition by DA

DA does not act on application-specific (non-standard) metadata. Responsibility is limited to cataloging contributions and making them available for analysis by developers and users outside of fleet logistics.

7.6. Changes to Standard Term Definitions

Purpose

The process for change request submittal, review, and disposition of metadata is described in **Section 7.2, The Change Control Process**. This subsection contains the additional information that is specific to revising standard term definitions. The collection of these definitions is referred to as the standard terms dictionary.

Updating of Standard Terms Dictionary

Current and accurate standard terms are important to everyone who creates and submits definitions. Use of standard terms in definitions facilitates understanding and review of submitted metadata. Submittal of new terms and refinement of existing definitions will keep the standard terms dictionary current and complete.

Reasons to Request Change of a Standard Term

Every word that is used in any definition is not necessarily a candidate for the standard terms dictionary. The most useful additions are:

- Technical terms and phrases that have specific meaning in a business process
- Nouns that refer to specific things in CG use and might be misinterpreted as more general things
- Adjectives that place a standard noun in a specific context or condition
- Verbs that denote specific actions or processes

The most likely reasons to submit revisions are:

- Refinement needed before using a specific definition in an application
- No reasonable match found for a needed term
- Current standard definition creates confusion in a particular context
- An additional meaning for a standard term is discovered.

Preparation and Submittal of Change Request

A standard term or definition request should include:
The standard term (new or proposed)

- Current definition
- Proposed definition
- Reason for the change
- Estimate of the instances in fleet logistics standard metadata where the proposed definition will be used (i.e., effect of making this change)
- Consequences of not making the change
- Program or organization generating the change, with contact information

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7.6. Changes to Standard Term Definitions, Continued

Analysis and Review of Change Request

Analysis and review of standard term change requests should follow the same pattern as review for other items, as mentioned in this subsection, including: Data Standard Evaluation, Data Stewardship Evaluation, Disposition and Implementation of Changes, and Incorporation into the fleet logistics enterprise data model.

7.7. Changes to Other Metadata

Purpose

The process for change request submittal, review, and disposition of metadata is described in **Section 7.2, The Change Control Process.** This subsection contains the additional information that is specific to revising metadata other than the types described in the previous subsections.

Preparation and Submittal

Prepare the change package, noting "not applicable" for items that are not appropriate for the type of metadata being changed. Note that for exceptions and unusual submittals, it is especially important to identify precisely the subject of the change.

Receipt and Processing

DA will log and evaluate an "other" change request package using the standard process. DA will determine the review process, as appropriate to the request.

Notice to Community

In addition to the notice specified in **Section7.2**, fleet logistics DA will broadcast notice of "other" change requests shortly after receipt of the request. This additional notice is to alert potential stakeholders of a potential change that affects more than a single definition.

SECTION 8
ENSURE DATA QUALITY

8.1. Overview

Introduction

This section provides the concepts and procedures that provide data quality and security components to the data administration process. These processes are not separate, but are integrated into the system life cycle and metadata development process. The quality criteria in this chapter are intended to be applied during development and subsequent review cycles.

The goal of the processes described in this subsection is to provide for quality and security of the data through design and planning. These functions focus attention on the development and business processes that create data values, and facilitate authorized, system-wide sharing of information.

In this Section

This section contains the following topics:

Topic	Section
Overview	8.1
Data Quality and Security Concepts	8.2
Ensuring Compliance with Data Standards	8.3
DA Education and Outreach	8.4
Facilitation and Technical Support	8.5
Processes and Criteria for Metadata Review	8.6
Acceptance and Registration of Standard Systems	8.7
Modifications to and Exemptions from Data Standards	8.8
Assess Risk and Control Access to Non-Public Information	8.9
Risk Analysis Process	8.10
Ensure System-Wide Data Synchronization	8.11
Ensure Data Quality and Integrity	8.12
Implement Data Integrity Measures	8.13
Establish Consistent Definition of Terms across Systems	8.14
Improve the Data Quality Program	8.15

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8.1. Overview, Continued

Cross Reference

The following table indicates topics that are covered in specific sections.

Topic	Primary Responsibility	Refer to Subsection
Principles and concepts for data quality and security		8.2. Quality and Security Concepts
Compliance with metadata standards	Fleet logistics DA staff	8.3. Ensuring Compliance with Data Standards 8.6. Processes and Criteria for Metadata Review 8.7. Acceptance and Registration of Standard Systems
Data security, Data ownership, Access permissions	Fleet logistics DA staff, Data Stewards	8.9. Assess Risk and Control Access to Non-Public Information 8.10. Risk Analysis Process
Data synchronization Concurrent update Timeliness	Fleet logistics DA staff, Data Stewards	8.12. Ensure System-Wide Data Synchronization
Data quality Data integrity Validation formulas	Developer	8.12. Ensure Data Quality and Integrity 8.13. Implement Data Integrity Measures
Implement the Program Enable developers to use the standard Enforcement	Fleet logistics DA staff, Data Stewards	8.3. Ensuring Compliance with Data Standards 8.4. DA Education and Outreach 8.5. DA Facilitation and Technical Support
Metadata terms and definitions	Fleet logistics DA staff	8.14. Establish Consistent Definition of Terms across Systems
Program, process improvement	Community	8.15. Improving the Data Quality Program

Continued on next page

8.1. Overview, Continued

Background

Since the mid-1960's, system engineers and database designers have recognized the importance of data management to ensure high-quality data. Enterprise-wide integrated information systems such as CG fleet logistics require thorough understanding of the nature of data, the relationship of various data entities, and the use of data by each application system and business process.

Information is a major asset to any organization. Many logistics operations are complex and data-intensive; they require the right data in the right form at the right time. The consequences of inaccurate, late, or unusable data can be significant to other CG missions. High-quality, shareable data is a force multiplier and economy measure because it supports better planning, indicates opportunities for process improvement, locates resources and identifies duplication, and enables staff to make faster, better-informed decisions.

The advantage of an integrated information system is that it uses the combined information, across organizations and functions, to provide current and complete information to each of its application systems. This advantage is threatened if unauthorized individuals and/or processes can read and misuse or change items in the shared data resource, if data characteristics are defined inconsistently, if data values are corrupted or overwritten, or if invalid values are mixed in with valid ones. User confidence in the integrated, enterprise-wide data resource deteriorates and the data sharing concept is defeated if any part of the standard data resource becomes unreliable or unusable.

Data Quality

Data quality is the capability of the data to meet the expectations and requirements of the users. High-quality data is usable, accurate, complete, accessible, reliable, dependable, unambiguous, and timely. The definitions and attributes of data elements are compatible from one standard system to the next, permitting reliable data sharing. Data ownership and limitations to access are clearly and consistently defined. Careful system design, data administration, and system administration are critical to obtaining and keeping high-quality data. The quality of the data in these terms determines the value of shareable data to all potential users.

Quality of Metadata

Metadata quality refers to the completeness, accuracy, portability, and ease of use of the information that describes and standardizes the data. Description includes definition, format attributes, business rules, ownership information, access restrictions, synchronization, integrity tests, and use of standard terms. High-quality metadata includes clear definitions, attributes that support how the data values will be used in the real world, support for data sharing with the desired applications and organizations, and sufficient planning and foresight to meet the needs of all potential users of the information.

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8.1. Overview, Continued

Quality of Physical Data

Quality of the physical data (values) is determined by the usefulness, reliability, accuracy, completeness, accessibility, and timeliness of the data values. High-quality physical data is useful and reliable for those who need to use the information. It provides information that carries the agreed meaning, in a format and to a level of detail that meets the needs of the wider information-sharing community.

Data Quality Critical to Success of CG Information Architecture

The Coast Guard has defined its open systems approach in COMDTINST M5230.45, *Information Systems Technology Architecture*. This Instruction identifies data as one of four critical components of the architecture. The data component includes information classes, ownership, residence, flow, access, and delivery. Only by ensuring high-quality data for the various constituent systems will the architecture provide tangible benefit to mission-area users.

Standards as a Starting Point for Other Functions

By incorporating data quality and security dimensions into the fleet logistics DA program, the CG has provided the Quality Assurance, System Administration, and Security functions with a reliable starting point.

By identifying the data ownership, access control, synchronization, and validation attributes as part of the metadata, the ongoing data security and integrity functions have, for each application system, a reliable starting point for their respective responsibilities that require decisions about data.

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8.1. Overview, Continued

Responsibility

To achieve a high quality central information resource, participation by all parts of the developer and mission area communities is critical. The following components have specific responsibilities:

- *Development*: Understand the implications of data standards to system development. Incorporate these requirements into the analysis and development sequence. Influence design decisions in favor of open, not stovepipe, systems. Utilize the technical support and data encyclopedia resources of the Data Administration office. Translate the constructs and terms of any internal methodologies or proprietary CASE tools to a neutral format for delivery as reports or deliverables, and before sharing information with other teams. The system architecture and database design teams must take the lead in this effort.

- *Data Administration*: Provide rapid response time and sufficient support to facilitate, not inhibit, system development. Provide helpful reviews of submitted metadata and design documents. Provide clear and consistent dispositions of requests. Ensure compatibility of Coast Guard data resources with those of other agencies and industry. Update and distribute standards information in a timely manner.

- *Data Stewardship*: Represent the assigned functional areas in a complete and professional manner, reflecting applicable standards, requirements, and best practice. Avoid repeated modifications to definitions and domains by ensuring the initial set is complete and authoritative. Act as an advocate for the users of the assigned categories of information. Recruit a network of functional experts to advise on specific issues. Learn data administration concepts and data modeling skills, to quickly assess the effects of proposed changes. Provide timely, complete, and authoritative response to requests.

- *Information System Developer/Upgrade/User team Management:* Ensure that all design reviews and submitted documents address data quality, security, and standards issues. Encourage information sharing and open systems. Demonstrate the quality advantages and cost saving opportunities of central information resources. Ensure that all data compatibility, standards, security, and data quality issues are resolved at each milestone. Design-in quality early in the life cycle, to avoid subsequent rework.

8.2. Data Quality and Security Concepts

Introduction

Reliability and quality of the Coast Guard information resource depends in large part upon the quality and consistency of the underlying metadata. Protection of the Coast Guard's sensitive information depends upon clear identification of data ownership and applicable restrictions to access. By attention to these principles, we can design-in quality and dependability, to use the system's information resources for the intended purposes.

The following concepts are key to understanding the quality and security principles that are implemented in this section.

Ensuring Quality of Physical Data

Quality of data values is attained when the following actions are performed on an information system:

- Identification of data errors and faulty processes
- Tracking of corrective actions
- Improvement of business processes and validation rules
- Providing an automated mechanism for restoration of data
- Training the creators of data values to be responsible for the quality of the data they create.

Data quality is applied to the aggregation of all metadata for a data entity or data element. As the metadata is refined to meet the exact needs of the user community, the quality of the data values improves.

Information Management Planning

Building an information system that functions properly and is used to its full potential requires detailed planning. Information Management Planning, or Strategic Data Planning, considers the organization's:

- Missions, functions, and tasks
- Strategic goals and objectives
- Priorities
- Subordinate organizations

The quality of the data in a system is only as good as the initial information management plan, and the subsequent execution of the plan through modeling and data standardization. Data quality concepts should be built into this process at every step. COMDTINST 5231.2 requires that an Automated Information System (AIS) Proposal be submitted to G-TIS, and that the proposal demonstrate valid functional, information resources, security, and support planning. A fleet logistics AIS Proposal should include in its Concept of Operation the intention to participate in the fleet logistics standard data resource, and in its System Resource Requirements the need for the applicable network interface and access.

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8.2. Data Quality and Security Concepts, Continued

Contingency Planning

Contingency plans ensure that the enterprise data resource will continue to be available even under conditions of war, natural disaster, power failure, fire, or other emergency. Each fleet logistics standard information system must have a contingency plan similar to the plan described in COMDTINST M5500.17 Section 2.C.5. The plan should include emergency response, backup operations, disaster assessment, and recovery actions. In addition, the fleet logistics metadata repository must have a contingency plan because the data dictionary provides current data element names, attributes, and systems where used. This information is used to prepare ad-hoc SQL queries and reports, and is mission-critical to the users of the information.

Contingency plans that provide for recovery in the case of partial or full system failure should be built into the system from the very onset of analysis and design. In addition to hardware recovery procedures, software recovery procedures such as backup and restore, on-line help, and field service must be considered. Periodic data quality checks should include the evaluation of this software, processing, communication, alternate site, and administration support.

Likewise the fleet logistics DA should have Continuity of Operations plans that are built into all of the data integrity and quality procedures mentioned in this section.

Standards Compliance

Information system standards are conditions that permit sharing of information between unlike systems by providing definitions, categories, formats and protocols as a common exchange medium.

Standards compliance is necessary for, but may not be sufficient for, reliable information sharing. Standards compliance is a first step to achieving data quality. The standards cited and incorporated in this document are selected to permit data sharing with CG, DoD, other agencies, and private-sector organizations. Standards compliance is critical to efficient accomplishment of fleet logistics functions.

Enterprise Data Resource

The fleet logistics enterprise's total data resource includes all of the data that it creates, collects, stores, maintains, and uses. The scope and definition of the enterprise will evolve over time. The scope of this version of the DAPAP manual is CG fleet logistics organizations and the systems that support fleet logistics work.

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8.2. Data Quality and Security Concepts, Continued

Data Security

Data security protects the data resource from unauthorized access. The purpose of this protection is to prevent misuse of the data or damage to it. Security schemes usually protect the data resource from both malicious and inadvertent damage and misuse. Data security provides protection for data that must be protected due to legal, regulatory, or operational reasons. A data security program provides access to identified, authenticated users who have an identified need. While security administration and data administration are separate functions, data ownership and level of protection are included in the data element naming formula. Providing ownership and access information in the metadata ensures consistent access.

Security Metadata

The following types of data security metadata should be added to standard data entities and data elements to ensure consistent protection. Data security metadata addresses the user access restrictions and permissions that are assigned to data entities and data elements. When security requirements are explicitly bound to an entity, applications making use of that entity will have the necessary security built into their system design. The different types of security metadata that can be assigned to an entity include:

- Security requirements for an entity name
- Security requirements for entity attributes
- Security requirements for an entity in relation to other entities
- Security requirements for some or all values of specified data elements

Data Integrity

Data integrity has two meanings: integrity of data values and integrity of design. Integrity of data values means freedom from corruption, loss, or other threat to its accuracy. Typical precautions to verify data integrity include check digits, counters, and comparisons. System administration provides data integrity services such as regular backup and off-site archiving. **Section 9** provides for inclusion of indicators and formulas in metadata for verifying data integrity.

Integrity of design means the avoidance of redundancy, clarity of entities and attributes, and the other quality criteria provided in **Section 8.6.** Flaws in integrity of design will generate corrupted data values. For data elements where data integrity depends upon business rules, the rules should be documented as validation formulas in the data element definition. These formulas and indicators are used two ways:

- Software developers use the integrity formula as a guide to provide for consistent checking of data through edit checks and filters.
- Fleet logistics DA and data stewards use these formulas and indicators along with data quality audit software to identify data quality problems in the shared data resource.

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8.2. Data Quality and Security Concepts, Continued

Data Synchronization

In a functioning system, various items of data are updated at different times. Data update cycles include machine cycle times, data transfer transactions, system run cycles, and management reporting and decision cycles. By identifying and documenting update cycles, data can be synchronized. Synchronization indicators in a data element's definition permits optimum programming and planning, and prevents inadvertent data "clobbering" and mismatching.

Open (Standard) Systems

The open systems concept is a design goal for fleet logistics data administration. In an open system, all authorized data can be shared transparently. Transparent data sharing means that all information and application software are accessible (with authorization) from any standard system (that is, any supported equipment/software combination) within the community. Achieving this any-to-any goal of enterprise-wide transparent data sharing requires careful observance of design principles such as user interface, data communication, and metadata standards.

Legacy Systems

This term implies a system that was inherited, meaning that its creation was outside the responsibility of the current program, and so it does not meet current standards. A similar term used in DoD is "migration system." Legacy systems support functions and/or contain data that is of interest to the current program, and may be converted to become compatible with the current system. Upgrading of a legacy system or migrating its data requires redefinition of its data structures and data element definitions in terms of the current standards.

What is a Standard System?

A CG fleet logistics standard system is an information system in which the data interfaces, data structure, and application software are accepted as compliant with the related standards. Standard systems are registered, and are enabled to share data with the other fleet logistics standard systems. This registration indicates that the system's shareable data is consistent with standard metadata, and will not corrupt other standard systems' data when data values are combined or summarized.

The effectiveness of this data quality and security effort within data administration will directly affect the reliability and usefulness of the information resource that is built and shared by these standard systems.

Standards Compliance

A new system will be registered as a standard fleet logistics information system when the system's developers have demonstrated adherence to the process models, data models, and data standardization procedures of the DAPAP manual.

8.3. Ensuring Compliance with Data Standards

Purpose

The first level of data quality is compliance with data standards. The compliance and enforcement tasks that are described in this subsection provide information, support, and incentives to the developer and program manager teams who create and maintain information systems.

The specific standards for data models, data entities, and definitions are described in the previous subsections. This subsection reviews the overall process for facilitating developer compliance.

The main point of the standards compliance effort is to ensure that:

- Data processes, models, entities, elements, and definitions are described sufficiently to support enterprise-wide data sharing, and
- In each development task, data definition and naming decisions are made by selecting a close match from the menu of available standard definitions first, and only creating new or revised metadata in cases where no standard definition can be applied.

Means to Ensure Compliance

Data standards compliance is achieved through cooperation of the CG fleet logistics enterprise community by perception of the value of high-quality, sharable data. This understanding and appreciation of the value of the enterprise information resource can be achieved by the following means:

1. *Education and outreach* to information system developer and program management personnel
2. *Facilitation and technical support* of analysts and designers
3. *Review*, with constructive comments and discrepancy resolution, of online models and deliverable documents
4. *Acceptance and registration* of systems that meet the standards
5. Providing reliable and responsive data sharing support to users of registered systems
6. *Controlling and validating requests* for new metadata, changes to standard metadata, and exemption from standards

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8.3. Ensuring Compliance with Data Standards, Continued

Applicability

The standards and processes described in this document apply to any new CG fleet logistics information system or process that:

1. Creates, updates, or uses data that crosses organization boundaries.
2. Uses data from and/or should contribute data to the fleet logistics DA standard data resource.

And to existing information systems that:

1. Are being upgraded, with the upgrade anticipated to affect 30% or more of the existing lines of code, or which adds functions or interfaces (not just a maintenance release)
2. Add any new data entity definitions, or modify standard data entity definitions by adding or modifying data element (entity attribute) definitions.
3. Use data from or should contribute data to the fleet logistics DA standard data resource.

8.4. DA Education and Outreach

Purpose

The goal of the education and outreach effort is to minimize the amount of rework required after submittal of data models and data element definitions. The role of this proactive fleet logistics DA coordination and guidance task is to allow system designers the room to think creatively, and then to identify the best match to standard processes, data models, entities, elements, and definitions. This metadata support permits designers to achieve metadata consistency and full use of the standard data resource before submittal.

Data standards compliance is the responsibility of each program manager and developer. Fleet logistics DA will train and facilitate developer teams to ensure success and to save redesign time. This education and facilitation role will be performed for systems that have been authorized for design, but have not yet submitted Database Definition Documents. It does not replace the developer's responsibility to meet the standard, but intends to show how to meet the standard in a complete and useful manner.

Provide Training and Facilitation

In the general role of data standards outreach, the individual(s) tasked with coordination should perform the following general duties:

1. For each program management and development team, ensure that all team members are trained in the provisions of fleet logistics DA standards, use of the fleet logistics DA repository, and in the processes described in this document. (Training in specific methodologies and tools is the responsibility of the developer.)
2. Ensure that each program management and development team is aware of the metadata deliverables that are due with each milestone in the development life cycle.
3. Facilitate authorization of access for development team members to the fleet logistics DA data encyclopedia.
4. Brief program management and development teams as needed regarding choice of metadata analysis and management tools, methods used by previously successful development teams, and evaluation criteria for deliverables.

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8.4. DA Education and Outreach, Continued

Provide Initial Guidance

This proactive outreach role provides the development team (or data steward or data users) with data compatibility goals, sets achievable expectations, and shows the team how to use the standard data tools to speed up development. The DA representative will provide information as training or a series of briefings to the program management and development teams for each application.

These briefings will cover the following topics:
- Goals of the data administration program
- Data administration process and functions
- Fleet logistics conceptual data architecture
- Process and data modeling
- Metadata life cycle as part of the system life cycle
- Data administration components of requirements and design documents
- Developer's responsibilities to achieve standard data
- Use of CASE tools to prepare submittals
- How to prepare and submit data models
- Standard forms and examples for data models
- How to prepare and submit standard data element requests
- Standard forms and examples for data elements
- How to request information and obtain technical support
- Standard system registration: user benefits and program implications

A standard set of briefing materials will be provided. The DA representative can supplement these materials with program-specific examples and material from the representative's professional experience.

8.5. Facilitation and Technical Support

Purpose

This subsection describes the facilitation and technical support activities, by which fleet logistics DA can encourage participation in the data standards program and can save review and rework time.

Facilitation

Facilitation involves the following tasks:

1. Review preliminary design documents to identify as early as possible the opportunities for data commonalty and risks to data security and integrity.
2. Review data flow descriptions to identify enterprise-wide implications for data interface, integrity, security and synchronization.
3. Review preliminary system and interface requirements documents. From this review, identify the intended uses for the data, and apply this insight to ensure accurate selection of standard metadata and appropriate submittal of requests for new or revised metadata items.
4. Improve the integrity and usage of data through principles and standards, and by coordinating data element definitions among functional and line organizations.
5. Inform fleet logistics DA of the status of the project's metadata deliverables, potential delays, and opportunities to improve the process or facilitate a problem.

Verify Opportunities for Metadata Commonalty

Fleet logistics DA provides technical support to identify and anticipate the potential opportunities for common definitions among developing systems, to use existing sharable data, and to define consistent interfaces. For each opportunity:

1. Identify the appropriate information class, and include the relevant data steward in the definition process.
2. Identify other agencies with whom the application's data might be shared, and ensure that the definition is compatible with the format and definition of the corresponding entity in the other system(s).
3. Review the definitions of related data entities and elements, to ensure that the level of detail is consistent.

Coordination Responsibility

Fleet logistics DA coordinates this process, relying on data stewards to make these determinations for the appropriate information classes.

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8.5. Facilitation and Technical Support, Continued

Tools and Repository Support

Fleet logistics DA provides technical support for recommended process modeling, data modeling and other CASE tools. This support focuses on loading standard metadata into the tool, identifying standard entities and elements that meet application data requirements, and preparing metadata deliverables for review. Fleet logistics DA as operator of the data encyclopedia, answers questions and solves problems regarding user access, report generation, and available information.

8.6. Metadata Review Processes and Criteria

Purpose

Review of models and deliverable documents is the main fleet logistics DA compliance activity. This subsection shows the review and control points in a system development life cycle.

This subsection includes quality checklists for process models, data models, and data elements. If these criteria are used to prepare and evaluate definitions, both the developer and the administrator will save time, and the resulting data will be more portable, complete, high-quality, and sharable.

Metadata Review

The review and acceptance procedures in **Section 3, Develop and Integrate Data Models,** and **Section 4, Standardize Data Elements,** include the specific data quality and security check points that implement the guidelines described here. Quality and security reviews shall be part of the review of each submitted data model.

In addition, each candidate data entity and element definition and change request shall be reviewed to conform to the data security and integrity requirements described in this section.

General Review Guidelines

The review and acceptance procedures for data models and data elements include review points that answer the following questions:

1. Is each data entity (in a model) or data element (in a DBDD) defined in sufficient detail to evaluate its definition and attributes?
2. Is each data entity or data element defined sufficiently to determine its uniqueness, and to identify its use in the system-wide data resource?
3. Is the definition and attribute set consistent with that of related items?
4. Is the ownership (creation and update responsibility) of the data identified?
5. Is any restricted access requirement identified, and need-to-know criteria established?
6. Is the relationship of this data element to other data (link, update, superset) indicated in the definition? (relationship implied in the model but must be explicit in the DE definition)
7. If the data element is updated periodically, are the source of the update, the application performing the update, and the update schedule/cycle indicated?
8. If the data can be checked for external validity, is the algorithm for the recommended validity check supplied?

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8.6. Metadata Review Processes and Criteria, Continued

Metadata Review by Development Phase

Quality and security issues are integrated throughout the functions and procedures described in this manual. The following table summarizes the metadata to be submitted and evaluated at each development milestone, to ensure that data quality and security have been designed-in.

Data Quality Review Points by System Development Phase

Development Phase	Process Model:	Data Model	Data Element Definitions
Planning	Mission need, conceptual architecture, and prototypes evaluated	Potential for use of shared data; risk analysis	
Requirements Analysis	Review Functional Description or System Spec, and preliminary process model	Analyze risk and potential synch. problems; review logical data model	
System Design	Review revised process model, including process cycle time estimates.	Review prelim. attr. data model. Reconcile data model to process model. Review preliminary DBDD	Ensure quality and security attributes are part of DE definitions. Review requests for changes and for new data elements where needed.
Detailed Design		Review fully attributed data model and DBDD Version 1 (baseline). Resolve discrepancies.	Resolve all change requests and standards discrepancies.
Development		Review any technology-driven or requirements-driven changes	Review any technology-driven or requirements-driven changes
Integration and Testing	Identify and resolve integration issues.	Identify and resolve integration issues. Demonstrate data portability, compatibility, and quality.	Identify and resolve integration issues.

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8.6. Metadata Review Processes and Criteria, Continued

Metadata Review by Development Phase Continued

Development Phase	Process Model:	Data Model	Data Element Definitions
Acceptance		As-built data model accepted. Review Product Baseline (Version 3) DBDD.	All data items approved or waivered. System registered for data sharing.
Operations	Revise process model to describe current practice.	Update metadata to support changes in requirements.	Verify data values are consistent with metadata
Retirement	Ensure smooth transition of processes	Ensure smooth transition of data	Ensure smooth transition of data

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8.6. Metadata Review Processes and Criteria, Continued

Standardization Process Responsibilities

Upgrading and standardization of an application's data structures requires delineation and coordination of tasks by the fleet logistics DA Office, the application owner/developer and data stewardship teams. The following tables identifies the tasks with the responsible party.

Responsibility	Tasks
Fleet logistics DA Office	Identifies a system's place in the enterprise data model.
Fleet logistics DA Office	Determines the need for a system's data to be standardized
Fleet logistics DA Office	Supports and facilitates the data standardization process.
Fleet logistics DA Office; data stewards	Assesses the effect (cost, function, time) on the application area and on the fleet logistics DA community of standardizing and of remaining nonstandard.
Fleet logistics DA Office	Determines whether/when system must be upgraded to meet fleet logistics DA standards.
Developer	Examines current data structure and definitions.
User	Describes and assesses the current quality of the interfaces between the application and other systems.
User and Developer	Assesses and models the business processes within the scope of the application.
Developer	Assesses and redefines all data entities, applying standard entity definitions wherever possible.
Developer	Identifies remaining entities as potential unique entities and prepares requests for: • New standard definitions • Modification or extension of a definition • Waiver for internal non-sharable entities
Developer	Defines process model, data model, entities, and data elements in accordance with fleet logistics DA standards.
Developer	Submits proposed attributed data model as part of DBDD for Design milestone.
Developer	Develops physical design in accordance with approved data model.

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8.6. Metadata Review Processes and Criteria, Continued

*Standardiza-tion Process Responsi-bilities (**continued**)*

Responsibility	Tasks
Developer	Develop and test the system, using the approved data structures only.
Developer	At physical configuration audit, demonstrate standard, sharable data and receive registration.
Database administrator	Provide data configuration control
Data Stewards	Determine where data is used throughout the CG as it relates to the assigned information classes and functional areas.
Data Stewards	Determine impact of change on other current and planned systems (where-used report)
Data Stewards, subject matter experts	From knowledge of the function, establish recommended processes and data definitions.
Data Stewards, subject matter experts	Determine functional merit of change requests to standard definitions.
Data Stewards, subject matter experts	Determine functional merit (uniqueness, usefulness) of proposals for new data entity and element definitions.

Review of Activity (Process) Models

A business process or activity model represents the relationship of the business processes in the enterprise. The data administrator's interest in a process model is based upon the process model's context for the data. Process models should contain sufficient detail to derive a data model, and to support the definition of each data entity. So, from a data standards point of view, a process model is acceptable if it contains adequate information to derive the data model and to initiate the definition of all data entities. Likewise, when a data administrator reviews a data model, all data entities should be traceable to the process model.

Data administrators should begin to understand the application by reviewing the process model for outside interfaces, identification of previously defined processes, risk analysis, data security and integrity issues, and data synchronization. Resolution of these issues should precede approval of the application-level process model.

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8.6. Metadata Review Processes and Criteria, Continued

Review of Data Models

This checklist shall be used by developers as they prepare candidate data entity definitions (new or modifications of standard entities) and by fleet logistics DA staff to review data entity requests using the procedures in **Section 3, Data Models.** As quality standards, these criteria describe the level of consistency and completeness to build an enterprise-wide data model, and to provide a useful basis for evaluating and defining data elements. If these criteria are used to prepare and evaluate definitions, both the developer and the administrator will save time, and the resulting data will be more portable, complete, high-quality, and sharable.

To be a candidate for integration into the enterprise data model, a submitted data model should meet the following requirements:

Quality	Principle	Criterion
Relationship to the Real World	Relevance	The view should provide data needed by the application, by other fleet logistics applications, and to facilitate data sharing with allied agencies.
	Obtainability	Data values should be easily obtainable, as identified in each data entity definition.
	Clarity of definition	Each item in the definition of the view should be clearly defined.
	Comprehensiveness	Each needed data item should be included.
	Necessity	No unneeded data items should be included.
	Naturalness	Each item in the view should have a "natural" counterpart in the real world.
	Occurrence identifiability	The view should make identification of individual entities easy.
	Systemic consistency	The view should be clear and unambiguous and consistent.

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8.6. Metadata Review Processes and Criteria, Continued

Review of Data Models ***(continued)***

Quality	Principle	Criterion
Level of Detail	Precision of Domains	The domains of possible values should be large enough to support anticipated applications, and to support data sharing with allied agencies.
	Attribute details	The attributes should be defined at a sufficient level of detail to support applications, queries, and data sharing.
	Robustness of View	The view should be wide enough so that it does not require change every time applications change.
Consistency of Definition	Homogeneity	Entity types should be defined to minimize the occurrence of unnecessary attributes.
	Minimum redundancy	Redundancy of occurrences of data elements should be kept to a minimum. Each redundant entry must be justified.
	Structural consistency	Entity types and attributes should have the same basic structure wherever possible.
	Content	Definitions must indicate entity ownership, any access restriction, synchronization requirements, and validation algorithm as appropriate.
	Flexibility	Definitions must include the same kinds of attributes sufficiently to permit all anticipated application and enterprise views without additional analysis.

After T.C. Redman, *Data Quality: Management and Technology*, 1993

Continued on next page

8.6. Metadata Review Processes and Criteria, Continued

Common Consistency Problems

The three most common problems in defining data entities and elements are:

1. Same (or functionally similar) definitions corresponding to multiple data entities or elements *(synonyms)*.
2. Same (or substantially the same) data entity or element name with multiple definitions *(homonyms)*
3. Apparently the same data elements with multiple formats or characteristics.
4. By *selecting first from existing definitions* and then submitting the remaining unique items, the information systems analyst can reduce definition time, increase data compatibility, and ensure approval.

Data Element Quality Checklist

The following four checklists provide criteria for use in the **Section 4, Standardize Data Elements** acceptance procedures. As quality standards, these criteria describe the level of consistency and completeness needed to build a useful resource of enterprise-wide data element definitions.

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8.6. Metadata Review Processes and Criteria, Continued

Data Element Quality: Relevance

Relevance ensures that each data element is associated with the appropriate standard entity, and that the definition provides useful information.

Quality	Principle	Criterion
Relevance	Traceability in Application	Represents a characteristic (attribute) of one and only one data entity in the previously accepted data model. Provides a logical basis for and lends integrity to DE definitions.
	Relation to Standard	Definition provides a useful and necessary addition to the set of similar standard data elements. Element is defined consistently in level of detail and attributes compared to similar standard elements.
	Merit	Has demonstrable merit as a data element, serving an identifiable purpose.
	Naming	The data element name starts with the name of the entity of which it is an attribute, and contains sufficient modifiers to show its purpose and uniqueness.

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8.6. Metadata Review Processes and Criteria, Continued

Data Element Quality: Scope and Definition

The "scope" criteria ensure that the data element precisely describes the information intended, and only that information.

Quality	Principle	Criterion
Scope	Conciseness, precision	Has a single purpose and a single meaning (concept).
	Uniqueness	Avoids overlap or redundancy
	Clarity	Ensures common understanding by clearly indicating what the data element represents.
	Atomic	A basic unit of information; cannot be subdivided without losing its meaning or creating redundant elements.
Definition	Function	Defined according to functional requirements and not physical characteristics. (i.e., no connotations of physical location, organization, or application) *Exception*: data 'ownership' and restricted access attributes.
	Purpose	Defined according to the purpose of the data element, not how, where, or when the DE is used or who uses it.

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8.6. Metadata Review Processes and Criteria, Continued

Data Element Quality: Format and Attributes

The format of the data element definition determines its consistency with other definitions, and therefore affects its usefulness and clarity.

Quality	Principle	Criterion
Format and Attributes	Format Compliance	Utilizes the standard data element definition, format, and notation specified in Section 4.
	Generic or Reference Element Utilization	Based upon the appropriate generic element or reference element in structure and physical characteristics.
	Attribute Consistency	Similar data elements are defined to the same level of detail regarding data types, domain, and definition.

Standards Compliance for Existing Systems

A fleet logistics information system must be upgraded to be acceptable for standard system registration if it also requires AIS Proposal approval by Commandant (G-TIS) as described in COMDTINST 5231.2. This requirement includes criteria of where the system's information originates, use of the system in more than one CG district, and acquisition cost.

Systems that were authorized for development before December 31, 1994 will be considered as "current fleet logistics information systems," and will not be required to comply with these data standards unless and until one or more of the conditions listed in COMDTINST 5231.2 becomes true, or unless the system requires sharing of data with other fleet logistics information systems.

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8.6. Metadata Review Processes and Criteria, Continued

Metadata Deficiency Tracking and Correction

During review of plans, requirements and design documents, data models and data elements, fleet logistics DA will first advise the developer of discrepancies informally and request correction and re-submittal. For discrepancies that are too large for informal request and/or when full corrective response does not occur promptly, fleet logistics DA staff will implement the following corrective action process:

- Note each problem or discrepancy on a Metadata Discrepancy Report (provided in **Appendix D**). Identify each discrepancy on a separate form. Link the report to the subject request by citing the tracking number that DA assigned when the metadata request was submitted.
- Classify each discrepancy by priority and category, and record the desired disposition and suspense date.
- Developer and fleet logistics DA office will keep a discrepancy list with the current status of each item. In case of a conflict, the fleet logistics DA version of the list prevails.
- Correspondence and submittals should cite the Discrepancy Report tracking number.
- Developer corrects deficiencies item-by-item, and reports/submits correction to fleet logistics DA office.
- A repeat of the standards and stewardship review cycle will be conducted when all discrepancy items have been resolved, to determine whether additional problems have been introduced, and whether correction has revealed additional problems, discrepancies, and/or open issues.

Deficiencies will be corrected against the version of the metadata or change request that was submitted to DA. After resolution of discrepancies, DA will approve the corrected version of the metadata (hardcopy or model) or change request, and will then transmit it to CM for release.

Corrective actions will be evaluated to verify that problems have been resolved, adverse trends have been reversed, and changes have been correctly implemented in the appropriate metadata.

8.7. Acceptance and Registration of Standard Systems

Purpose

The goal of the compliance effort and the incentive for a system's developer is to achieve data standards acceptance, and to have the system registered as a fleet logistics DA standard system. The incentive for registration is enterprise-wide data sharing.

Fleet Logistics DA Responsibilities

To ensure the best quality and availability of shareable information between Coast Guard information systems, the fleet logistics DA office must execute the following responsibilities:

1. Review all models and data elements submitted by the software development teams for standards compliance, and recommend modifications
2. Assign each metadata request (add, change, exemption) to the appropriate Data Steward, and ensure appropriate functional expert review of deliverable documents.
3. Negotiate and resolve any disagreements between the software development team, the Data Steward, and other related stakeholders, as required
4. Determine the enterprise-wide impact of the new system and its data elements

Data Stewardship Responsibilities

To ensure that the metadata for an information class matches the available standards and meets the needs of the user community, each data stewardship team must execute the following responsibilities:

1. Identify and select functional expert(s) to the software development/review team for a new system
2. Assign functional expert(s) for the review of models and data elements
3. Negotiate disagreements between functional experts and software developers, as necessary
4. Provide the fleet logistics DA with models and data elements approved by the Data Steward

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8.7. Acceptance and Registration of Standard Systems,
Continued

Developer Responsibilities

To ensure that the system under development provides and uses standard data, and to avoid the costs of developing and maintaining unique, incompatible systems, each software development team that is authorized beyond the proof-of-concept (prototype) stage shall:

1. Develop data elements and/or data models according to fleet logistics DA guidelines
2. Submit data models and/or data elements to DA for approval
3. Abide by all decisions of the fleet logistics DA, and implement changes as required on the new system

Acceptance of a Standard New System

Acceptance of a DA standards compliant new system includes the following steps, conducted by fleet logistics DA:

Step	Action
1	Review final DBDD and IDD(s) for conformance to data standards and for traceability from the approved data model to requirements to physical database and interface design.
2	Confirm that all Discrepancy Reports have been resolved.
3	Perform a Physical Configuration Audit of data structures, implementation of business rules, validation of data values, and definitions.
4	Demonstrate data portability: export of the candidate system's data to another standard system. Evaluate use without generating errors.
5	Test the system across the Coast Guard Wide Area Network, using standard SQL requests. Evaluate the response for completeness and accuracy. Likewise, from the candidate system generate requests that merge standard resource data with the system's data and evaluate the result.
6	Reconcile the candidate data model into the fleet logistics DA enterprise data model as described in **Section 3: "Support Integration of Data," and "Incorporate Data Model Into Repository."**

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8.7. Acceptance and Registration of Standard Systems,
Continued

Acceptance of a Standard Upgraded System

Acceptance of a DA standards compliant upgraded system includes the following steps, conducted by fleet logistics DA:

Step	Action
1	Review final DBDD for conformance to data standards and for traceability from physical design to data model to process model to requirements.
2	Confirm that all Discrepancy Reports have been resolved.
3	Perform a Physical Configuration Audit of data structure, process, and definitions.
4	Demonstrate of data portability: export of the candidate system's data to another standard system. Evaluate use without generating errors.
5	Test the system across the Coast Guard Wide Area Network, using standard SQL requests. Evaluate the response for completeness and accuracy. Likewise, from the candidate system generate requests that merge standard resource data with the system's data and evaluate the result.
6	Incorporate the candidate data model into the fleet logistics DA enterprise data model.

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8.7. Acceptance and Registration of Standard Systems,
Continued

Registration Process

Registering a new or upgraded system as a fleet logistics Standard System is the final step in bringing a new or upgraded information system into the fleet logistics enterprise. Registration indicates that the system's data is transparently shareable across the enterprise, and the system's data quality can be trusted. This process starts with review of the Data Conversion Plan (described in **Section 5**).

The registration process includes the following steps:

Step	Action
1	Provide a letter to the program manager indicating the system's acceptance and registration.
2	Add to the repository the new standard system's name so that the new system is included in all relative metadata calls to it throughout the fleet logistics data model and the data dictionary.
3	Add to the repository the new standard system's name to the data elements whose values are created, modified or used by the system, so that the system is included in impact analysis (where-used) reports.
4	Add to the distribution list for fleet logistics DA data standards and resource information.
5	Notify network administrators to add the new system to their lists of "trusted systems" for data transfer
6	Notify the user community by email and by amending the list of registered fleet logistics information systems
7	Notify CM that the system's process model and data model have been integrated into the fleet logistics DA enterprise model.

8.8. Modifications to and Exemptions from Data Standards

What Constitutes a Modification?

A modification is a request to change a metadata standard. A modification is most often a request to change the definition, domain, or other characteristics of a standard data entity or element. A modification can also request creation of a new standard data entity or element.

Developers and maintainers prepare modification requests in accordance with **Section 3.3** for entities and relationships, and with **Section 4.3** for data elements. Use the Metadata Submittal Identifier (**Appendix D**) as a cover for the request materials. Fleet logistics DA reviews requests in accordance with **Section 3.4** for entities and with **Section 4.4** for data elements. Data quality criteria used in these reviews are provided in **Section 8.6**. Fleet logistics DA implements approved modifications in the metadata repository in accordance with **Section 4.5** and **Section 7**.

When is a Modification Required?

A modification of the standard is required if the application's intended use will make the entity, relationship, or data element slightly different and therefore not transparently shareable. For example, an application's business rule that places special restrictions (such as requiring additional approvals) before creating or changing a data value may not require a modification. However, if the application's business rule changes the meaning or context of the data element so that it is not interchangeable with other instances of the data element in other systems (such as a refinement in the definition or modification of the domain), then a modification should be requested.

When in doubt regarding the effect of an application's treatment of a data element, consult the appropriate data steward or information class proponent.

What Constitutes an Exemption?

An exemption is granted by the fleet logistics Data Administrator for a specific data element as it is used on a specific system. Exemptions are rare. The most common basis for exemption is a finding that the nonstandard data element, relationship, or entity is unlikely to be subject to data sharing within the current long-range planning horizon.

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8.8. Modifications to and Exemptions from Data Standards, Continued

Eligibility for an Exemption

To qualify a request for an exemption, the requesting developer must demonstrate that the data entity or element is:

- Truly unique to this application
- Not likely to be used in a report or query
- Not significant or useful outside the application

The request is subject to review by fleet logistics DA for data standards merit, and by the appropriate data steward(s) for functional merit.

Eligibility for a Modification

To qualify a request for a modification, the requesting developer must demonstrate that the requested change to the standard data entity or element is:

- Necessary to support the application's requirements, or is required to work within the limitations of the technology that has been approved for building the application.
- Compliant with the analysis, level of detail, quality, and format requirements so that it is consistent with similar standard metadata.
- Functionally accurate, representing "best practice" and conformance to all Coast Guard policies and regulations, and is not merely driven by local practice.

The request is subject to review by fleet logistics DA for data standards merit, and by the appropriate data steward(s) for functional merit.

Submittal of Metadata Requests

When the developer determines that no current standard data element can be utilized, the developer submits a request. The request can be for:

- Creation of a new standard data entity or data element
- Modification of an existing entity or element by changing the definition, modifying attributes, or expanding domains.
- Exemption from the requirement to standardize a specific entity or element

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8.8. Modifications to and Exemptions from Data Standards,
Continued

Preparation of Metadata Requests

Prepare the request using the fleet logistics Metadata Submittal Identifier (**Appendix D**), or the authorized electronic equivalent.

At a minimum, the request must contain the following information:
- Identification of the program, application system and Computer System Configuration Item (CSCI) for which the request is made.
- Contact information, including the information systems engineer or database analyst who determined the need for the request.
- Name of the standard entity that most closely matches the request.
- Situation, example as to why this standard element must be created, modified, or exempted.

Processing and Review of Exemption Requests

Fleet logistics DA processes exemption requests as follows:

Step	Action
1	Check the existing data element or data elements noted by the developer as the closest match, and compare the items in these data elements to those of the data element submitted by the developer
2	Determine the accuracy of the developer's request
3	Provide a justification and response to the developer's request
4	Take additional actions and notify parties as necessary to implement the decision.

Review Current Exemptions

Fleet logistics DA reviews and evaluates exemptions and waivers as follows:

Step	Action
1	Check all exemptions according to the review process as described in "Review and Accept Information Systems Metadata"
2	Suggest changes in status to the Data Steward and system developer(s)
3	Implement change based on response by Data Steward and developers(s)
4	Inform developer of requirement to change their local data element

8.9. Control Access to Non-Public Information

Introduction

Data security is administered by personnel other than in Data Administration, but identification of data ownership and levels of data protection starts with data administration. Data security ensures appropriate and authorized access to data. Appropriate data security measures are part of the qualification required for fleet logistics information systems to share data with systems of other agencies. Data security protects the information resource from unauthorized access, and thereby prevents misuse of or damage to data in this system.

Data security is implemented in the application software, and in system administration. The definitions of data ownership and access that are provided in data definition and standardization form the basis for security provisions in application software development and for appropriate and effective security administration. Complete and accurate metadata, therefore, provides one of several critical components for effective data security.

The Security Component of Data Administration

The security component of data administration includes the following :

- Risk analysis from process model
- Interface analysis from the logical data model
- Data element definition fields for data restriction and ownership
- Equivalent controls to enable data sharing with DoD systems

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8.9. Control Access to Non-Public Information, Continued

Security Requirements

The Coast Guard sometimes requires specific security measures to protect information, whether in hardcopy or digital form. Constraints and requirements for data access come from a number of sources, including the following:

- Laws of the United States
- DOT and Coast Guard regulations
- Security requirements of other agencies
- Security classifications for DoD-related data
- Coast Guard information systems policy
- Security for aggregated data
- Privacy Act
- Freedom of Information Act
- Procurement sensitivity
- Protection of vendors' proprietary information
- Work-in-process data (incomplete, scratchpad, personal use, etc.)

CG information security guidance is provided by COMDTINST 5500.13, *Automated Information System (AIS) Security,* and COMDTINST 5510.21, *Information Security Program.* The DA role is simply to capture and convey the appropriate access restriction as part of the data element's definition.

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8.9. Control Access to Non-Public Information, Continued

Life Cycle Requirements

Data security and integrity should be engineered into the initial analysis and design of an information system. Along with the other metadata for a model and or data element, this will ensure that the overall DA requirements are part of the system at the outset, will highlight any discrepancies or deficiencies in the design as it develops, and will avoid massive review and rework.

The following are measures to include data security requirements at each step of the life cycle development of a system:

Phase(s)	Data Security Action
Requirements Analysis and System Design	1. Review all pertinent security doc. sources for rqts 2. For each entity, apply the requirements from security documents to determine access restrictions
Subsystem Requirements Analysis	1. Review all pertinent security doc. sources for rqts 2. For each subsystem, apply the rqts from security docs to determine access restrictions
Detailed Design	1. Review all pertinent security document sources for requirements 2. For each data element, apply the rqts from security docs to determine access restrictions
Software Coding and Testing	1. Apply software design security rqts 2. Devise test cases for types of security procedures and test their practical application
System Integration and Acceptance Testing	1. Analyze all security features of all components of the system and ensure that they are mutually compatible 2. Devise test cases for types of security procedures and test their practical application 3. Review results and incorporate into procedures
Implementation Procedure	1. Analyze the security features of the entire system and ensure that they are compatible with the information system's security features 2. Incorporate any changes based on this analysis 3. Devise field test for types of security procedures and test their practical application

At each step of the life cycle development, enforcement points and actions must be defined and executed. This will ensure that security classification and other access restrictions are documented as part of data element definitions.

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8.9. Control Access to Non-Public Information, Continued

Data Security Audit

Data security metadata attributes will only meet the CG's needs if they reflect current CG security requirements. Periodic audits of the security attributes may show that some attributes were incorrectly defined, or need to be modified due to current requirements. Discrepancies in the data security attributes must be changed accordingly.

The data security audit process and evaluation of internal controls is done as follows:

1. Review all security-related metadata in the system to see if meets current CG information security requirements (COMDTINST 5510.21)
2. Check the security-related business rules and validity checking as implemented in the software code and system performance
3. Test access permissions enforcement for all user categories and privileges
4. Prepare a discrepancy report (or the appropriate test results document) for each problem found.

8.10. Risk Analysis Process

Introduction

Before defining the security attributes for an entity, risk analysis for that entity must be conducted. Risk analysis will generate the requirements that the attribute definition must meet. The analysis includes:

- Strategic data planning
- Data model analysis
- Data security requirements review (define security requirements) process

Risk analysis should be performed against those security requirements sources listed at the beginning of this section. In the case of an entity meeting the needs multiple security sources, the attribute should be defined according to the requirement with the highest level of security.

Risk Analysis

Risk analysis assesses the data security and integrity risks to an application system. Risk analysis examines the following potential exposures:

- Unauthorized access to sensitive, classified, or otherwise non-public data
- Impact of unauthorized change or damage to data values
- Implications of access to aggregated data

This risk analysis will contribute to DA support of system security requirements.

Risk Analysis Procedures

Data security risk analysis procedures include the following general steps:

Step	Action
1	*Review of Strategic Data Plan and design documents.* Review Concept of Operations, System Specification, and requirements documents, and data requirements, interfaces, etc. for security implications.
2.	*Review Business Process.* In the business process model and other process analysis documents, identify the points at which the data is vulnerable, including user access, data transfer, unattended workstations, and interface to non-CG systems.
3.	*Data Model Analysis.* Identify those entities and relationships which are addressed in data security requirements sources, metadata conflicts. Identify the legal requirements and potential misuse for individual records aggregated (rolled-up) data, and specific combinations of data values.
4.	*Data Security Requirements Design Process.* Review analysis against requirements sources, review milestones, and implementation plan.
5.	*Risk Analysis on Submitted Systems Designs.* Review all submitted models against the business process model's security rules.

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8.10. Risk Analysis Process, Continued

Wider Risk Analysis

Risk analysis should also be performed on current systems and interfaces as well as aggregated, cross-system information resources. The results of these analyses should in turn be applied to the risk analysis of the process and data models.

Interface to Other Agencies

Because fleet logistics business processes use resources from DoD and allied agencies, the fleet logistics standard provides for data interfaces to the information systems of those agencies. When defining the process and data models for fleet logistics, the data model design must all address the security requirements for sharing data with DoD and its allied agencies.

Metadata for Access Restrictions

The CG deals with many kinds of sensitive information, including national security, law enforcement, procurement, vendor-proprietary, and Privacy Act restrictions. For each kind of sensitive information, a set of access restrictions apply. For some kinds, the critical issue is access for changing the data. For most kinds, reading the data is restricted also. For a sensitive or classified entity, the restriction applies across application systems and for all sites and computer systems. Classified entities carry these enterprise-wide access restrictions in their metadata.

Implementing the restriction in software is the responsibility of each application developer. Granting access to individuals is the responsibility of system administrators. Identifying categories of restricted information is the responsibility of policy makers and security specialists. The contribution of data administration is to record the restriction in the standard metadata, so that each application developer and system administrator can treat the restricted information consistently.

Indicating Data Access Restrictions

In most CASE tools, data access will have to be included in the definition or in a comment field. Responsibility should include the following facts:

- Functional area that creates records (CREATED BY aaa)
- Functional area that updates records (UPDATED BY bbb)
- Exceptions, other areas that sometimes create or update records (ALSO UPDATED BY ddd WHEN <conditions>)
- Mission area groups that are authorized to use the data values (USED BY eee), or criteria for determining need to know (NEED ESTABLISHED BY <criteria>)

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8.10. Risk Analysis Process, Continued

Level of Detail

In most cases, enterprise-wide restricted entities will form only a part of the data that requires access restriction. A restriction indicator in the metadata will indicate only the data that is always restricted. Additional types of information fall under the various types of restriction when they are used in combination (aggregated data), or at a specific time (procurement sensitive), or contain specific values (HAZMAT right-to-know), for example.

The restriction information carried in a data entity definition should indicate:
- Nature of the restriction (which law or policy applies)
- Level of the restriction for modifying the data values
- Level of the restriction for reading the data values

Access to Information

Users, groups of users, or systems may have different needs for accessing an entity or data element. For some entities or data elements, a user type may only need to read and use the associated data, where another user type might also be able to edit and delete that data. Restricting the action performed on data should be based on security requirements as defined for each security analysis checkpoint within the life cycle development of a system. These analyses, of course, should meet the fleet logistics DA security requirements for that entity or data element.

Need to Know

Rules for determining need to know and appropriate access permissions are as follows:
1. Refer to security sources for the requirements that pertain to an entity or data element
2. Determine the security requirements for the aggregation of data and interfaces to other systems
3. Determine the group(s) of users that meet the security requirements for access to the entity or data element
4. Record and submit the metadata for access as appropriate, including group name (by Data Steward, information system, etc.) and associated R,W, E, D privileges.

8.11. Ensure System-Wide Data Synchronization

Introduction

Data synchronization involves the timing relationship one entity or data element may have with another set of entities or data elements. The goal of the fleet logistics DA effort is to improve the overall system-wide synchronization of related fleet logistics systems, thus ensuring the reliability of the data within the system.

Synchronization

Good data synchronization means reading a data item after it has been updated, to obtain accurate and timely values. Synchronization includes both *when* the data is read, and *how often* it is read. Reading at the wrong time (such as just before the field is updated) yields incorrect or untimely data. Reading too often or not frequently enough can yield inaccurate data, and can waste processing time. Updating a value at the wrong time is useless if another program writes over (clobbers) the update before it can be used. A well-synchronized data-gathering program will read data soon after it is updated, and will be scheduled to read the data no more frequently than it is updated.

Benefits of Accurate Data Synchronization

If timely updating of data were the only requirement for proper synchronization, the metadata analysis and definition for synchronization would be a relatively simple process. If this were the case, a data user would know how accurate that data was simply based on the minimum requirements for updating that data.

However, especially for a multi-system enterprise, some data may be dependent upon the timely input made from other data on a remote system. In conjunction with timeliness metadata, additional metadata identifying the synchronization requirements would further refine the accuracy and reliability of the data. The more accurate the data, the better prepared is to user to better judge what action should be performed on that data.

Synchronization Requirements

Synchronization requirements are derived from the process model and the data model by analysis of:

- Flow of data (interactions, dependencies)
- Business rules
- Use and frequency of data for roll-up, cross-system reporting and reference
- Schedules for release of time-dependent data values for general use

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8.11. Ensure System-Wide Data Synchronization, Continued

Cycle Time

The cycle time for a data entity is the period between updates, that is the time between scheduled changes. Even a continuous stream of data has a cycle time. A monthly status report would have a cycle time of one month. An electronic signal might have a cycle time of a hundredth of a second.

Refresh Cycle

In electronic systems, the frequency with which a value is updated in a given time

Examples: screen refresh rate of 72 times per second; network polling rate of 12 times per minute; identification broadcast of once every 20 minutes

Data Transfer Cycle

In information systems, the frequency in which a value or data set is transferred or broadcast. This refers to the time lapse between the start of one transfer and the start of the next.

Example: position of a target on a radar screen on one sweep compared to the next.

System Run or Process Cycle

In automated or manual systems, the time between the end of a processing cycle (such as payments, requisition processing, or personnel status change) and the end of the next cycle. This cycle time indicates how often the process requires input data, and how often its product data will be updated.

Example: Time between submitting a change of address for a distribution list and the issue that is mailed with the corrected address.

Management Reporting and Decision Cycle

In a business process, the time between the completion of a task or phase, and the end of the next cycle of the same type. This cycle indicates when and how often the business process requires and/or produces information.

Examples: Project status reporting, review and approval cycles, budgeting cycles, and project phases.

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8.11. Ensure System-Wide Data Synchronization, Continued

Levels of Synchronization

The different data synchronization cycles are arranged as hierarchically dependent levels, as shown in the following diagram:

Machine update cycle
↓
Data transfer cycle
↓
System run/process cycle
↓
Management reporting/decision cycle

Each lower level of synchronization cannot be recycled until the higher level is recycled. Synchronization metadata rules for one level thus make take into account the rules for the immediately higher level. When analyzing the relationship of one level to the next, system designers may find that the timeliness metadata for a data entity or element should be modified to ensure accuracy.

Documenting Synchronization Requirements in Metadata

Document synchronization metadata as follows:

1. Identify the timeliness requirements for the update of a data entity or data element as defined by the process and data models
2. Identify those data entities and/or elements, and the relationships to these other data entities and elements, which must provide the data entity or element with input before updating is performed.
3. Identify the system run cycle times.
4. Identify the data transfer cycle times.
5. Identify the machine update cycle times.
6. Based on a logic algorithm, modify the data entity or data element timeliness metadata, if necessary.

Review of Synchronization Requirements

Identification of data synchronization requirements starts with review of the application's data model. This review includes external synchronization (interfaces with other systems) and internal synchronization (updates and uses within the application).

Continued on next page

8.11. Ensure System-Wide Data Synchronization, Continued

Assess Requirements

Review the application's data model using the following procedure:
1. Identify the synchronization requirements
2. Verify the timeliness and synchronization metadata rules based on the requirements
3. Send any change requests to the DA repository operator for recording.

Review Definitions

The data synchronization definitions should be reviewed when reviewing the process model and/or data model. Any changes should be put through the repository CM process.

Raise Synchronization Issues

System designers should always be cognizant of synchronization issues when performing system design. Because the overall goal of the fleet logistics DA effort is to manage data across different systems, data synchronization will most certainly always be a factor. Bear in mind any information you may receive on changes to the information system platform, as these will probably affect the data synchronization rules.

Verify Synchronized Update of Data Values

Test specifications should be devised to verify that the synchronization rules for data values is accurate. Any test failures should be documented and run through the repository CM process.

8.12. Implement Data Integrity Measures

Introduction

Data integrity, as with data quality, increases as the process for analyzing, designing, and implementing required metadata is improved. Specifically, data security and data auditing impact data integrity most directly.

Preventing Unauthorized Changes to Data Values

A main component of data integrity are the implementation of data security procedures, as described in the subsection "Assess Risk and Control Access to Non-Public Information." Implementation of data security procedures should prevent the great majority of data errors. With an appropriate data security process in place, data errors will for the most part be inadvertent and relatively minor. The better the data security system, the fewer the major problems in data integrity, and thus the easier it will be to recover from these major problems.

The following data security actions directly affect data integrity:

- Documentation of the restriction requirement in the entity definition.
- Implementation of the restriction in each application where the data item is changed.
- Providing authorized access to individuals through security administration.

Distribution and Version Control

Some standard data elements will change attributes and definitions over time, and the repository will track these changes as described in **Section 7.** The purpose of "impact analysis" is to assess the effects of a proposed change and to identify which standard systems will require modification to support the change. After a metadata change is accepted, there will be a period of one to two years when some systems have been upgraded to support the change, while others have not. It is important, then, to know which version of each system's application software supports which version of each standard data element it uses. CM will provide this mapping of application software versions to data element versions.

For some critical data elements and/or significant changes, the change will be implemented by "effectivity date," so that all systems switch over to the new version simultaneously.

Data Tracking Technique and Metrics

Statistics should be compiled that provide a detailed measures of data accuracy, data consistency, and process cycle times. These statistics should be designed to answer to the specific data integrity audit procedures. The data tracking techniques should include metrics for a system of measurement and statistical control.

Continued on next page

8.12. Implement Data Integrity Measures, Continued

Purposes of Data Integrity Audit

At regular intervals, data integrity audits should be performed. Such audits:

- Ensure that only organizations identified by Data Stewards will create or update specified data values
- Ensure that reliability, accuracy, and ease-of-access of standard data meets the needs of users.
- Detect corruption of data (providing data quality checks at an information resource level)
- Provide a means for ongoing checking of data integrity, (e.g., edit checks, filters, and criterion-referenced metrics)

Data Integrity Audit

Data integrity audits should be based on the following assessment points:

- Data to be used as input to a critical process
- Validate results of processing
- Validate output

Life Cycle Review, Audit Points

Perform the above procedure at the following points in the system design/development life cycle:

- Requirements Analysis
- System Design
- Detailed Design
- Software Coding and Testing
- System Integration and Acceptance Testing
- Implementation

Improvement

Throughout the data quality audit process, improvement opportunities should be identified for the standards/DA program from individual data elements up through process models. fleet logistics DA will assess the results of data quality audits for the following types of actions:

- Selecting improvement opportunities to pursue, and setting objectives
- Making changes and sustaining gains
- Process simulation - reduces the number of choices to a manageable level.

8.13. Establish Consistent Definition of Terms across Systems

Purpose

An enterprise-wide set of data definitions is achievable only if the various functional areas agree on common meanings for the information they share.

Responsibility

The fleet logistics DA office will compile and publish a Dictionary of Metadata Terms as part of its data standardization function.

Dictionary for Metadata Terms

The fleet logistics DA repository will collect and publish a Dictionary of Metadata Terms. These terms and definitions shall be used wherever applicable to define data and processes to convey the same meaning to all users of the data.

What are Key Terms?

Key terms are nouns, verbs, adjectives, and adverbs that are allocated specific meaning in metadata definitions. These terms are to be used in definitions only in the meaning that is indicated in the Dictionary of Metadata Terms.

Standard Definition Process for Terms

The following are the general phases of the standard definition process for terms:

1. The process is begun with a request for new term or expansion of definition for a standard term
2. Review by fleet logistics DA for duplication, relevance, completeness, and consistency with definitions used by allied agencies
3. Review by designated data steward(s)
4. Release of approved term (on-line and in next published version of Dictionary)

8.14. Improve the Data Quality Program

Purpose

The processes and standards used to achieve data quality must improve and evolve. This continuous improvement effort will improve the reliability and usefulness of fleet logistics DA data standards by refining the criteria and processes for standardization and administration.

Guidance for CG quality improvement is provided in COMDTINST 5224.8, *Coast Guard Total Quality Management (TQM) Organizational Structure and Training Strategy*

Continuous Improvement of the Standards Program

Improvement of data administration processes will require the following:

- A *Quality Officer*, who serves as the point of contact for quality issues, who monitors the quality of the standard data resource, and who provides information to the Data Quality Action Team.
- A *Data Quality Action Team* (QAT), representing the developer, program management, data administration, data stewardship, and mission area (data user) components of the information life cycle.
- A *monitoring and reporting process*, to anticipate problems by analysis.

Continued on next page

8.14. Improve the Data Quality Program, Continued

Record and Track Data Quality Issues

The fleet logistics DA will designate a Quality Officer as a data quality and process improvement point of contact. The Quality Officer shall collect information and seek opportunities for process improvement, including the following:

- Recurring and unresolved discrepancies between standards and submitted metadata
- Ambiguities in information class boundaries and data stewardship responsibilities
- Metadata quality deficiencies
- Recommendations for improved processes
- Apparent bottlenecks in the review and standardization process

For each issue and opportunity, the Quality Officer shall:

- Document the issue or opportunity, and log each for tracking.
- Distribute the write-up for each item to members of the appropriate Business Process or Data QAT.

The Business Process or Data QAT in turn shall:

- Prioritize the issues and opportunities, and aggregate items into larger issues for problem-solving.
- Periodically review the list to ensure attention to all items
- Report to fleet logistics DA with recommendations for process improvement, and with disposition of all traceable items.

Tracking Metadata Quality Deficiencies

The fleet logistics DA quality officer shall analyze the standardization process and the standard data resource for potential problems and opportunities for improvement. Findings shall be reported to the fleet logistics DA and to the Data QAT. Data quality problems include the following:

- Process-oriented problems, including discrepancies in the standards and gaps in the data administration process.
- Data value problems, including reports of inaccurate, corrupt, or unusable data from registered standard systems.
- Productivity and general quality problems, as indicated by metrics, by incident reports, and by data sampling, and by data audits.

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8.14. Improve the Data Quality Program, Continued

Review and Authorization of Improvements

The fleet logistics DA authorizes, funds, and implements DA process improvement recommendations. Improvements are to be considered from at least the following sources:

- Changes in Coast Guard information resources management policy
- Changes in the information management practices of allied agencies
- Strategic data planning
- Program priorities
- Results of data quality monitoring and audits
- User requests and recommendations
- QAT and Quality Officer recommendations

SECTION 9

IMPLEMENT DATA STEWARDSHIP

9.1. Overview

Introduction

An effective and representative data stewardship program is the key to long-term success of information sharing. Data stewards, also called information class proponents (ICPs), represent their respective areas of responsibility on behalf of the entire enterprise. Each data steward is assigned one information class or a small number of related information classes, to build the necessary expertise and perspective. Data stewardship is a role, not a full-time job. Each data steward represents the CG mission area that has the highest level of responsibility or most frequent interaction with the data items in the respective information class. When fully operational, the data stewardship role returns data definition authority to the appropriate expert user communities.

Data stewards and subject matter experts ensure the accuracy, completeness, and relevance of data element definitions and components of the enterprise data model that are within their respective areas of responsibility. Their work ensures that standard metadata can be used to satisfy data requirements throughout the organization.

The scope of data stewardship includes the designated data stewards, any deputy data stewards that share the responsibility for an information class, and subject matter experts (SMEs) who act as consultants for specialized subject areas or business processes.

In this Section

This section shows how data stewardship works to ensure the accuracy, validity, and usefulness of fleet logistics shareable data. The program has the following major parts:

Topic	Section
Overview	9.1
Introduction to Data Stewardship	9.2
Data Stewardship Responsibilities	9.3
Implementing a Data Stewardship Program	9.4
Data Stewardship Skills and Training	9.5
Access to Tools, Systems, and Information	9.6

9.2. Introduction to Data Stewardship

Purpose of Data Stewardship

Data stewards and subject matter experts (SMEs) are the critical and ongoing link between the people who use the information and the people who create and manage standard information systems. The people who do a particular type of job are the ones who are closest to those types of information that are central to their specialty. The experts in that information class know, from experience and training, the difference between similar technical terms, how to verify the accuracy of data values, which laws and regulations apply to certain information, which information requires restricted access, and the timing relationships between updated data items.

For a data standard to be useful, this insight must be built into each business rule in the data model and each detail of each data element definition. Making sure that each data element definition is complete, accurate, and useful is the role of the data steward. SMEs support a data steward by providing technical information and reviewing data element definitions within the SME's area of expertise.

For example, if "Task Start Date" in one system means an approval or funding date, and in the other system it means the date the work actually started, these dates don't mean the same thing. To import these dates with the other task and assignment information and print a report where all of the tasks are sorted by "start date" provides inaccurate and misleading information - one group of tasks is going to appear to have started later, when the opposite may be true.

The best way to be sure that two systems are storing sharable data is to establish a complete, accurate, and useful data standard - and then make sure that all information systems use these standard data definitions before permitting them to share data values. Only then can information systems share data with the assurance that data fields with the same name mean exactly the same thing. For two items of data from different systems to be combined and rolled-up in a report, they must represent the same information.

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9.2. Introduction to Data Stewardship, Continued

Role of Data Stewardship

Data stewards and subject matter experts keep the standard data definitions complete, accurate, and useful over time. If the standard data definitions are useful, system developers, maintainers, and users will be less likely to invent their own, incompatible definitions. By representing the community that uses and is responsible for each information class, data stewards keep the standard data definitions current. The tests of success of a data steward include the degree to which:

- Information system developers and maintainers use (accurately) the standard definitions of the steward's information class
- Newly developed or standardized applications use the standard data elements and model without requesting modifications
- Information is shared routinely and transparently between unlike systems.

Figure 9-1 show the relationship of the stewardship role to users, system developers and maintainers, and fleet logistics data administration.

Data Stewards Maintain their User Communities' Best Definitions.
Data Administration Maintains the Enterprise Data Standard.

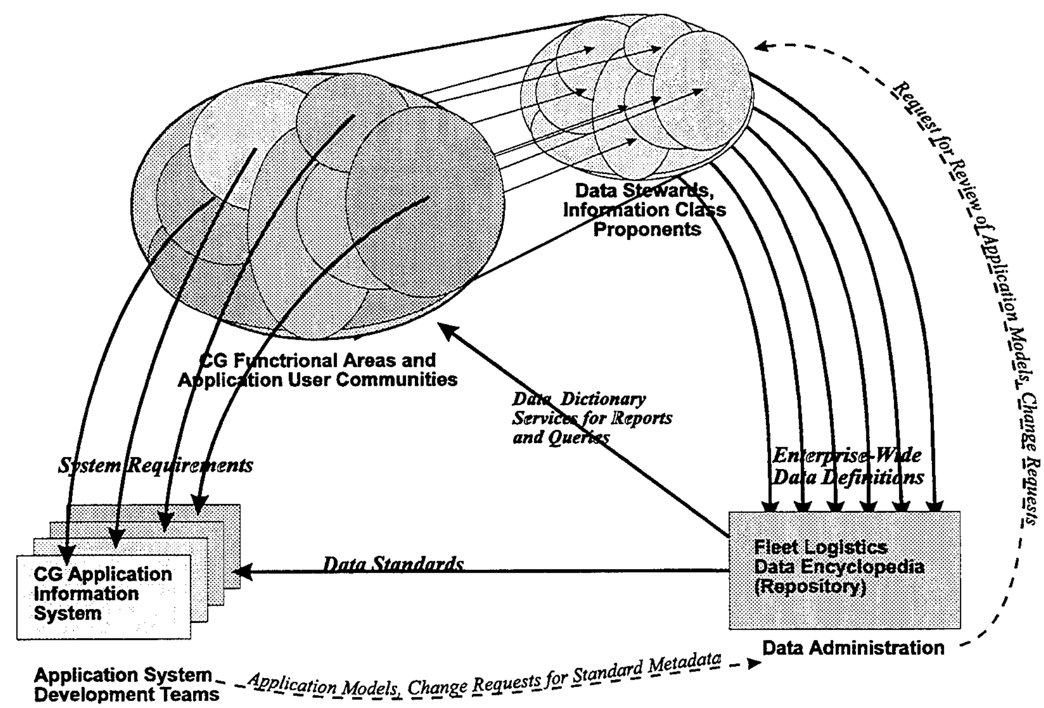

Figure 9-1. Data Steward Working Relationships

9.3. Data Stewardship Responsibilities

Data Steward's Scope of Responsibility

Each data steward is responsible for one or more categories of information in the enterprise data model, each referred to as an *information class*. Within this information class, the assigned data steward has the following seven responsibilities:

1. Understand how data is used across the fleet logistics community and in the wider Coast Guard enterprise
2. Determine how standard (enterprise) data could be used, and participate in strategic data planning to achieve optimum data use
3. Provide data standardization leadership and support
4. Recruit and coordinate the participation of subject matter experts
5. Review metadata change requests
6. Monitor data quality
7. Represent users of data within the information class

Each data steward performs these responsibilities for one or more assigned *information classes*. The decisions regarding an information class apply to all instances of use of data elements within that information class throughout the enterprise. For example, a decision regarding a personnel-related data element (such as rank or occupational specialty designation) would apply to all standard information systems in the enterprise that create, read, update, or delete values of that data element -- not just personnel applications. The data stewardship program assumes that specialists in a given functional area are best qualified to define the data associated with that information class.

To provide the best long-term decisions that accommodate the widest possible range of current and future applications, each data steward must continuously gather information and negotiate metadata standards criteria. A summary of the interactions and the kinds of information shared are shown in Figure 9-2. The information classes and their respective proponent organizations are provided in **Appendix C**.

Continued on next page

9.3. Data Stewardship Responsibilities, Continued

Specific Stewardship Roles

The following table summarizes the activities through which each data steward will discharge his/her data stewardship responsibilities.

Responsibility	Actions	How Often
1. Understand how data is used	Continually model business processes to reflect changes in requirements. Maintain familiarity with CG information systems Establish contacts in orgs with which CG shares data (of info class)	Ongoing (intensive at start)
2. Determine how data could be used	Participate in inter-organization standards groups. Participate in strategic data planning, data modeling, process improvement, user groups Identify data standardization rqts. & opportunities for data sharing	Ongoing (growing)
3. Provide data standardization leadership and support	Advocate sharing of standard data Provide technical support to users Propose DA changes that lead to data sharing between organizations	Ongoing (growing)
4. Recruit & coordinate SMEs	Identify areas requiring SMEs Recruit SMEs; replace w/ duty cycle Consult SMEs	Heavy initial activity, then moderate ongoing
5. Review metadata change requests	Review change requests Track DEs "where used"	Moderate after DS program deployment
6. Monitor data quality	Add quality/security/synch attributes to all reviewed DEs Identify risky data categories Monitor at-risk data values	Moderate ongoing
7. Represent data users	Review IS design docs Participate in process improvement Review training materials Develop process & data models	As-needed

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9.3. Data Stewardship Responsibilities, Continued

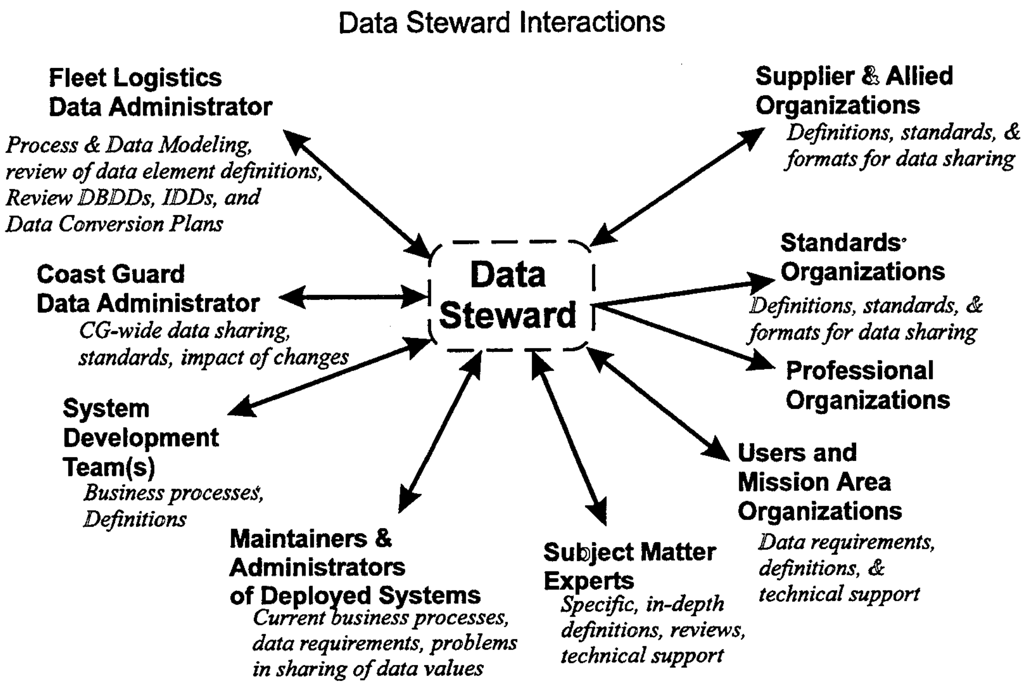

Figure 9-2. Data Stewardship Information Exchange

Stewardship Interactions

The steward's key contribution to the data administration program is to ensure the quality and durability of data item definitions. Important to success is the steward's ability to achieve an "enterprise view." Defining data from an enterprise point of view provides metadata that meets the needs of multiple applications and business areas, and so does not need to be revised each time a new system is added to the enterprise.

Figure 9-2 suggests the kinds of insight that the steward can gain from working with various organizations and stakeholders.

Detail for Stewardship Roles

The following seven paragraphs provide detail for performance of these stewardship roles. Each data steward should read and understand these. While the stewardship role is not a full-time job, each steward's enterprise view and effectiveness as an advocate will improve to the degree he/she performs these seven roles.

Continued on next page

9.3. Data Stewardship Responsibilities, Continued

1. Understand How Data is Used in the Enterprise

The most basic role of a data steward is to understand, as completely as possible, how data in general, and the assigned information class in particular, is used throughout the enterprise. "Use" of data includes data capture (creating new values/records), updating data, deleting or archiving unused data, and reading data for queries, reports, or reference. Data stewards achieve and improve this understanding by:

- Becoming familiar with the capabilities and daily use of *all standard and legacy information systems* that use data from the assigned information class
- Using data modeling techniques to describe the *relationship of information among Coast Guard organizations and to/from other Government and private organizations*, with special attention to tracking all uses of data from the assigned information class
- Participation in quality teams that *define or improve business processes*, using business process modeling methods and tools
- Contributing to *strategic data planning*, and to refinement of the Coast Guard's data architecture.

These experiences, in addition to contributing to efficient use of the Coast Guard's information resources, will provide each data steward with a foundation of information, skills, and contacts. This foundation will enable the data steward to make better-informed decisions when reviewing data element definition requests. It also provides opportunities to advocate and support effective use of the enterprise data resource. **Sections 2 and 3** provide additional information regarding this role.

Many potential data stewards have participated in process improvement teams for the processes that would require their attention as data stewards. One part of the data stewardship role is to continue this participation (after training in data modeling and data administration) with closer attention to information requirements and opportunities for data sharing. COMDTINST 5224.8, *Coast Guard Total Quality Management (TQM) Organizational Structure and Training Strategy* describes the types of teams and participants. The combination of process analysis and data modeling is effective to improve understanding of a function and to develop significant improvements.

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9.3. Data Stewardship Responsibilities, Continued

2. Determine How Data Could Be Shared

Information that is developed and stored in Coast Guard information systems is an enterprise-wide asset. Specific data values should be captured once, stored in a standard, accessible repository, and then used as-needed throughout the enterprise. Each data steward, through familiarity with regulations, Coast Guard business processes, and information sharing, will identify additional data standardization requirements. Each data steward, through attention to the assigned information class, will find opportunities for improved information sharing, data quality, and data utilization.

The data steward's familiarity with the information class, including the use of this information in other parts of the Coast Guard, will enable him/her to recognize opportunities for:

- Data sharing
- Improving data quality
- Improving the consistency of data access rules
- Improving business processes.

This perspective will also enable the data steward to recognize subtle problems such as:

- Misapplication of data definitions
- Corruption of data values
- Mis-synchronization of data updates
- Duplicate data entry
- Unauthorized access to restricted data.

Each data steward will take the initiative to contribute and advocate these improvements and refinements in the use of the assigned information class. This initiative and advocacy will include participation in business process quality improvement teams, strategic data planning sessions, information systems user groups, and data standards working groups.

Section 2, Data Administration Program, provides additional information regarding this role.

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9.3. Data Stewardship Responsibilities, Continued

3. Provide Metadata Leadership and Support

Each data steward is a leader and advocate for enterprise-wide use of information resources. He or she is the most visible advocate of data standardization in one or more application user communities, and is the representative of the assigned information class to the information systems community. The role of advocacy works three ways:

- To the user communities, the steward advocates standard, shareable data and promotes confidence in the standard data definitions.
- To the information systems community, the steward advocates precise data definitions and accurate data models that reflect the best practice of the respective user communities. This advocacy assists planners and designers to understand why enterprise-wide use requires a specific set of definitions.
- To other enterprises, the steward advocates common data standards that permit efficient and reliable information sharing, and offers cooperation in metadata definition to achieve a wider enterprise.

The long-term success of the data administration program depends directly on each steward's success in these three advocacy and leadership roles. Each steward's efforts to achieve an enterprise point of view will determine whether fleet logistics standard data definitions will require frequent revisions, or are strategic and meet the needs of future standard systems without revision.

4. Recruit Subject Matter Experts

Each data steward is encouraged to multiply his/her effectiveness by utilizing the specialized knowledge of others. Specific areas within the steward's assigned information class will require specialized familiarity and experience. In addition, the participation of subject matter experts (SMEs) will increase their respective organizations' awareness and support of standard, shareable data. SMEs serve as consultants in the business process modeling, data modeling, and data element definition processes. Each SME is in a position, by experience, study, and/or organizational assignment to determine the finer points of use, naming, applicable regulations, best standard practice, and/or Coast Guard policy authoritatively for his/her area of expertise.

Each data steward should identify the specialty areas within the information class that may require occasional SME support. The data steward will work with the DA to identify and recruit the best available expert to meet each specialty requirement. The data steward should communicate regularly with the SMEs in the assigned information class, will distribute relevant material to SMEs for review and comment, and will arrange for transition and replacement of SMEs when necessary.

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9.3. Data Stewardship Responsibilities, Continued

5. Review Metadata Change Requests

Reviewing requests for data element and data model changes is the most frequent activity of each data steward. Success of the data administration program is improved by each steward's enterprise point of view and thorough familiarity with one or more information classes. Effective review is based on the steward's familiarity with the subject area, consultation with the appropriate SMEs, and the experience and perspective gained from performing the stewardship roles of leadership, advocacy, and support. Stewards review the following types of metadata change requests:

- New and proposed revisions of data element definitions and attributes
- Business rules, domains of values, data quality and security issues
- Logical entities (names, aliases, scope)
- Relationships

Metadata review is an especially sensitive and visible process because the results can significantly affect the Coast Guard's business processes, the shareability of data, and the usefulness of information systems. Review of specific requests must be efficient, fair, and quick, and must not be perceived as a roadblock to information systems development.

The steward's review is the second step in the metadata review process. Developers, maintainers, and others submit metadata change requests to DA, where the request is checked for completeness and standards compliance. DA then identifies the information class(es) associated with the request and forwards it to the appropriate steward(s) Stewardship review begins at this transmittal from DA, in the process shown in Figure 9-3 and consists of the following steps:

Step	Step Name	Steward's Action
1	Receipt of review request	Log-in the date request was received, suspense date, type of request.
2	Evaluate request	Determine whether request is unique, significant, and useful. Determine effect of requested change on current and planned systems (repository "where-used" report). Identify which SMEs should be consulted.
3	Prepare and transmit to selected SME(s)	Provide initial assessment of impact of proposed change. Prepare transmittal; send to selected SME(s) with due date.
4	Receive and evaluate SME recommendations	Evaluate SME responses. Follow-up on non-responses. Incorporate SME recommendations in decision.
5	Develop recommendation	Decide to reject, modify, or accept the request, with justification.
6	Transmittal	Log and transmit the response to DA.

A log worksheet and Data Steward's Review Response are provided in **Appendix E**.

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9.3. Data Stewardship Responsibilities, Continued

Data Stewardship Review

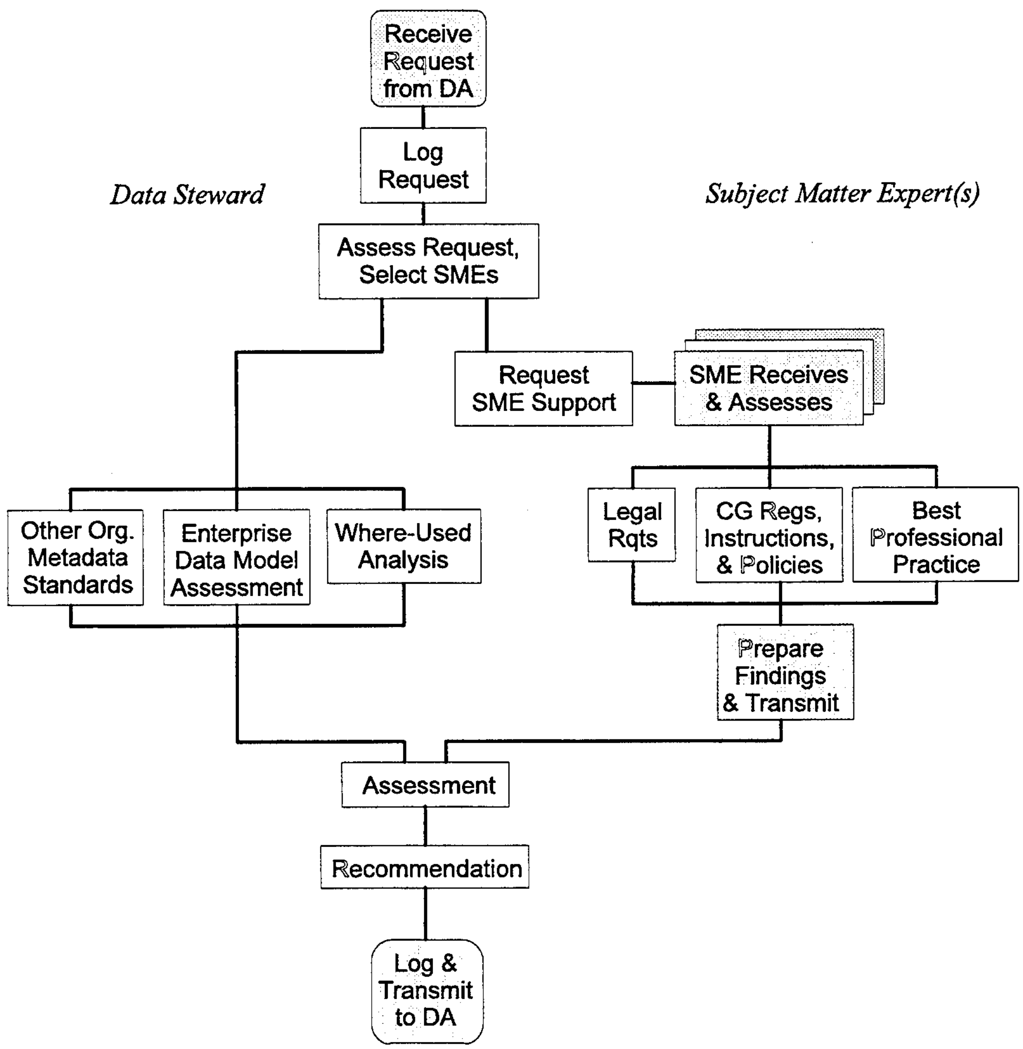

Figure 9-3. Metadata Review Process

Sources of Additional Information

Sections 3, Integrate Data Models, 4, Define Data Elements, and 9, Ensure Data Quality, provide additional information regarding this role. Metadata life cycle stages are defined in **Section 11.**

Continued on next page

9.3. Data Stewardship Responsibilities, Continued

6. Monitor Data Quality

The risks to data quality multiply as more information systems become part of the enterprise standard data resource. No one individual or organization can monitor all the possible risks to all types of information. Each data steward must use all possible means to anticipate data quality problems, and to detect inaccurate or corrupted data values. Attention to data quality by each data steward for his/her assigned information class provides a number of monitors, each watching the information resource from a different perspective. The steward's position is the most visible data advocate in a functional area, and so the steward is a logical point of contact to collect and document data quality problems. From this information, the steward can recommend solutions that are both technically appropriate and consistent with standard metadata. Monitoring data quality can provide clues to problems with the data model, or can point to systems with inadequate error checking. The understanding gained through this experience will help each data steward to appreciate subtle interactions of data values, and so will improve the precision and insight of the metadata review and strategic data planning processes.

Data integrity and security areas directly affect data quality. Each data steward must coordinate with information system database administrators to ensure data integrity measures are consistent and adequate, and with network and system administrators to ensure that consistent and appropriate data access rules are implemented.

Section 9, Ensure Data Quality, provides additional information regarding this role, and describes specific facets of data quality that require stewardship attention.

Continued on next page

9.3. Data Stewardship Responsibilities, Continued

7. Represent Data Users

A Coast Guard organization allocates valuable time of key staff for data stewardship because this is the best way to ensure representation. Information systems are tools that people use to accomplish their work more efficiently, accurately, completely, and consistently. Every information system is designed to support users, but regular review and feedback is required to ensure an ongoing match between system functions and user requirements. Precise definition of standard data elements and accurate modeling of the relationships of these elements are critical to useful system design. Systems that lack this attention require expensive work-arounds and later redesign before they can be deployed effectively. By representing the user communities associated with the assigned information class, the data steward ensures that all data definitions are accurate, complete, and useful, through the following functions:

- Participates in process improvement action teams, both to advocate use of standard data and to understand improvements in business processes
- Represents the information class users in strategic data planning
- Reviews Functional Descriptions, Concept of Operations, System Specifications, Interface Design Documents, and Database Design Documents for all new or upgraded information systems that touch the assigned information class
- Participates in data administration briefings to system developers, maintainers, and administrators, especially when definitions in the assigned information class are complex.
- Reviews information system training materials to ensure proper use of standard data
- Works with SMEs, program managers, and the chain of command to develop accurate and complete business process models and data models, so to describe the community's true information requirements.

Sections 2 through 8 provide additional information regarding this role.

9.4. Implementing Data Stewardship

Scope of the Program

The scope of the data stewardship program is driven by the span of the current enterprise. As the enterprise evolves to a wider, more inclusive span, the responsibility for data stewardship will change. The specific roles will remain, but the scope of organizations and missions within the enterprise will grow. For this reason, the data stewardship program will be in constant implementation.

Organization

Data stewards and subject matter experts (SMEs) do not report to the enterprise data administrator; rather, they represent their respective information classes *to* the data administrator and advocate for accurate and complete data definitions. Data stewards and SMEs take on this role in addition to their regular duties, to ensure accurate representation of their respective areas in the Coast Guard's information systems. This independence ensures that each data steward will retain the users' point of view and that the dialog between data stewards and system developers and maintainers will remain lively, vital, and relevant.

Evolution and Turnover

At some point in the future, the fleet logistics enterprise is likely to be integrated with others, forming a higher-level cross-functional enterprise. To prepare for an orderly transition to the higher-level enterprise:

- Anticipate integration by coordinating metadata with stewards of enterprises with which the Coast Guard shares data. Find out who is the data steward for the equivalent information class(es) in each organization, and share definitions, change requests, impact assessment, models, etc.
- Participate in strategic data planning, especially when integration of data standards and data values are part of the potential outcome

Also, the customary Coast Guard duty cycle will make recruitment of successor data stewards and SMEs necessary on an ongoing basis. Over time, this rotation will place personnel throughout the Coast Guard who can take advantage of shareable data resources, and who are additional advocates for information resource management. To anticipate this turnover, the stewardship responsibility should be rotated among the most knowledgeable personnel. Plan for transition by appointing a deputy steward halfway through the scheduled tour of duty.

9.5. Data Stewardship Skills and Training

Introduction

Data stewardship is a responsibility, not a career. The role of data steward is the link between the user community and the DA community. As has been described in previous subsections, the data steward's diligence and proficiency will make the difference between information systems that are accurate and useful, and those that don't quite fit the need.

Data Stewardship Knowledge and Skills

The data stewardship role combines a variety of skills and information, both from the steward's occupational specialties and from the Coast Guard's business processes and the information systems that support those processes.

Success of data stewards will be improved by information and skills in the following areas:

- Technical aspect of the information class, and each prime word in that class, and the distinctive meaning behind each prime word.
- Laws, regulations, policies, standards, and agreements that affect the information class.
- Purpose, functions, and interfaces of all information systems that touch the area(s) of responsibility (legacy and standard).
- Who (systems and organizations) is sharing information now, within the areas of stewardship responsibility.
- How data of the assigned information classes are shared with other organizations, outside of CG fleet logistics
- Which information systems touch which data (where created, read, updated, deleted, and/or archived)
- How the larger organization (CG) uses these types of information; where it flows.
- Use data modeling tool and data dictionary sufficiently to find information about data items and which systems use them.
- Understand the principles and operation of data administration, to contribute appropriately as a data steward.
- Understand and apply the principles of data security and data integrity in review of data element requests.

9.6. Access to Tools, Systems, and Information

The Data Steward's Need to Know

To perform the seven data stewardship roles, each data steward should have access to:

- Enterprise and functional area strategic data plans
- The fleet logistics enterprise business model, data model, and data encyclopedia
- Data dictionaries and data models for non-standard systems
- Data values that are available for sharing on standard systems
- Rules for determining data access, establishing data integrity, and ensuring data quality
- Identification of all systems that use the standard data elements within the steward's assigned information class

Access to Tools

Recommended tools to perform data stewardship functions include the following:

- A workstation, communications, and software with which to display and work with the enterprise data model and to submit queries for evaluation of data element and data model change requests
- Data query tools and data quality filtering software, with which to monitor the quality of data values
- Access to the metadata repository system

Access to Systems

Recommended system access to perform data stewardship functions include the following:

- A guest user account on all standard systems and candidate systems on which data element of the steward's assigned information class are used
- A user account on the enterprise metadata repository system

Participation in Data Planning

Data stewards should participate in, and be informed regularly regarding, fleet logistics strategic data planning.

Data stewards shall review all design documents, including Functional Descriptions, Concepts of Operations, System Specifications, Interface Design Documents, and Database Design Documents for all new or upgraded information systems that touch the assigned information class. Their comments shall be resolved by the enterprise data administrator. The resolved comments shall be incorporated into the Coast Guard's review response.

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9.6. Access to Tools, Systems, and Information, Continued

Participation in Business Process Improvement

Data stewards participate in process improvement working groups to understand how various processes use information, to advocate the use of the standard information resource, and to anticipate requirements for standard data definitions.

Resolving Discrepancies and Disagreements

In resolving disputes between SMEs and between data stewards, the enterprise data administrator will serve as mediator. If mediation does not resolve the difference, the data administrator will make the final decision.

SECTION 10

ROLES, RELATIONSHIPS, AND RESPONSIBILITIES

10.1. OVERVIEW

Introduction

This section presents key roles and responsibilities associated with fleet logistics DA. These roles support data administration objectives for coordination, for providing direction and oversight, and for data administration operations. The objective of this chapter is to provide an overview of the contributions each role makes to the successful accomplishment of fleet logistics DA objectives. Each responsibility is described in greater detail in another section of this manual as indicated.

In this Section

The following subsections summarize the roles and responsibilities of the individuals indicated.

Topic	Section
Overview	10.1
Key Roles and Their Relationships	10.2
Senior Management	10.3
Fleet Logistics Data Administrator	10.4
Metadata Repository Administrator	10.5
Data Stewards	10.6
Users of Data	10.7
Supporting Coast Guard Organizations	10.8
Developer or Maintainer	10.9
System Database Administrator	10.10

10.2. Key Roles and their Relationships

Overview

The foundation for effective data administration is the fleet logistics enterprise data model, and the quality of this model. It provides the framework for information management policy and the basis for the expenditure of resources to implement that policy. This enterprise data model is the principal information management product used by fleet logistics DA. It is described in **Sections 2 and 3.**

Fleet logistics DA is a central point of contact, a resource for technical support and repository information, a coordinator of the data standardization process, and the primary advocate for shareable data. Fleet logistics DA is the principal coordination point for communication with fleet logistics business operations units, information systems development teams, Coast Guard organizations outside of fleet logistics, and organizations external to the Coast Guard. Key products include plans for supporting migration from the variety of non-standardized legacy data and systems environments to standard corporate logistics data and systems.

Data stewards advocate technical accuracy and usable data standards for one or more information classes. Functional experts support the data stewards in reviewing the data models and data elements in their area of expertise.

Information system developers and maintainers bring the enterprise data resource into reality by analyzing business processes, identifying standard data items, and then building and upgrading systems to create and use standard, shareable data in a reliable manner. Shareable data is one of the goals of the Coast Guard's Information Resource Management (IRM) strategy for cross-functional information systems.

Users of standard data benefit from the shareable information resource by writing SQL queries and reports that use data from one or more standard information systems.

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10.2. Key Roles and their Relationships, Continued

Working Relationships

Figure 10-1 provides an overview of the working relationships necessary for this data administration program to succeed. It shows the subsection references for the responsibilities described in this section.

It is not meant to imply that there is a corresponding position within the organization of fleet logistics or any other component of Coast Guard organization for each role. Several roles may be assigned to an individual or several individuals may fulfill one role. It is also possible that at some point in time an organization may be created to correspond to identified roles.

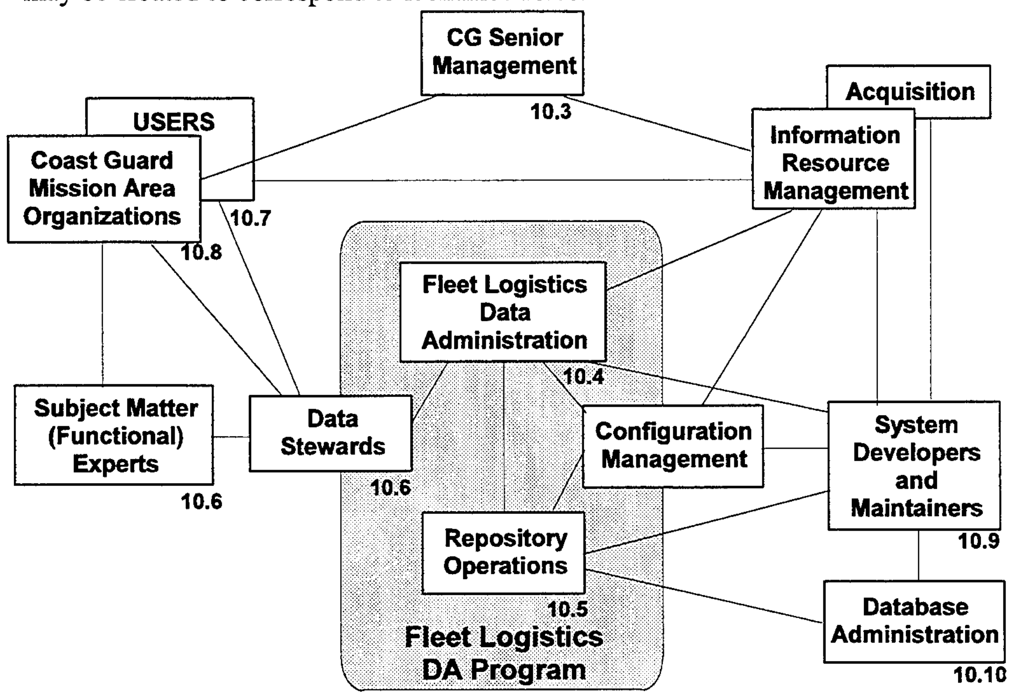

Figure 10-1. Fleet Logistics DA Program Organization

Description of Key Roles

The following sections provide brief descriptions of each role. There is also a table for each role. The table summarizes the tasks and responsibilities, the relationships with other DA components, and principle products produced.

Detailed discussions of the processes and the roles required to complete the processes are found in the preceding sections of this manual. Thus, all the responsibilities for a particular role (e.g., data administrator) have been compiled for reference. Each responsibility area is described in greater detail in **Sections 3, 4, 5, 6, 7, 8, 9 and 11.**

10.3. Senior Management

Description

CG senior management advises and assists the program managers for all fleet logistics programs and provides the CG enterprise-wide perspective for making the transition from the current legacy system environment to the standardized, integrated data environment. Senior management, having a CG enterprise point of view, may serve as the final authority for any fleet logistics issue, and can be uniquely valuable in resolving CG-wide information resource issues.

CG Senior Management

Managers of fleet logistics business functions and operations perform the following activities to ensure efficient information sharing.

Major Responsibilities	Scope	Key Products
• Provides authority for fleet logistics DA program • Resolves issues requiring senior level Coast Guard - wide authority	Fleet logistics enterprise	• Fleet logistics DA program • Issue resolutions

10.4. Data Administration

Description

Fleet logistics DA provides the lead role in DA operations. The fleet logistics DA establishes and maintains the fleet logistics data standards program by coordinating the development, implementation, operations, and maintenance of the program, policies, procedures, and standards. The DA function refers to the designated fleet logistics data administrator and others to whom DA work is delegated.

DA Responsibilities

Responsibilities of the fleet logistics DA include providing fleet logistics DA policy, standards, and guidance to CG functional areas and to information system development and maintenance teams. The DA also develops and maintains those DA plans and strategies that are applicable to the activities of the data stewards, to the activities of the development teams, and to its own operational DA activities.

The DA performs the core functions of reviewing, approving, and disseminating metadata and information about metadata. The DA also monitors the progress of the DA program and provides training regarding DA activities. The DA is responsible for coordinating with the data repository administrator and with information system database administrators to assure effective management of the fleet logistics enterprise data model and the data element standardization program.

Reference

Detailed descriptions of the data administrator's responsibilities are found in the following sections:

- **Section 3. Support Development and Integration of Data Models,**
- **Section 4. Standardize Data Elements,**
- **Section 5. Share Data by Mapping and Migration,**
- **Section 7. Control Changes to Metadata, and**
- **Section 8. Ensure Data Quality.**

DA Responsibilities

Under the direction of the data administration manager

Major Responsibilities	Scope	Key Products
• Provides fleet logistics DA policy and procedures • Develops fleet logistics DA strategy • Coordinates with other Coast Guard offices on matters concerning fleet logistics data management • Supports all fleet logistics development efforts	Fleet logistics - wide	• DA procedures • DA standards • Integrated corporate logistic data model • Standardized fleet logistics data elements • Data quality and security procedures • Fleet logistics DA training program

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10.4. Data Administration, Continued

Major Responsibilities	Scope	Key Products
• Develops and ensures the integrity of the fleet logistics data architecture • Reviews conceptual and logical data models • Coordinates with data modeling analysts to ensure compatibility of data definitions • Reports data definition discrepancies • Tracks resolution of data discrepancies • Accepts data models for inclusion in the repository • Maintains control of revisions to data models • Provides guidance and instruction for data standards and administration • Reviews design documents • Reviews application models • Coordinates development and integration of models into the fleet logistics enterprise data model • Improves data model development and integration process • *The following activities are detailed in Section 4* • Controls and manages data and metadata • Reviews data element change requests • Approves or disapproves data element change requests • Coordinates resolution of technical and functional review conflicts • Notifies change request submitter of approval or disapproval • Updates "where-used" references to information systems for data elements		• Fleet logistics data and metadata repository • Standards for data models, methods, and tools

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10.4. Data Administration, Continued

DA Responsi-bilities (continued)

• Archives existing standard data elements • Reinstates archived data elements • Releases to users changes to metadata *The following activities are detailed in Section 5.* • Coordinates definition and use of data structures among organizational components • Supports and facilitates system upgrade and data conversion • Reviews metadata mapping plans and other documents • Assists developers in compiling legacy data element inventory • Maintains legacy data element inventory *The following activities are detailed in Section 7.* • Reviews metadata change requests • Approves metadata change requests • Releases metadata change requests *The following activities are detailed in Section 8.* • Defines data quality and security procedures • Trains developers in standards and use of the repository • Answers questions and solves problems • Accepts and registers standard systems • Assigns change requests to data stewards		

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10.4. Data Administration, Continued

DA Responsi-bilities (continued)

• Resolves disagreements between data analysts, data stewards, and others • Accepts and registers new and upgraded systems • Incorporates data models into the fleet logistics enterprise data model • Notifies the user community of newly registered or upgraded systems • Reviews, evaluates, and approves or rejects requests to modify DA standards • Reviews, evaluates, and approves or rejects requests for exemptions from DA standards • Conducts risk assessments • Reviews data synchronization • Compiles and publishes a dictionary for metadata terms *Other responsibilities* • Manages fleet logistics data model • Develops standard fleet logistics data elements and other data products • Establishes, operates, and maintains the repository • Establishes and maintains standards for data models, methods, and tools • Provides fleet logistics DA procedures and training • Develops action plans		

10.5. Metadata Repository Administrator

Description

The metadata repository administrator manages the repository containing all DA products. A complete discussion of metadata repository operation is the subject of **Section 6.** However, at this writing, the platform and tools for the fleet logistics metadata repository have not been selected. Responsibilities are identified below, but specific operational details will be provided by the developer of the repository system.

Metadata Repository Administrator Responsibilities

Responsibilities of the administrator of the fleet logistics metadata repository include the following.

Major Responsibilities	Scope	Key Products
• Assists the fleet logistics data administrator in utilizing repository resources required for data element standardization efforts • Facilitates the receipt, delivery, and maintenance of the documentation and other deliverables identifying fleet logistics configuration items • Extracts metadata objects from repository • Imports models from development tool format to the DA repository format	Fleet logistics - wide	• Updated metadata repository • Metadata repository security and quality

Continued on next page

10.5. Metadata Repository Administrator, Continued

Metadata Repository Administra-tor Responsi-bilities (continued)

• Extracts sets of repository objects for data modeling analysts, data stewards, and others with a need for them • Generates lower level data models from the repository • Links repository objects to corresponding objects in other data models • Assigns ownership of repository objects • Registers changes to metadata • Identifies impact of metadata changes on other models • Propagates changes to metadata • Implements approved metadata changes • Incorporates accepted metadata into repository • Assures integrity of the repository tool		

10.6. Data Stewards

Description

Data stewards manage an assigned set of metadata on behalf of the Coast Guard. A data steward captures or creates metadata in the process of carrying out business functions and oversees the definition of data required for the business. Data stewardship responsibilities are explained in detail in **Section 9.** In addition, data stewards should understand the metadata development and review process described in **Sections 3 and 4,** and the data quality and security criteria described in **Section 8.**

Data stewards keep the standard data definitions complete and accurate. By representing the community that uses and is responsible for each information class, data stewards keep the standard data definitions current. Each data steward is responsible for one or more categories of information in the enterprise data model. These categories are referred to as information classes.

Data Steward Responsibilities

Data stewards are the link between the information systems community and the various user and mission area communities. Active data stewardship ensures that data standards are set properly, for long-term use by many systems, and ensures that the interests of data users are represented. Stewardship responsibilities include the following:

Data Stewardship Program

For additional detailed information about data stewards, their role, and the entire data stewardship program, refer to **Section 9: Implement Data Stewardship**.

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10.6. Data Stewards, Continued

Major Responsibilities	Scope	Key Products
• Understand how data is used across the Coast Guard enterprise • Determine requirements for standard (enterprise) data and participate in strategic data planning activities • Provide data standardization leadership and support • Recruit and coordinate the participation of subject matter experts • Review change requests for candidate standard data elements • Assure that candidate data elements will meet functional data requirements • Assess impact of change requests on appropriate data models • Coordinate with other data stewards regarding requested changes • Recommend approval or rejection to the data administrator • Identify and assign experts to review metadata • Provide for and verify data quality • Represent users of data within the information class • Review and approve data models • Approve standard data elements • Approve entity attribute names and definitions • Establish data quality standards for data within their authority • Grant access to data within their authority • Maintain tables of business codes • Provide the data administrator with "data steward approved" metadata	Assigned subject area, collection of entities, or collection of entity attributes	• Foundation of information, skills, and contacts • Identify opportunities for data sharing, improving data quality, improving the consistency of data access rules, and improving business processes • Identification of subject matter experts within the supporting Coast Guard organizations • Approved data models • Approved entity attribute names and definitions • Approved standard data elements • Standards for assessing the quality of data • Identification of data of less than acceptable quality

10.7. Users of Data

Description

"Users of data" refers to those individuals and organizations that are responsible for performing any of the business functions being supported by the information systems. In addition to use of specific information systems, some users require aggregated data from several systems. Users who generate aggregated reports, create ad-hoc SQL queries, or audit multiple systems require familiarity with the structure and naming of standard data items. The reliability of aggregated data depends directly on the consistency of data element definitions and attributes across systems, and the care with which these definitions and attributes are implemented.

Users who enter or modify data are responsible for the quality of the data values they create. Users are also responsible for generating business process improvements (including better use of standard information) and information system requirements, and create applications, reports, and queries as needed. Users ultimately judge the quality of the data provided, and define the requirements for additional data or changes in the representation or form of the data.

Users of Data

Major Responsibilities	Scope	Key Products
• Plan strategic use of data • Identify data quality issues and problems • Identify additional data requirements • Ensure proper use, modification, and creation of data values • When accepting new or upgraded information systems, ensure that data meets fleet logistics data sharing standard	Business function	• Identification of issues and problems • Identified data requirements

10.8. Coast Guard Organizations

Description

The role of the constituent fleet logistics organizations is key to understanding the relationship of the data models, entities, and data elements to the requirements of the business functions. The mission area organizations are units within the Coast Guard that provide subject matter expertise to the fleet logistics data administrator to facilitate the resolution of standardization issues that arise. They support data stewards by providing technical information and reviewing data element definitions within their area of expertise.

Coast Guard Organizations

CG organizations who perform fleet logistics functions or use fleet logistics information provide resources to validate models; validate name, definition, and attributes of data elements; and assure the security and quality of data for the business functions. They assist the data stewards in keeping the standard data definitions complete, accurate, and useful over time. Being part of a community that uses and is responsible for information, they can keep data definitions current and effective. The success of the program depends on the following kinds of support from constituent organizations.

Major Responsibilities	Scope	Key Products
• Consult with fleet logistics Data Administrator • Provide subject matter expertise to resolve standardization issues • Assure that the supporting organization's requirements are adequately reflected within fleet logistics data administration • Consult to analysts modeling business processes, modeling data, and defining data elements • Validate data models of the business function • Validate standardized data elements • Validate quality of data for a business function • Assure security for data of a business function	Subject area	• Resolutions to issues within subject area • Definition of subject area DA requirements • Validated data models • Validated standardized data elements • Validated standards for data quality • Validated levels for data security

10.9. System Developer or Maintainer

Description

Data models are developed at various times, under various initiatives, and within various CG organizations. CG information resource management (IRM) policy demonstrates the need for integrated, cross-functional information systems. Isolated, single-mission systems are contrary to CG IRM policy. As information systems are upgraded, their respective data structures should be revised to bring them into consistency with the fleet logistics (or wider enterprise) metadata standard. The advantages to CG mission areas include reduction in software development and maintenance costs, more efficient acquisition and use of information, integration of more sources of information for decision support, and the availability of a wider base of technical support.

Coordination and integration of data must be an inherent part of each system development and maintenance activity, at the same level as integration of functions, equipment, and software. Therefore each system development or maintenance manager should assign the responsibility to an individual to perform the role of data model coordinator. (This is a role, not necessarily a position within the organization.)

The terms "developer or maintainer" and "development team" are used frequently throughout this manual. They refer to those performing the various functions for developing, modifying, and/or supporting information systems. The development team data modeler(s) is (are) the principal producer(s) and user(s) of data administration products. In this section, therefore, the role is named "data modeling analyst."

Data modeling is an integral component of business analysis. For every fleet logistics initiative involving business analysis, a data modeling effort will be performed by data modeling analysts. Data modeling analysts support information system changes or new development needed to achieve the objectives of functional process improvements, initiatives to migrate existing systems, and short-term initiatives. They analyze and evaluate requirements to incorporate standardized data element definitions and formats in the migration system or process improvement development, and effect the changes once approved. Data modeling analysts also support the re-engineering of systems to be migrated by separating the data from application source code and procedures in order to move toward data independence. They are responsible for coordinating any changes into the systems with fleet logistics Data Administration and with the business function managers.

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10.9. System Developer or Maintainer, Continued

Data Model Coordinator

The data model coordinator is the designated point of contact within the developer organization for ensuring metadata standards.

Major Responsibilities	Scope	Key Products
• Facilitates the integration of various components of fleet logistics data modeling and data element standardization activities • Assists the data modeling teams in planning and executing integration activities • Conducts integration exercises and analyses • Facilitates resolution of integration issues among modeling teams, working groups, or data stewards and custodians • Prepares metadata for joint user-developer technical reviews • Coordinates maintenance of results of integration efforts with the fleet logistics metadata repository	Program, project, or information system	• Advice and counsel for data model integration • Consistent data model using fleet logistics standard data model as the foundation • Identify truly unique data items to be submitted as candidate data elements • Preliminary logical data model • Attributed data model • Data sharing and interface requirements • DBDD and IDD, preliminary and final versions • Metadata change requests and new data element requests

Change Control

Each system development and maintenance organization has a change control or configuration management responsibility. Included in that responsibility is the necessity to keep the application's approved logical data model concurrent with the physical database design.

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10.9. System Developer or Maintainer, Continued

Data Modeling Analyst

Data modeling analysts can be part of a developer, maintainer, or user organization. This role can include systems analysts, information systems engineers, and functional experts trained in process analysis and data modeling. The intent is to address those who translate their understanding of information requirements into a logical data model, and who reconcile the application's information requirements with standard metadata.

Major Responsibilities	Scope	Key Products
• Analyze subsystem data requirements • Populate the application's CASE tool with standard metadata from the fleet logistics repository • Define information requirements in a standardized format, using fleet logistics standard metadata as a starting point • Develop conceptual data models • Develop logical data models • Develop standard names and definitions for data elements • Request changes to data models where an expansion or refinement to standard metadata is indicated • Develop requests for additional standardized data elements • Develop requests for changes to standardized data elements • Identify and define data element attributes • Re-engineer data for systems to be migrated • Define legacy data element inventories • Define legacy data element maps • Identify migration data • Coordinate and integrate the standard definitions with those of other subsystems • Recommend improvements to data standards and data administration processes	Subsystem-wide	• Definitions of data requirements • Entity-relationship models • Logical data models • Physical data models • Requests for standardized data definitions and names

10.10. Database Administrators

Description

Database administrators for standard systems and for enterprise-wide reference data maintain their respective subject area or application databases, in alignment with standard metadata. Database administrators maintain the security and integrity of the data values that comprise the shared information resource. Database administrators have the critical responsibility for release as shareable data only those values that comply with fleet logistics data standards, and to accept (import, download) data values only from registered standard information systems.

Database Administrators

Responsibilities of database administrators of registered fleet logistics standard systems include the following.

Major Responsibilities	Scope	Key Products
• Enforces the policies, standards, and procedures set by the Data Administrator • Contributes to the establishment of the physical data architectures • Provides technical support for the databases • Coordinates database development, maintenance, and operations activities • Manages the information repository, software, and databases for the fleet logistics data administrator • Provides input on fleet logistics data management policies and procedures	Assigned information system(s)	• Updated data repository • Data repository security and quality

SECTION 11

DATA LIFE CYCLE METHODOLOGIES

11.1. Overview

Purpose

This section describes the metadata that is required at each phase of information system development. It describes various methodologies and tools that help the designer to discover and describe the information that is then used in the application and shared across the enterprise.

Metadata and data values have a life cycle different from that of an information system. Data tends to remain constant while business processes, organizations, and information systems change over time. That is, people and organizations improve how they deal with information, but the kinds of information within a given mission area remain remarkably stable over time. Describing the information accurately and competently, and in a manner that facilitates sharing of data is therefore central to the design of a business process and for the information systems that support the business process.

In this Section

This section contains the following subsections:

Topic	Section
Overview	11.1
Life Cycle of Standard Metadata	11.2
System Life Cycle Metadata Requirements	11.3
Metadata Documentation	11.4
Information Systems Engineering and Management Tools	11.5
Working Relationships	11.6

11.2. Life Cycle of Standard Metadata

Purpose

Metadata has its own life cycle of proposal, review, acceptance into the enterprise standard, and retirement. This subsection summarizes the metadata life cycle as it applies to all fleet logistics standard metadata. For detail regarding the specific life cycle for data models, data entities, and standard terms, refer to the appropriate subsections.

Metadata Life Cycle

Information tends to endure, both in data types and data values, longer than specific information systems, business processes, or organizations. The processes for management of metadata, that is, management of the definitions and characteristics of data, follows this series of stages. Figure 11-1 shows the relationship between the system development cycle (described later in this section), the data element life cycle (described in **Section 4**), and the standard metadata life cycle. The figure highlights data elements because requests to change data element detail are the most frequent metadata transaction.

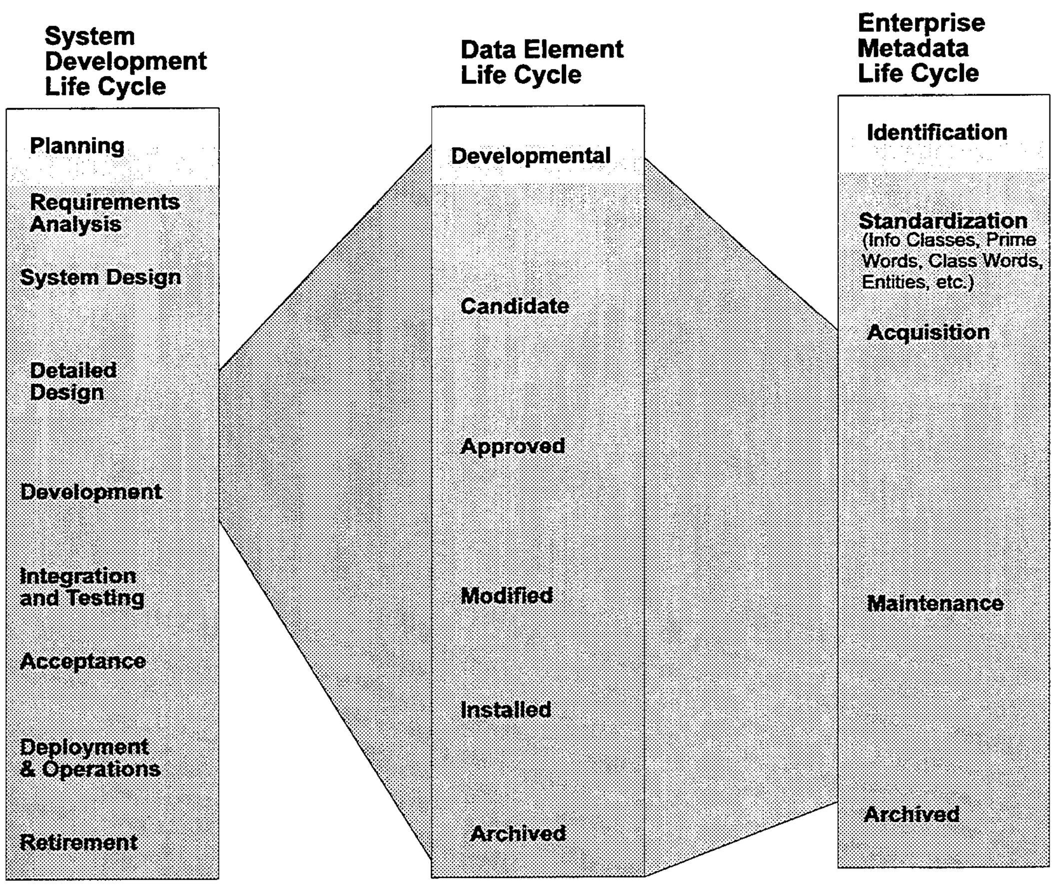

Figure 11-1. System and Metadata Life Cycles

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11.2. Life Cycle of Standard Metadata, Continued

Identification

This process involves enterprise data planning and data use planning. The sub-processes include classification of subject business data and identification of stable data entities.

User organizations, information systems managers, data administrators, and senior management participate in strategic data planning. Strategic data planning includes a range of activities, from providing information support to new business processes, to planning the sharing of data with other organizations, to refining the scope of information classes and high-level entities. Enterprise information sharing and data administration initiatives are two of the outcomes of strategic data planning. This is the activity that will change the scope of the enterprise as data sharing becomes more central to CG operations.

Standardization

This process yields shareable processes, data entities, and data element characteristics and definitions that are unambiguous across the enterprise.

Development teams, process improvement teams, and data stewards perform process/activity and data modeling to obtain accurate and widely usable data entity and element descriptions.

Data element descriptions (for new DEs or for modification to existing standard DEs) that are in review are *candidate data elements*.

Acquisition

This stage defines data sources, uses, integrity rules, and quality and security requirements. The acquisition stage is the part of the data life cycle that spans the information system development phases. It is also the phase in which single points of data collection (*i.e.,* data administration) are defined.

The fleet logistics data administrator must work with acquisition staff to ensure that sufficient metadata-specific contractual language and data item description (DID) detail is included in each procurement. Data administration activities to build and standardize an enterprise metadata repository, and to populate it with valid, useful standard entities and data elements, is the central activity of this phase. To ensure the validity of the standard entities and data elements, data stewards and subject matter experts perform the activities detailed in **Section 9.**

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11.2. Life Cycle of Standard Metadata, Continued

Maintenance

This stage keeps data current, timely, and accurate based on quality and security and configuration management procedures. Data recovery and restoration are provided for data values during this life-cycle phase. Metadata is refined through the metadata change request process.

Metadata maintenance includes advancing standard data elements to the "modified" and "archived" stages, as described in **Section 4**.

Archive

Data and metadata are retired from day-to-day use, but are kept somewhat available for later reference. Data archiving means stable storage of values. Metadata archiving means retirement of names, definitions, characteristics, or key terms that are no longer in active use.

Disposal

This final stage occurs with the decommissioning and destruction of data that is no longer needed or required by law, order, regulation, or potential use. For fleet logistics data, this process applies to data values and metadata.

Retention of data values is determined by the Federal law (44 U.S.C. 2901) Records Management, and implemented by the National Archives and Records Administration (NARA). COMDTINST 5212.16, *Transferring Records to Federal Records Centers (FRC)* implements this policy for the Coast Guard.

11.3. System Life Cycle Metadata Requirements

Purpose

Each new and upgraded information system requires attention to data standards to ensure a high-quality shared data resource for fleet logistics. Regardless of the methodology used to develop a specific information system, each information system evolves through a series of stages, from initial concept to retirement. To provide for valid, complete, and sharable data, the appropriate metadata must be developed for each of a system's development stages.

This subsection identifies a set of generic development stages and shows how to include the appropriate levels and types of metadata as part of each stage. Deliverable documentation is recommended that will provide a focal point for metadata standards design and compliance reviews.

Overview

The various Government and commercial life cycle methodologies each have a particular emphasis. Most of these provide for tailoring of processes and documents to fit the scope of the application.

The two documentation styles that have been used for many Government information system procurements are DOD-STD-2167A and DOD-STD-7935A. At this writing, MIL-STD-498 is superseding both. While all three of these standards have their roots in defense systems, they provide a structure and proven management approach that has proven useful to many agencies. Coast Guard systems are likely to utilize tailored versions of these styles, with the addition of organization-specific program management tools.

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11.3. System Life Cycle Metadata Requirements, Continued

System Life Cycle Stages

The following table provides a set of general information system development phases, and shows how these phases apply to the standard Major Automated Information System Review Council (MAISRC) milestones, to two recently-used Government system development standards, and to the standard that recently superseded the other two.

General Phase	MAISRC Mile-stone:	DOD-STD-2167A	DOD-STD-7935A	MIL-STD-498 *
Planning	0			Project planning and oversight; Establishing a development environment
Requirements Analysis	1	System Requirements Analysis	Design Phase: Definition	System requirements analysis
System Design	2	System Design *Functional Baseline*	Design Phase: Design	System design; Software requirements analysis
Detailed Design		HW/SW Rqts Analysis Preliminary HW/SW Design; Detailed Design *Allocated Baseline*	AIS & Telecomm. Technical Adequacy Validated and Approved	Software design
Development	3	Coding and CSU Testing; Hardware Fabrication	Development	Software implementation and unit testing
Integration and Testing		CSC Integration & Testing; CSCI Testing; HWCI Testing; System Integration & Testing *Product Baseline*	Development: Integration Development: Test	Unit integration and testing CSCI quality. testing CSCI/HWCI integration and testing

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11.3. System Life Cycle Metadata Requirements, Continued

*System Life Cycle Stages (**continued**)*

General Phase	MAISRC Mile-stone:	DOD-STD-2167A	DOD-STD-7935A	MIL-STD-498 *
Acceptance	4	Physical Config. Audit; Formal Qualification Review; Testing & Evaluation (SAT)	Development: Evaluation	System qualification testing
Operations		Production Deployment	Deployment Phase Operations Phase	Preparing for software use; Preparing for software transition
Retirement	5			Transition

* MIL-STD-498 describes "major activities, which may overlap, may be applied iteratively, may be applied differently to different elements of software, and need not be performed in the order listed." It requires that the developer's software development process be described in the software development plan. When following MIL-STD-498, metadata requirements and deliverables should therefore be keyed to the activities rather than to the milestone/phase sequence. This difference does not relieve the developer of design responsibilities or deliverables; it merely permits tailoring of the process sequence to accommodate a wider range of methodologies.

The general development phases in this table will be used in this document to indicate the phase in which specific data administration activities must take place.

Planning

What it is: Planning starts with recognition of the need for the new or enhanced system, and continues throughout the project. As a development phase, Planning typically requires the following:

- Demonstration of the need, and the priority of meeting the need
- Demonstration of the concept and methods that are proposed to meet the need
- Citing the fit of the system into the organization's plans and standards
- Identifying scope, program responsibilities, and development environment.

What to do: Effective data administration starts early in the planning phase. The following data-related activities should be part of the planning phase:

- Ensure that sufficient contractual language is included in the procurement to support effective data administration, and which will result in development or upgrade of an information system that meets fleet logistics metadata standards
- Verify the flow of information among business processes
- Identify current and future inter-organization information sharing requirements
- Review standards and regulations that prescribe how information will be kept, shared, and protected
- Review the business process model for conformance to CG standard business processes and support of standard metadata (data stewards)
- Review the organization's strategic data plan, and implement the strategy by applying its information sharing approach and metadata standards.

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11.3. System Life Cycle Metadata Requirements, Continued

Requirements & Analysis

What it is: This phase starts with defining the problem(s) and describing the current and desired (to-be) business processes, information flow, and automation support. This phase can consist of a formal system analysis or a less formal requirements survey, depending on the nature of the system, the environment, and the organization. For a large, multi-phase system, the full requirements set may not be complete until the final phase. The important benefit of this phase is for all stakeholders to agree on what is needed and exactly what is to be done. Revisiting the general system requirements and goals later on in the project can be expensive.

What to do: Data administration should review the business process model or equivalent analytical product from the previous phase.. From this description, one can identify the kinds of information the system will process, what data should be shared, and what data will be shared with which outside systems. If the business process model has sufficient detail, the data administrator and the appropriate data stewards can assess the data synchronization requirements, detect potential risk to data quality, and identify data that will require restricted access or enhanced protection. During this phase the developer should integrate the current enterprise logical data model into the selected CASE (or other system design) tool, so that all design work is based on standard metadata. The developer creates and DA reviews a high-level logical data model (usually represented by one or more entity relationship diagrams).

System Design

What it is: System design starts with approval of the requirements and the solution concept. The developer designs the system to meet the requirements that were approved in the previous phase. Design descriptions and interface documents are developed. Part of this design process is the logical data model, which will shape the contents of the database design document (DBDD), interface design document(s) (IDD), and later, the physical design of the database and/or object definitions. This phase includes system-wide design decisions about the system's behavioral design, interfaces, and operations. These decisions are documented in the system/subsystem design description (SSDD), which should include evidence of commitment to use of standard metadata and sharing of valid data values.

What to do: The developer uses the approved logical data model to create and submit an attributed data model. At this time the developer should identify any attributes (data elements) for which standard data elements cannot be matched. Data administration reviews the attributed data model, DBDD, IDD, and SSDD.

Continued on next page

11.3. System Life Cycle Metadata Requirements, Continued

Detailed Design

What it is: During detailed design, process and data models are developed to a consistent level of detail. Software design should include the business rules, validity checks, synchronization, and security protection that is indicated in the data element definitions.

What to do: Review software design descriptions (SDD) for compliance with the business rules, validity checks, synchronization, and security protection that is indicated in the data element definitions. Review the detailed version of the DBDD and IDD(s). Ensure that test plans provide for using standard test data that is provided by DA.

Development

What it is: Development includes coding and unit testing, and installation of equipment. If the design is complete and valid, the development phase should not uncover unexpected data standards discrepancies. Any discrepancies that are found must be corrected with change requests.

What to do: Provide to the development team samples of test data for all standard data elements used by the system. Samples should include values that represent the full range of the data element's domain and that demonstrate important points of the data element's definition. By providing these samples, DA improves the chances that the system will treat data values in accordance with the standard, and will avoid unnecessary corrections and re-testing later. Evaluate and respond to change requests from the development team as quickly as possible, and with constructive suggestions regarding how to handle the discrepancy that prompted the request.

Continued on next page

11.3. System Life Cycle Metadata Requirements, Continued

Integration and Testing

What it is: As major pieces of the system are completed, they are tested, first individually and then in combination with other pieces. The tests should include demonstration of the system's ability to support the business rules, validity checks, synchronization, and security protection that is indicated in the data element definitions. DA should provide a test data set that includes the range of data values for each data element, as well as tests of data quality, security, and synchronization.

What to do: Integration starts as elements of the system come out of development and are tested together. Integration often uncovers detail-level problems, which may require adjustment of the data model or an element definition.

For each system, testing must include sharing of standard data. For most systems, data sharing is two-way: the system reads standard data from the network, and other systems collect data from the new system (routinely or in ad-hoc queries).

The tested system forms the *product baseline.* The product baseline is the as-built version (usually numbered 1.0) against which future changes are described in Version Description Documents (VDD).

Acceptance

What it is: The Coast Guard reviews the test reports and approves transition of the system from development to deployment.

What to do: Acceptance is a relatively short phase, where the CG transfers program management responsibility from the developer to the user organization.

The main data administration issue with acceptance is reliable data sharing. By this point, all metadata and deliverable documents should have been submitted and any discrepancies resolved. As part of acceptance, DA registers the new standard system for data sharing.

Operations

What it is: Ongoing operation of the system, with occasional upgrades, after deployment and before retirement. The operations phase extends from first system deployment to last system retirement.

What to do: Ensure that the system is creating valid data values for shareable data elements.

Continued on next page

11.3. System Life Cycle Metadata Requirements, Continued

Retirement

What it is: Replacing the system with its successor, and ensuring a smooth transition to the new system. Retirement may also include archiving of data that was not migrated to the new system, or as a snapshot of all data on the retiring system. Retirement starts with the decision to replace the system, and ends when the transition, archiving, or termination of the last operational copy of the system.

What to do: Successful transition of any system is a complex and demanding task, demanding attention to detail. Each transition situation is different. DA must identify the data to be migrated to the successor system, ensure archiving of the current system's data, and identify the measures necessary to protect the data resource during transition.

11.4 Metadata-Related Documentation

Purpose

This section describes the deliverable documents that are associated with most system development efforts. It cites the parts of these documents that concern data administration and recommends review points at the appropriate development phase.

Metadata in Requirements Documents

The most effective development phase in which to incorporate standard data is the initial concept development phase. If the decision to standardize data is made after the design is well along, then redesign and rethinking will be required. If the decision to standardize data occurs even later in the development cycle, then more extensive rework will be required.

General Phase	MIL-STD-498 Activity	Data Admin. Activities	Metadata Deliverables
Planning	Project planning and oversight Establishing a development environment	Strategic data planning Business process. model, rules; Contribute to operation. concept, FD, SOD, SDP.	Strategic data plan, Cite data sharing & standards in Operational Concept Document
Requirements Analysis	Requirements analysis	Logical data model, identification of entities, E-R diagram, Populate CASE tool with standard data dictionary; Risk analysis (data synchronization, quality, & security)	E-R diagram, showing use of standard entities and elements, and potential areas for unique or modified DEs; Definition of all entities; Data CRUD requirements in SRS; data sharing rqts in IRS
System Design	System design	Attributed data model; Define data elements.	Attributed data model; requests for new or modified data elements

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11.4 Metadata-Related Documentation, Continued

*Metadata in Requirements Documents (**continued**)*

Detailed Design	Software implementation and unit testing	Physical database design per approved model; Interface design doc.	DBDD, showing implementation of approved metadata into physical design. IDD w/ use of std. data defs.
Development	Software implementation and unit testing	Provide a test set of data values (Test Data) that meet std.	Code and SDFs show adherence to std. data element defs, names, validation, synch., etc.
Integration and Testing	Unit integration and testing CSCI testing CSCI/HWCI int. & test	Audit data values per standard Deployment planning; Data qual. planning	Test reports show successful creation, reading, update, and deletion of data values, relying on std definitions.
Acceptance	System qualification testing	Validate data per standard; validate data sharing w/ other standard systems.	All data values match std. metadata. Successful inbound and outbound SQL queries using std. defs & names. Maintenance Plan
Operations	Preparing for software use Preparing for sys. transition	Monitor data quality, success in data sharing.	System Administration Manual; training materials; Version Description Docs
Retirement		Transition data to successor or archive	Decision Paper; Transition Plan

DA Responsibilities for Documentation

It is the responsibility of DA and the program office to ensure that strategic data planning is part of the initial planning process, that each procurement provides for sufficient data standardization work and metadata-related deliverables, that sufficient data standardization planning is part of each requirements and design document, and that standardization and transparency of data is tested before acceptance. DA will participate in the review these documents as submitted, and use them for analysis and evaluation of the system's metadata and potential for data sharing.

It is the responsibility of the fleet logistics data administrator to ensure that sufficient data-related documentation (and/or equivalent electronic deliverables) remains on the Contract Data Requirements List (CDRL) for each information system acquisition. Subsequently, the fleet logistics data administrator must ensure that subsections related to data sharing, data exchange using well-defined interfaces, conformance to metadata standards, and commitment to qualification as a standard system are not tailored or negotiated-out of the deliverables.

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11.4 Metadata-Related Documentation, Continued

Basis for Document Titles and Content

The names and content assumptions for the following documents are taken from MIL-STD-498. At this writing, this standard has superseded DOD-STD-2167A and DOD-STD-7935A as the most frequently used life cycle and documentation standard for government information system acquisition. Systems that follow different standards will have slightly different allocation of activities by development phase and may use different names for the deliverable documents.

Any complete development standard will address the requirements for this basic information. The assigned data administrator will have to examine the standard and determine where the equivalent data-related information is provided, and review those deliverables accordingly.

Documents by Development Phase

Figure 11-2 shows the relationship between system development phases and the associated deliverable documents that should be reviewed by DA.

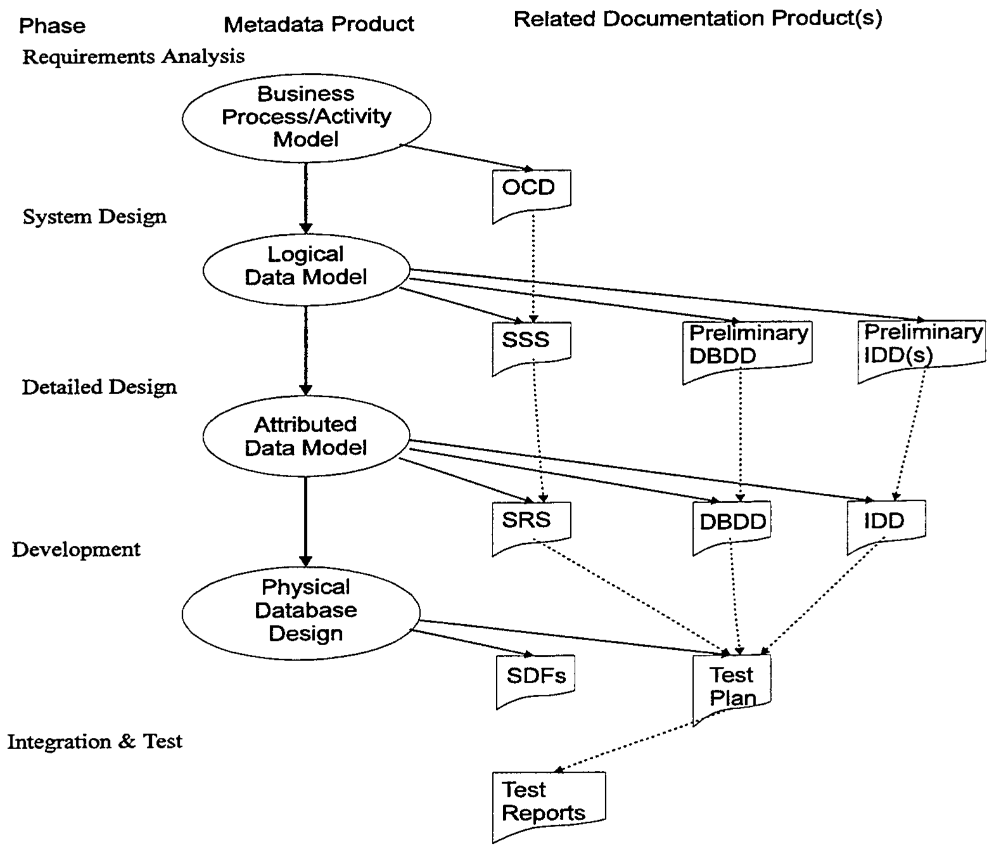

Figure 11-2. Deliverable Documents by Development Phase

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11.4 Metadata-Related Documentation, Continued

Operational Concept Description (OCD)

The OCD is the product of initial requirements analysis. It describes the current situation and proposes an improved set of processes, work flow, and information system support. Other titles for top-level concept documents are System Overview Document (SOD), conceptual architecture, and Functional Description (FD).

DA should review the OCD for commitment to data sharing and qualification as a standard system. This document may contain business process information that permits early evaluation of potential data quality, synchronization, and security risks. The general business processes and subject areas will indicate which data stewards should receive copies of the OCD for advance notice and comment.

System or Subsystem Specification (SSS)

The SSS is the product of system design. It describes in detail each function (behavior) of the proposed system, along with supporting services, processes, and interfaces. The industrial equivalent is the functional specification. An additional level of design detail may be provided later (detailed design phase) in a System/Subsystem Design Description (SSDD). Completing the detailed design requires reference to the business process model and logical data model.

DA should review the SSS for use of fleet logistics standard processes and standard data (standards and values). As part of this review, DA should evaluate the system for data quality, synchronization, and security risks. In formal development methods, the SSS is the subject of the System Design Review. DA should participate in the detailed review and in the acceptance decision process.

System Requirements Document (SRS)

The SRS is the product of detailed design. A larger project with multiple subsystems may break out requirements into separate SRS documents. The SRS describes precisely how the system will perform each of the functions described in the SSS. From a data standards point of view, the SRS cannot be completed without reference to the attributed data model.

DA should review the SRS for use of standard metadata wherever data input, output, processing, or exchange are addressed. Since the attributed data model must be approved before the SRS can be completed, the review should include traceability of data elements and entities to the approved data model.

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11.4 Metadata-Related Documentation, Continued

Database Definition (Design) Document (DBDD)

The DBDD is completed as part of detailed design. It describes each file, field, and relationship in the physical database (or the equivalent object definitions in an object-oriented system). If a design team is not planning to deliver a logical data model in the requirements analysis phase, a preliminary version of this document can permit review of the use of standard (and new/revised) entities.

DA review should trace each DBDD field (or object) definition to the corresponding entity and attribute in the approved attributed data model. Data stewards representing the related information classes should participate in this review.

Interface Definition Document (IDD)

IDDs are prepared during detailed design, one for each major interface. For a standard system, the main IDD should describe the system's interface to the fleet logistics enterprise information resource.

DA review of IDDs is especially important because each IDD is an instance of data sharing. The IDD description of exchanged data should be in terms of standard metadata, or at least mapped to standard data elements. Data stewards representing the related information classes should participate in this review.

Test Documents

Test plans are prepared during system design. For acceptance, the developer must demonstrate the successful operation of each function and interface. From a data administration point of view, the planned tests should demonstrate the ability of the software to:

- Handle the full range of values permitted by the standard data element's domain
- Enforce the business rules and definitions that lead to creation or update of data values
- Perform error checking to ensure the quality of data values
- Ensure proper synchronization of data value updates
- Allow read or write access only to those users and/or processes that are authorized
- Create instances (records or objects) that conform to the corresponding standard data element definition and attributes.

The DA tests should include data portability, inquiry from outside using standard names, outside reference from inside using standard names, and ad-hoc query.

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11.4 Metadata-Related Documentation, Continued

User Manuals

User manuals are developed during system development, and validated near the end of the system integration and testing phase. One of the primary purposes of enterprise-wide data sharing is to provide users with a wider range of information resources. Application software often uses enterprise-wide reference tables, or shares specific transactions with other applications. This level of automated data sharing should be represented to the mission-area user, so that the user can benefit from the available information.

DA should review user manuals for proper representation of the fleet logistics enterprise information resource, for emphasis on data quality for users who create or update data values, and for accurate instructions for use of (access to) enterprise data values. Because user understanding and participation are critical to the success of the enterprise information resource, DA review of user manuals is important to the success of the program.

Training Materials

Training materials typically are prepared at the end of the development cycle and validated during integration and testing, and are intended to be ready for system deployment. Training materials may address different audiences and technical levels, such as system administration, technical support, functional end users, and managers of user organizations. For a standard system, training should include instruction in effective use of the wider data resource.

Because training materials tend to combine instruction in the business processes along with how to use the system, the appropriate data stewards and subject matter experts are ideal reviewers.

11.5. Information Systems Engineering and Management Tools

Purpose

The purpose of this subsection is to show the use of typical tools in support of an enterprise-wide data administration program. The purpose of the feature sets and examples is not to endorse specific methodologies or products, but rather to represent a minimum feature set in any suite of methodologies and tools that will enable a development team to participate fully in the DA program.

Development Tools

The following table suggests tools that a development team may find useful to support the work of one or more life cycle phases:

General Development Phase	MAISRC Milestone	Data-Related Tasks	Typical Tools
Planning	0, 1	Strategic data planning, business process (activity) modeling, prototyping	Prototyping, JAD, Activity or Process Modeling, project planning, budgeting
Requirements Analysis		Logical data modeling	Data Encyclopedia; CASE
System Design	2	Attributed data modeling, data element definition; Reconciling app. data rqts. w/ enterprise standard	Data Modeling
Detailed Design		Database design, interface design	Model Integration
Development	3	Incorporating business rules, data quality criteria, data integrity checks, and access protection into the software	Code Generation, Version Control, Code Library
Integration and Testing		Use of DA-supplied test data; verifying transparent data sharing	Automated Testing, Data Mapping
Acceptance	4	Review of data-related tests	
Operations		Sampling of enterprise data, review of data quality; analysis of data quality and integrity problems	Technical Support, Data Validation, Generation and Tracking of Change Requests
Retirement	5	Ensure effective transition, data migration, data archiving.	Archive Index

The general development phases in this table indicate the phase in which specific data administration and standards activities must occur.

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11.5. Information Systems Engineering and Management Tools, Continued

Data Dictionary

An enterprise-wide metadata repository supports strategic data planning, functional process improvement, migration initiatives, functional model integration, and data standardization. The data dictionary function of the repository provides the following capabilities:

- Provide a point for integration and standardization of enterprise-wide metadata
- Consolidate the organization's knowledge about information assets
- Provide reports and ad-hoc queries to describe how and where Coast Guard information assets are used, especially identifying systems where specific standard metadata is used.
- Facilitate communication among developers, data administrators, and data stewards
- Facilitate data asset configuration control, and track the state of each standard process, data entity, element, and definition throughout its life cycle.
- Provide interfaces to other repositories, such as the Defense Data Repository System (DDRS), the Defense Logistics Encyclopedia (DLE), and the Army Data Encyclopedia System (ADSS).

The Coast Guard Data Administration Data Dictionary System (DADS) is documented in the DADS User's Guide. DADS functions available to a fleet logistics DA user are summarized in **Section 12.**

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11.5. Information Systems Engineering and Management Tools, Continued

Process Modeling Tools

Process or activity modeling tools manage detail to enable analysts to describe the application's functional processes. The tool provides a convenient means to simplify and streamline the descriptions, to permit several views of each process, and to assess the value of an activity to the process.

This type of tool:
- Identifies the work of activities in transforming inputs to outputs
- Shows activity relationships and the nature of their interaction
- Supports several levels of activity decomposition
- Models and rolls-up the cost of activities

To be useful for developing standard metadata, a process modeling tool should:

- Adhere to rules of activity modeling, and automatically perform consistency and integrity checking on the model
- Balance the levels of decomposition, and be able to subset and merge activity models
- Provide means for analyzing and noting timeliness and synchronization of processes and updating of data values
- Provide means for analyzing external and internal data interfaces, as a preliminary means of assessing data sharing requirements
- Allow for validation and testing on discrete models and on integrated baseline models, to assess the effect of changes
- Provide an interface to the DA standard repository, so that standard activity definitions can be used
- Support the standard range of analysis and information system engineering methodologies
- Enhance ease of use and productivity, and should not require extensive training beyond the standard analysis methodology

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11.5. Information Systems Engineering and Management Tools, Continued

Data Modeling Tools

Data modeling tools are used to evaluate and design functional entities so that essential data assets are provided for all users without redundancy, in a system that provides effective and economical storage of data.

To be an effective analysis and design tool, an acceptable data modeling tool should:

- Identify the entities (things or objects) which are used by each function or activity, and to describe each in sufficient detail to meet the requirements set forth in the Data Modeling and Quality sections.
- Identify processes by associating entities and defining business rules.
- Support several levels of entity attribution, identify key attributes, and normalize entities to the third normal form.
- Verify the data model against the activity model to reconcile the application's processes and data (all processes use, create, or change information; all data touches at least one process).
- Subset and merge data models.
- Provide an interface (transfer format) to the DA enterprise data model.
- Provide reference and selection of standard process and entity definitions from the DA enterprise data model.
- Support the information systems engineering methodology of the development team, with current industry standard feature set and rigor.

Data Mapping Tools

Data mapping tools are used to link data elements of legacy systems to standard data elements, thereby building a data dictionary and permitting data sharing with legacy systems.

Version Control Tools

Version control is as important for metadata as it is for specifications, code, documentation, or any other component of an information system. The larger CASE tools include version control as part of their feature set. For a smaller or less formal system, a separate version control system, such as the UNIX Source Code Control System (or its enhanced commercial successors) can provide storage of each change, access to any change level, major and minor releases, and check out/check in services.

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11.5. Information Systems Engineering and Management Tools, Continued

Automated Test Tools

Automated test tools provide a thorough means for verifying a system's response to an infinite combination of commands, data, and conditions. The results can point to errors in the application software, communications, equipment, data structures, or configuration. Automated testing works by building a test script, which launches the desired combination of commands and simulates a workload. The fast and thorough generation of transactions provides a more consistent test than most humans have the patience and attention span to conduct. The tool also collects responses and detects all discrepancies from expected responses. The evaluators of the system's functions are likely to specify the automated test system. The DA interest in this type of tool is to ensure that the selected tool handles a wide variety of data values and attributes.

DA should supply a set of test data values that includes, for each standard data element used by the system, examples of the range of the domain and that tests the business rules, quality criteria, and security protection that are defined for the respective data element.

11.6 Working Relationships

Purpose

The purpose of this subsection is to describe the functional relationships between data administration at the developer and DA levels, to other areas of the information system development and management community.

Key Interactions

The nature of the work changes from phase to phase in any development task. The interactions that are critical to development of valid, standard metadata and portable and usable data values begin in the system planning and concept development phases. The following table suggests which inter-team interactions deserve management attention and facilitation at each phase of system development.

General Phase	MAISRC Milestone:	Purpose of Interaction	Parties whose Cooperation is Needed
Planning	0, 1	Initiate strategic data planning	Program management
Requirements Analysis	1	Ensure utilization of standard tools & defs.	Application analysis staff
System Design	2	Ensure utilization of standard tools & defs.	Application analysis staff
Detailed Design	2	Ensure utilization of standard tools & defs.	Application analysis staff
Development	3	Ensure physical design matches the approved logical design	Development staff, program management
Integration and Testing	3	Ensure data integrity, security, synchronization, and portability is tested	Testing staff
Acceptance	4	Ensure data stds compliance is part of acceptance criteria	Program management
Operations	4+	Support data validity, integrity, and security	System operations & technical support
Retirement	5	Ensure proper migration of data	Successor program management

In addition, at each phase after the functional baseline is established, DA must coordinate with the program's configuration management staff and with the appropriate configuration manager to ensure that version numbers are assigned consistently, and that all metadata changes are tracked.

Detail regarding the working relationships of the various stakeholders in the enterprise information resource are provided in **Section 10, Roles, Responsibilities, and Relationships.**

SECTION 12

COAST GUARD DATA ADMINISTRATION DICTIONARY SYSTEM (DADS)

Introduction

The Coast Guard Data Administration Dictionary System (DADS) is the Coast Guard repository tool currently in production. The target design for DADS is a highly structured Data Dictionary/Directory (DD/DS) containing information about the Coast Guard's significant data processing and information resource management (IRM) processing resources. Testing of the data element dictionary is now complete and the system is in initial operational mode. The data element standardization process, as described in COMDTINST 5230.42 in coordination with this the process described in this manual, is the major focus of the DADS effort.

Data modelers should also reference the DOD Defense Data Repository System (DDRS), as well as any local Coast Guard dictionaries for development efforts. The DDRS and other such dictionaries are discussed in Section 12.2.

In this Section

This section contains the following topics:

Topic	Section
Data Administration Dictionary System	12.1
Other Automated Dictionary Systems	12.2

12.1 Data Administration Dictionary System

Introduction

DADS is in an initial operational mode. For full discussion of the functionality of DADS, contact the CG Data Administration Staff, G-TTC-3, for a copy of the User's Manual. In general, the following functionality exists within DADS:

- Access Control - Including user accounts and privileges assignments to screens and fields
- System Maintenance - Including problem prevention, problem reporting, and change requests.
- Manipulating Data Models and Data Elements - Including creating, modifying, submitting, and querying data models and data elements.

Fleet Logistics Use of DADS

When developing or updating a fleet logistics data model, DADS may provide useful names and definitions for data elements that are not yet part of fleet logistics standard metadata. Fleet logistics developers may inquire from DADS directly, but must submit requests for changed and new data elements through fleet logistics DA.

12.2 Other Automated Dictionary Systems

Introduction

In addition to DADS, refer to the pertinent dictionary systems during data modeling and data element development.

DDRS

In particular, because many of the fleet logistics data administration standards are based on DOD data standards, the Department of Defense Repository System (DDRS) is probably one of the best information sources for identifying data entity and data element requirements for system development. For more information on accessing the DDRS, contact the Defense Information Systems Agency (DISA).

Application Data Dictionaries

In addition to the DDRS, presently there are system development efforts within the Coast Guard that could also help in the development of other systems. For example, the Supply Center Computer Replacement (SCCR) system is the primary Coast Guard development effort that was referenced while researching and developing this manual. The SCCR data dictionary runs on Oracle CASE.

For more information on accessing an application-specific data dictionary system, contact the Information Resource Management division of the proponent organization.

APPENDIX A
INFORMATION SYSTEMS CONCEPTS FOR DA

Purpose

This appendix provides a summary of the more technical information systems engineering and data administration concepts used in this manual. For additional information regarding these topics, refer to the documents cited in **Section 1**.

A.1. Data Architecture Concepts

Guiding Principles for Integrated Data Management

The fleet logistics DA program will adhere to the guiding principles developed by logistics architectural planning and the concept of operations:

- Data is a shared resource that should be defined and structured independent of applications.
- Data should be treated as a primary and vital resource independent of current technology and systems.
- Standard tools and facilities should be used throughout an organization to manage data.
- Users should be given the tools to specify and retrieve the information and reports directly from a common, integrated data environment.
- Development and support methods need to change to bring about a new integrated environment.
- Management needs to be involved in the organizations data management strategy.

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A.1. Data Architecture Concepts, Continued

Introduction

This section introduces several concepts crucial to satisfy the mission, goals, and objectives of the fleet logistics data administration:

- Fleet logistics architectures and data models
- Fleet logistics development environment and data administration infrastructure
- Metadata repository and its metadata model

Fleet Logistics Architectures

Development of fleet logistics information systems (applications) follows development methodologies based on industry standard information engineering practices. According to these methodologies, applications are developed based on five architectures. These architectures are defined for: Work Process, Data, Applications, Organization and Roles, and Technical Infrastructure. Data administration is concerned with three of those architectures: Work Process Architecture, Data Architecture, and Applications Architecture.

1. Work Process Architecture	defines logistics business processes
2. Data Architecture	provides an organized data model that satisfies the information requirements of work processes and organizations
3. Applications Architecture	identifies and defines the software systems that support the logistics work processes

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A.1. Data Architecture Concepts, Continued

Data Architecture

Fleet logistics data architecture is critical to the ability of logistics business to share data across functions, organizations, locations, and applications. To achieve an enterprise point of view, the fleet logistics data architecture must be completed to the logical level of detail, represented as an entity relationship (E-R) diagram with entity and relationship definitions. A valid enterprise view will provide a model that will be useful across all fleet logistics business processes and applications. This enterprise view will enable effective data integration between multiple development projects (applications or sets of applications).

The fleet logistics data architecture serves several purposes:

- It provides common information concepts (entities and their attributes) for integrating data definitions across boundaries imposed by different organizations, functions, locations, and information systems.
- It provides an adequate level of detail to effectively design physical databases. For example, a well-constructed data model primarily identifies entities which exist in the "business" processes of an organization independent of the way the processes are performed.
- It provides definition of relationships among entities and corresponding databases and thus facilitates both control of data integrity/consistency as well as it facilitates access to data via these relationships.
- It precludes repeated re-definition of logical entities, data elements, and relationships because the enterprise view supports all fleet logistics functions.
- It ensures reusable, transparently shareable data for all standard systems and for use across systems.
- It reduces the costs of independent systems analysis and data modeling for each new and upgraded application systems.
- It provides a planning basis for migrating data from legacy systems to standard systems.

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A.1. Data Architecture Concepts, Continued

Architectural Framework

Data architectures are represented in a framework having three levels. They are conceptual, logical, and physical levels.

Fleet logistics conceptual data architecture is based on the following concepts:
- Subject Area
- Information Class

Fleet logistics logical data architecture is based on the following concepts:
- Logical Data Model
- Entity
- Relationship
- Attribute and Standard Data Element

Fleet logistics physical data architecture is based on the following concepts:
- Physical Data Model
- Physical File / Relational Table
- Physical Data Field / Table Column

Levels and Scope of Data Models

As shown in the following diagram, data models may be defined on different levels of detail (logical entity-relationship diagram, logical attributed data model, physical model).
Data models can also be defined for different scopes of interest, for example:
- Functional (e.g. supply)
- Organizational (e.g. Supply Center Curtis Bay)
- Application system (e.g. CM+)
- Database (e.g. Cutter System File)
- User view (e.g. screen, report)
- Data flow in a process model (e.g. alteration data)

Currently these data models may have inconsistencies in their definitions of data entities, relationships, attributes, and physical data fields.

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A.1. Data Architecture Concepts, Continued

Corporate Logistics Data Model

A corporate logistics data model is a logical data model for all of CG fleet logistics functions. As such, it will depict the baseline of entities, relationships, and attributes. It will also provide the basis for the standardized data elements ready to reuse in other data models.

A corporate logistics data model subsumes and represents all of the views listed above since it is a more comprehensive and coordinated view of the logistics business. Figure A-1 depicts the integration of the various "view" models with the corporate logistics data model and the integration of that model with the Coast Guard data model. Initially, if there is no "Coast Guard data model", the logistics data model will constitute the initial content thereof. This model will grow over time as additional business analysis and data analysis efforts are undertaken.

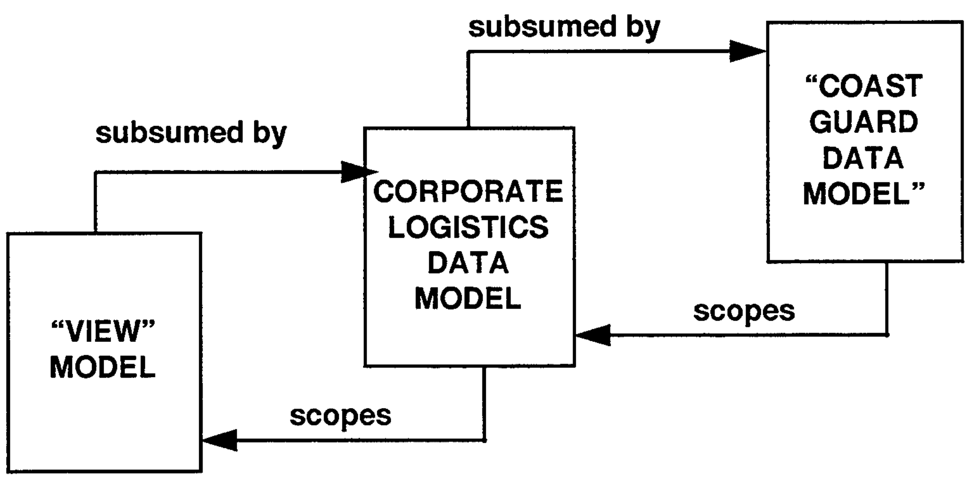

Figure A-1. Relationships of Fleet Logistics Data Model

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A.1. Data Architecture Concepts, Continued

Integration of Data Models

Integration of data within a whole corporate logistics data model or a logical model of subject area database or an application system (one or more) can be accomplished via:

- One logical/conceptual schema,
- Multiple external schema for user views, or
- Multiple internal schema for physical databases which could be located in different locations.

A.2. Three-Schema Architecture

Three-Schema Architecture

The following figure, Three Schema Architecture, depicts the "ANSI Three Schema Architecture" in simple terms. The box labeled **Conceptual Schema** represents a data administration unified view of the total information resources of the organization. The Conceptual Schema, or logical view, is the result of integrating all the information models developed to describe the various aspects of the corporate information resource.

The boxes labeled **External Schema** represent the ways in which different groups of users view the portions of the corporate information resource relevant to them. External Schema are also referred to as "user views" - i.e. when we think about the data used by a particular system.

Finally, the boxes labeled **Internal Schema** represent the actual physical storage of data, which may be stored in multiple, dispersed databases. These multiple databases may even use totally different storage methods.

The **Conceptual Schema** has an organization-wide scope, and is quite stable with respect to changes in data processing technology or specific applications. The External Schema have a narrow scope, change as applications change, but are stable with respect to data management technology. Finally, the Internal Schema change as the data management software and hardware changes, but remain relatively stable with respect to changes in applications. Internal Schema change in response to changing database access workloads, since alterations in workload usually require fine-tuning the physical database design to maximize performance.

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A.2. Three-Schema Architecture, Continued

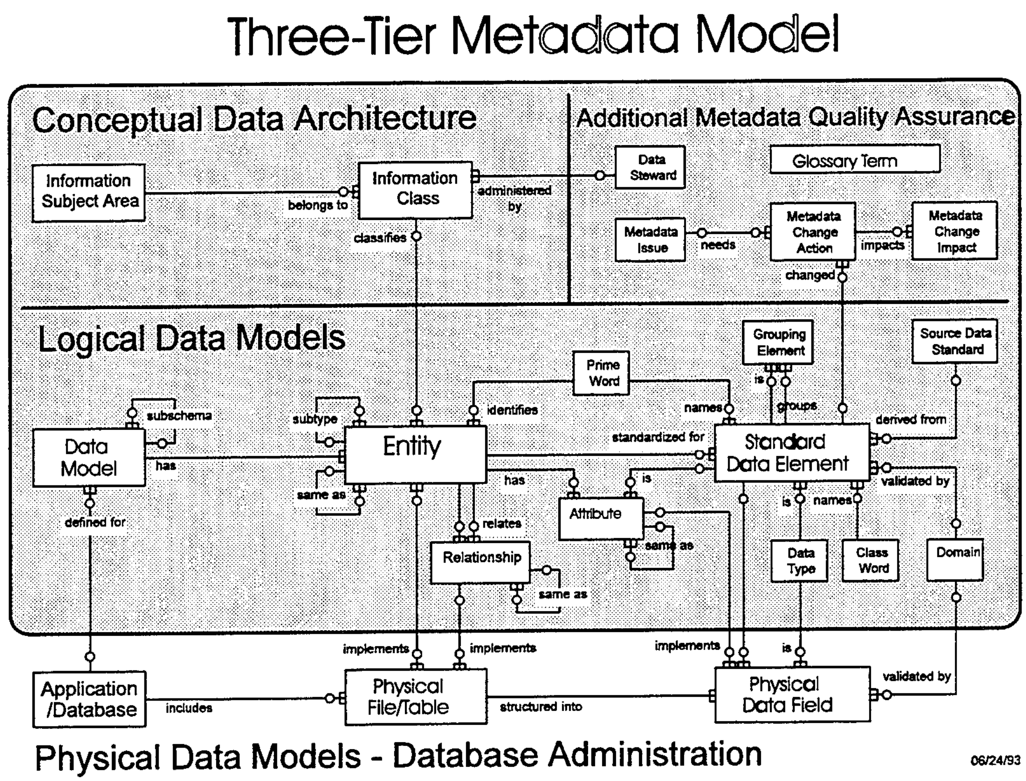

Figure A-2. Three-Schema Architecture

Metadata Models

The following four figures depict:

- • The Metadata Model for Conceptual ER Diagrams, (A-3)
- • The Meta Model for Logical Data Models (A-4)
- • The Meta Model Data for Mapping Physical Data Models (A-5)
- • The Meta Model for Data Element Standardization (A-6)

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A.2. Three-Schema Architecture, Continued

Meta Model for Conceptual ER Diagrams

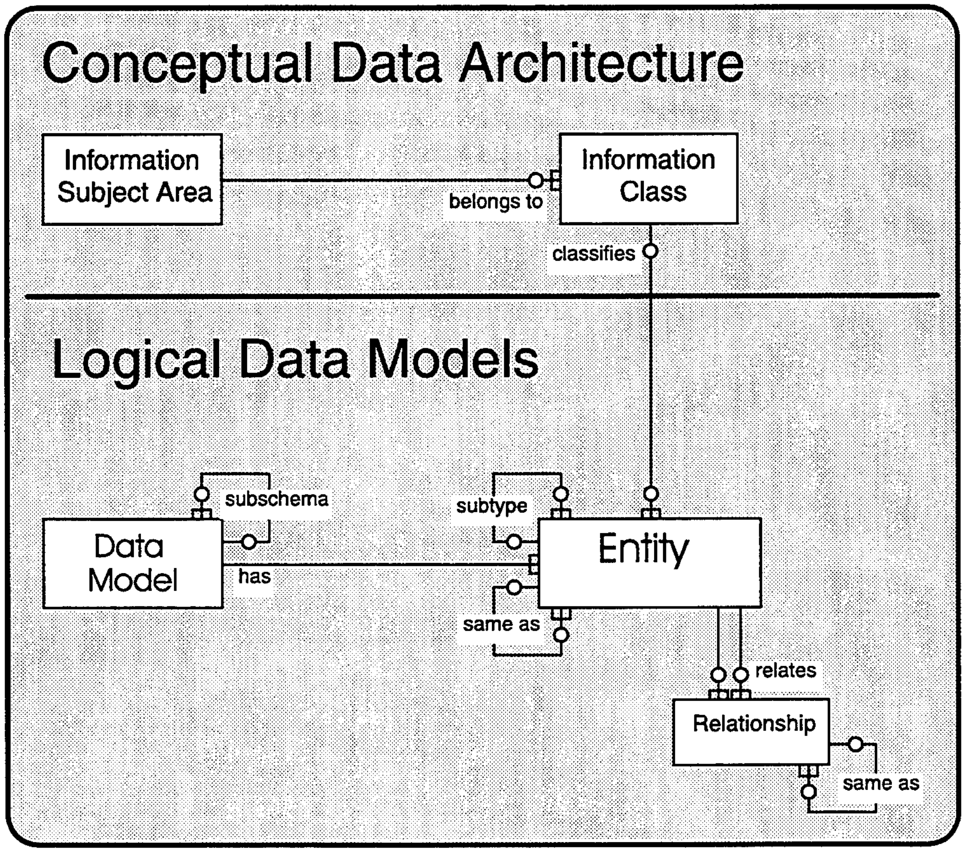

Figure A-3. The Metadata Model for Conceptual ER Diagrams

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A.2. Three-Schema Architecture, Continued

Meta Model for Logical Data Models

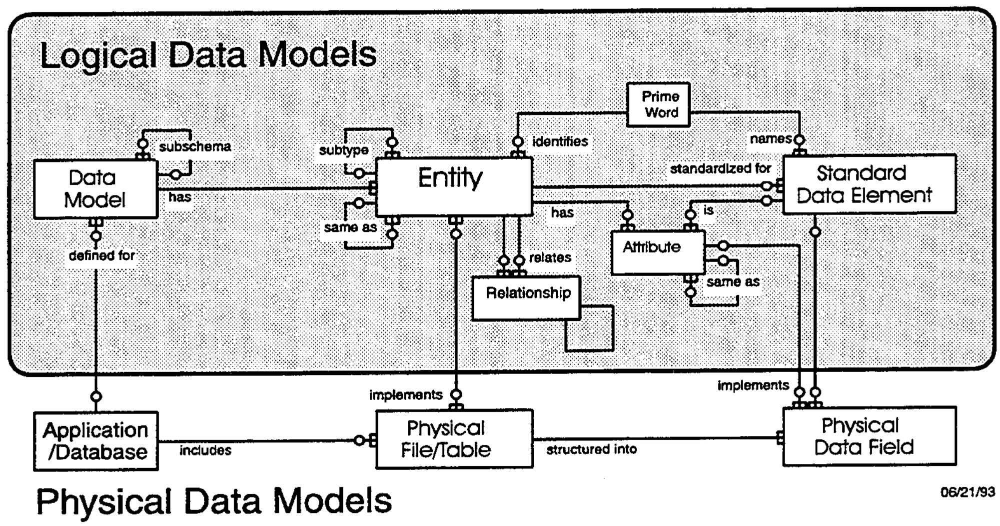

Figure A-4. Meta Model For Logical Data Models

Meta Model for Mapping Physical Data Models

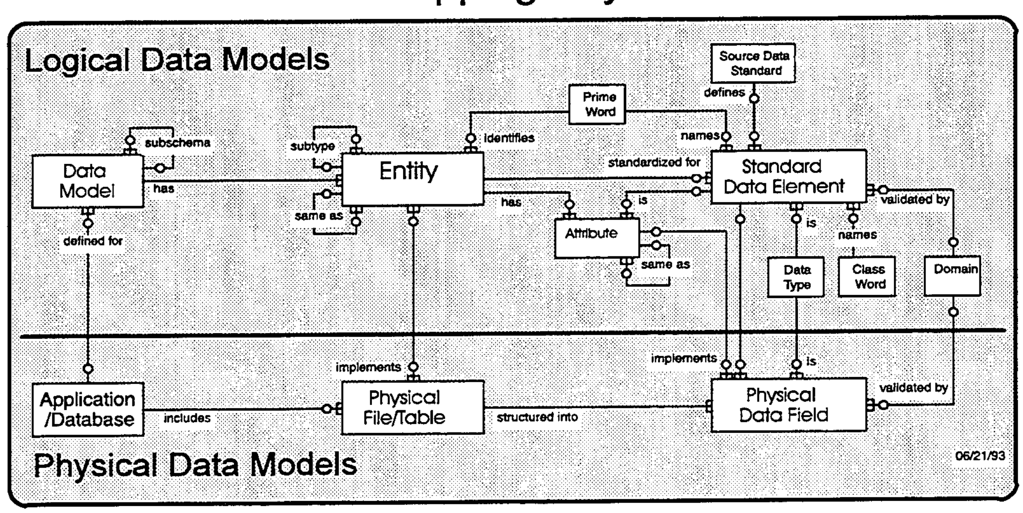

Figure A-5. Meta Model Data For Mapping Physical Data Models

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A.2. Three-Schema Architecture, Continued

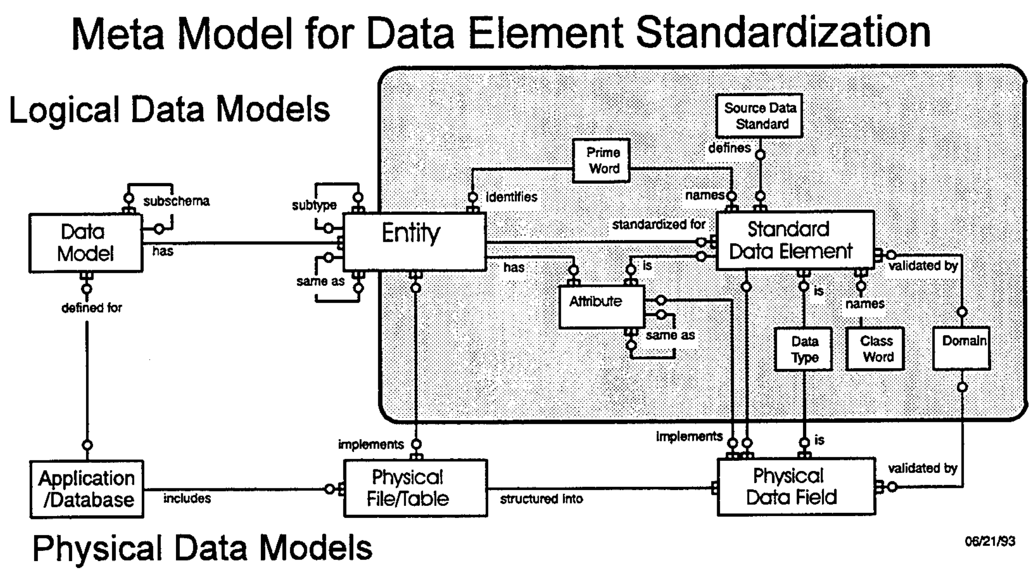

Figure A-6. Meta Model for Data Element Standardization

A.3. Data Modeling Concepts

Purpose

The following information supports the data modeling processes described in **Section 3.**

Entity Concept

An entity is a person, place, thing, concept, event, or activity about which an organization keeps information. Entities are named using singular nouns or noun phrases to emphasize the fact that they represent "things."

Like nouns, entities can represent a wide variety of rather tangible lasting objects such as people, vessels, money, buildings, or equipment installations as well as more dynamic events such as equipment casualties on CG vessels, supply requests, or work assignments. Identification of entities is a crucial step in determining and modeling the data the CG must track.

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A.3. Data Modeling Concepts, Continued

Entity Concept, continued

Entities versus instances: When we speak about entities, we are referring to *types* of entities rather than *instances* /occurrences of these entities.
For example, "Person" is a type of entity. "John Doe" is an instance of that entity type. As a convention, when we refer to the word "entity" in this document, we are actually referring to an entity type. Instances of entities will be called "*entity instances*" or just "instances".

Note that the two most important aspects of an entity from a data modeling viewpoint are:

1. Its identity, that which distinguishes one instance of the entity from all other instances through some unique identifier (e.g. Vessel Identifier),
2. Its substance, the properties / attributes that hold for the entity, and can be discovered by investigation of the entity (e.g. Vessel Length).

Qualification as an entity: All instances of an entity must have a set of common characteristics or attributes which describe them. Each instance of an entity must be uniquely distinguishable or identifiable from other instances by some or all of its attributes. Finally, entities must represent something of lasting importance to the enterprise.

Stability of entities: Unlike functions or procedures which tend to change over time, the data entities an organization deals with are relatively stable. The Coast Guard has been keeping track of vessels, equipment, provisions, maintenance work standards, money, buildings, and people since its inception.

The procedures used to collect and maintain information about these entities have changed significantly, but the entities themselves are the same.

Depiction of entities: Entities in a data model are represented by boxes with either square or rounded corners. Each entity in a data model must have a unique name. A unique number may be designated for each entity. The entity name and number (if one is designated) are placed on top of the box. Attributes of the entity may be listed within the box.

Proponency for entities: Proponency for an entity is assigned to the proponent (data steward) of the entity's *primary key* (refer to the topics *Attributes* and *Types of Attributes* below). Note that the proponent of an entity is not necessarily the proponent for all attributes of that entity.

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A.3. Data Modeling Concepts, Continued

Types of Entities

Entities are classified into categories / types by the role they have in the model. This document presents five DoD-compliant methodology entity types, and two other types that are used in some methodologies or extensions, but are not part of the DoD methodology.

Independent entity (primary entity): Also called fundamental entity, this is a basic entity type that exists. It is of interest to the organization in its own right (e.g. Vessel, Person).. An instance of such entity can be uniquely identified independently of its relationship with any other entity. Independent entities are often represented in diagrams as boxes with square corners.

Dependent entity: An entity is a dependent entity if unique identification of its instances is dependent on its relationship(s) with an instance of another entity (or multiple entities) that has to exist already. For example, an entity called Person Work Assignment is dependent on the existence of the Person entity. Dependent entities are often shown as boxes with rounded corners.

Associative entity: Also called an association, exists primarily to interrelate other entities (e.g. Vessel Crew). Associative entities are always dependent.

Generic entity (supertype entity): Also called a generic parent, instances of this entity can be divided into multiple entity subclassifications (e.g. Person). A discriminator attribute (or set of attributes) is used to determine which subclassification a particular instance belongs to.

Category entity (subtype entity): Each subclassification of a generic entity is called a category entity (e.g. Officer entity is a subtype of the Person entity). Category entities "inherit" all attributes of their generic parent entity.

Attributive entity: (non-DoD) This variation of the dependent entity type is addressed here only for completeness. It is used in some modeling techniques to describe attributes of another entity (e.g. Person Skill tracks multiple skills).

Aggregate entity: (non-DoD) Also called an aggregate object, this entity represents a collection of other entities. While the DoD methodology does not have a construct for designating aggregate objects, this concept can be useful when the need arises to show a simplified version of the model.
An aggregate entity is essentially an abstraction of a group of related entities (e.g. it may be useful to define an aggregate entity Technical Document).

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A.3. Data Modeling Concepts, Continued

Relationship Concept

A relationship is an association between two entities depicting a business rule. For example, the relationship "MAINTAINS" might be an association between a PERSON and a VESSEL. A relationship is always identified by a verb phrase that describes the relationship. The relationship name may be combined with the name of each entity to form a sentence that describes the relationship. In the example, a PERSON "MAINTAINS" a VESSEL. Two relationship names may also be defined for both relationship directions between the two entities, for example, a VESSEL "IS MAINTAINED BY" a PERSON.

Relationships are documented by the following metadata (data about data):

Relationship Metadata	Metadata Definition
Relationship name	Each relationship must be named with a verb or verb phrase. This phrase depicts the action represented in the relationship. The complete relationship name also includes the entity names in the association. The name takes the form ENTITY-VERBPHRASE-ENTITY.
Relationship definition	A complete description of the business rule which the relationship represents.
Parent entity	The parent (sometimes called the source) entity initiates the relationship between entities.
Child entity(ies)	The child (also called the target) entity or entities is the destination of the relationship from the source/parent entity.
Relationship type	Identifies the type of relationship (connection or category).
Cardinality	Indicates the upper and lower bounds on the number of times an instance of one entity is associated with another. Cardinality must be recorded for both directions in the relationship.
Category discriminator (for category relationships)	Distinguishes between categories in a category relationship.

Relationships will be evaluated for necessity to the application, reflection of the business process, business rules, and best use of information resources.

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A.3. Data Modeling Concepts, Continued

Types of Relationships

Relationships are classified according to the interaction they represent between entities. There are two major types of relationships: *connection* and *category.*

Connection Relationships

A connection relationship, also known as an aggregation relationship, is described as one of four subtypes:

Connection Relationships	Definition
Specific relationships	A connection relationship where an instance of Entity 1 may be related to zero, one, or many instances of Entity 2, but Entity 2 is related to exactly one instance of Entity 1. This is also known as a parent-child or one-to-many relationship. Entity 1 is considered the parent entity, and Entity 2 is considered the child.
Nonspecific relationships	A connection relationship where many instances of Entity 1 may be associated with many instances of Entity 2. This relationship is called many-to-many (M:M). M:M relationships cannot be directly implemented in a relational database schema. These relationships are eliminated during detailed data modeling through the introduction of associative entities.
Recursive relationships	These connection relationships, also known as reflexive relationships, are a special type of nonspecific relationship: they associate an instance of an entity with zero, one, or more instances of the same entity. Marriage is an example of recursive relationship where an instance of the entity PERSON is related to another instance of PERSON. In this case, Person 1 IS-MARRIED-TO Person 2.
Structural relationships	A structural relationship is also known as an "is part of" or "bill of materials" relationship. It defines a structural association between entities, one of which is a component of the other. For example, a cylinder IS-PART-OF an engine, which in turn IS-PART-OF a vehicle or vessel.

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A.3. Data Modeling Concepts, Continued

Category Relationships

Category relationships are also known as "entity type hierarchies", "is a kind of", or just "is a" relationships. Figure A-7 shows an example of an entity type hierarchy relationship. Category relationships represent an association of one or more entity types with a more general entity type. The more general entity is called the *generic parent* or entity supertype. The lower level entities are referred to as entity subtypes or *category entities.*

Category entities are merely special classes, supertypes or kinds of the generic parent. Attributes of the generic parent apply to all subtypes of that entity. The primary key attribute of the parent must be used as the primary key for all category entities. At least one attribute of the parent entity serves as a *discriminator* to indicate the category to which each instance belongs.

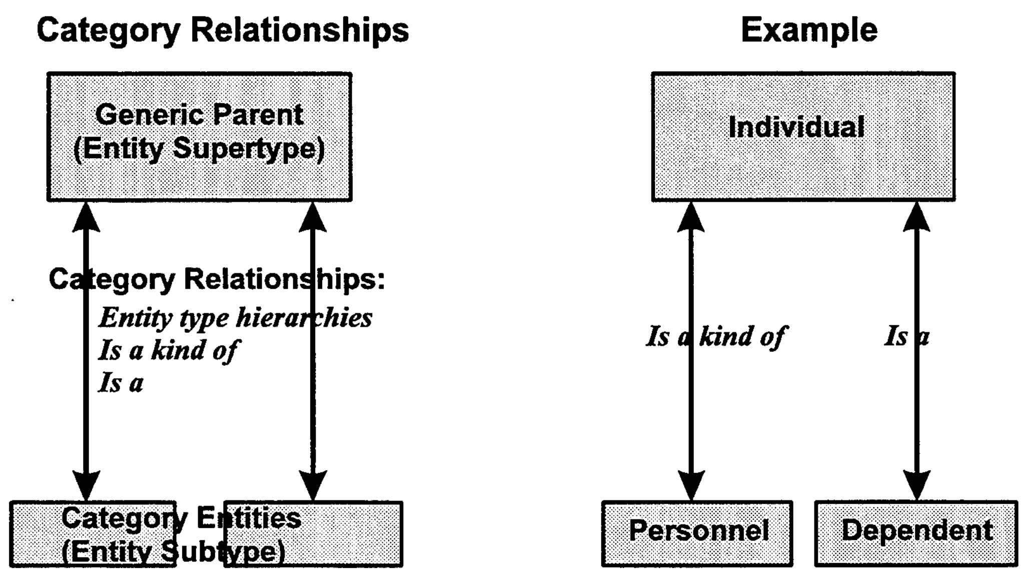

Figure A-7. Category Relationships of Entities

Cardinality of Relationship

A relationship between two entities actually represents two association directions: the association between Entity 1 and Entity 2, and the inverse association between Entity 2 and Entity 1. Instances of Entity 1 can possibly be associated with zero, one, or several instances of Entity 2. The same is true in the other direction. The property of a relationship which designates how many times an instance of one entity is associated with instances of another is called cardinality. Cardinality of a relationship is expressed in a ratio such as X:Y where X and Y are the number of instances, respectively, of Entity 1 associated with Entity 2, and Entity 2 associated with Entity 1.

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A.3. Data Modeling Concepts, Continued

Attribute Concept

All entities have properties or characteristics which can be used to describe and distinguish them. These characteristics are called entity attributes. They characterize an entity much in the same way adjectives and adverbs can be used to characterize a noun. Attributes are identified and documented by attribute name, definition, and type. The definition must describe completely what the attribute represents in the real world. An attribute should describe one and only one conceptual level entity in an integrated corporate data model. In other words, two entities can not contain the same attribute, however, multiple subtype entities could inherit an attribute from a supertype entity.

Attributes form the basis for standard data elements. A standard data element is an attribute which has been more rigorously defined. The data element definition and standardization process includes other attribute characteristics such as proponency, data value ownership, security, synchronization, and validation rules. Section 4 Standardize Data Elements describes the rules and conventions for forming and naming standard data elements.

Types of Attributes

Attribute types may be classified as being either key or non-key. On an E-R diagram, attributes are listed in the box representing the entity they describe. Figure A-8 shows the relationship of these attribute types.

Primary-key attributes: The designated attribute or set of attributes which uniquely identifies each entity instance is called the primary-key for the entity. DoD modeling convention calls for primary-key attributes to be listed at the top of the box representing the entity. A horizontal line is then drawn across the box immediately below the primary key.

Foreign-key attributes: An attribute or set of attributes that forms the primary key for another related entity is called a foreign key. Foreign key attributes that are not part of the primary key are listed below the primary key line.

Non-key attributes: An attribute that is not used as part of a key is a non-key attribute. When non-key attributes are included in the model, they appear below the primary key line. A "fully attributed data model," which is delivered at the end of requirements analysis phase, contains the known non-key attributes for each entity.

Group attributes: A set of attributes (non-key) that have been combined and given a unique name called a group attribute.

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A.3. Data Modeling Concepts, Continued

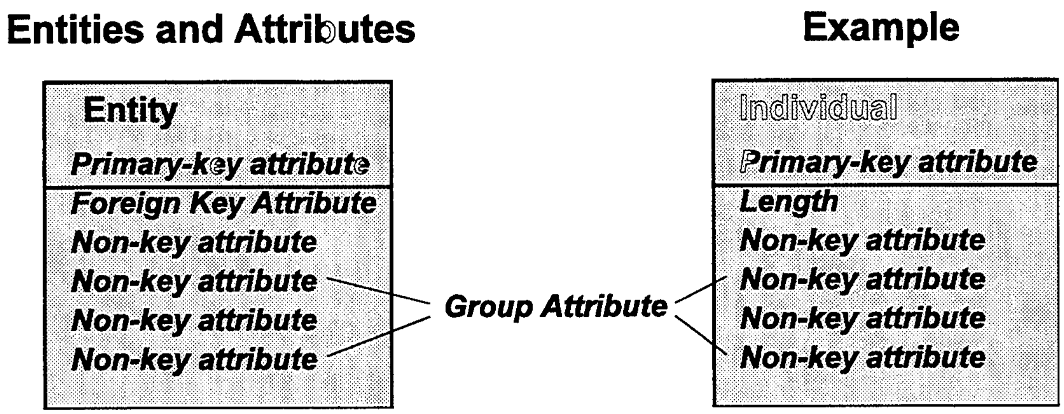

Figure A-8. Relationship of Attribute Types

APPENDIX B
CLASS WORD DESCRIPTIONS

List of Class Word Names

The following list of class word names is from the *COMDTINST 5230.42A*, and is in compliance with *DoD Data Element Standardization Procedures, DoD 8320.1-M-1, January 1993*. **Note this is the subset of both lists that complies with both standards.**

Class Word Name	Abbreviation	Description
AMOUNT	AM	A monetary value. (Includes average, balance, deviation, factor, index, level, mean, mode, scale, and yield.)
ANGLE	AN	The rotational measurement between two lines and/or planes diverging from a common point and /or line. (Includes azimuth and heading.)
AREA	AR	The measurement of a surface expressed in unit squares (two dimensional).
CODE	CD	A combination of one or more numbers, letters, or special characters substituted for a specific meaning. Represents finite, predetermined values. (Must have a specific domain.) (Includes category and status.)
COORDINATE	CN	Designation of the location of a line or plane. (Includes latitude and longitude.)
DATE	DT	The designation of a specific 24-hour period of time.
DIMENSION	DM	A measured linear distance (one dimensional). (Includes altitude, depth, diameter, elevation, height, length, radius, vertex, and width.)

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Class Word Name	Abbreviation	Description
IDENTIFIER	ID	A combination of one or more numbers, letters, or special characters that designate a specific object/entity but that have no readily definable meaning. (They must have a general domain.) (Includes designator, key, number.)
MASS	MS	The measure of inertia of a body.
NAME	NM	A designation of an object and/or entity expressed in a word or phrase.
QUANTITY	QY	A non-monetary numeric value. (Includes average, balance, count, deviation, factor, index, level, mean, median, mode, and scale.)
RATE	RT	A quantity or degree of something in relation to units of something else (e.g., miles per gallon). (Includes acceleration, density, factor, flow, force, frequency, humidity, impedance, inductance, intensity, magnitude, moment, percent, power, pressure, resistance, scale, speed, tension, torque, velocity, viscosity, and voltage.)
TEMPERATURE	TP	The measure of heat in an object or space.
TEXT	TX	An unformatted character string, generally in the form of words. (Includes category and comments.)
TIME	TM	A designation of a specified chronological point within a period.
VOLUME	VL	Measurement of space occupied by a three-dimensional figure as measured in cubic units.
WEIGHT	WT	The force with which an object is attracted toward the earth and/or another celestial body by gravitation.

APPENDIX C
DATA ELEMENT ATTRIBUTE DESCRIPTIONS

Introduction

The following alphabetical list of data element attributes should be recorded accordingly for each data element submitted as a candidate for standardization. These attributes will change over time through the change control process after recommendations are made to fleet logistics DA. Refer to the fleet logistics DA repository for the most up-to-date versions of these attributes (see **Section 6, Implement Metadata Repository,** for more information on attribute versions).

Data Element Attribute List

The following is the list of data element attributes. For each attribute there is a definition for the "domain definition," "length," "type," and "edit" associated with that data element attribute.

Note that items A through T are attributes associated with the *Class Word* component of the Data Element. Items U through AU are attributes associated with the *Prime Word* component of the Data Element.

Because Class Words are relatively static compared with Prime Words and Data Elements, it will be the rare case that you will need to modify or create a Class Word. In the automated tool to assist in Data Element creation, all of the values for the attributes of the Data Element's associated Class Word will be automatically reflected in the Data Element definition. Prime Word attributes that are bounded by their associated Class Word attrubutes (such as "definition," or "justification") will be automatically filled in with the associated Class Word attribute value, and are modifiable if necessary. Refer to **Section 6, Implement Metadata Repository**, for more informaiton on the automated tool for accessing the data repository.

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DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

A. Automated Data Entity Identifier	Definition:	Identification of the data entity this data element is associated with.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	35
	Type:	Alpha-numeric
	Edit:	Required attribute
B. Automated Standard Process Names	Definition:	The name of a standard process that adds, modifies, and deletes a standard data element.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	250
	Type:	Alpha-numeric
	Edit:	Required attribute
C. Class Word Authority Reference Text	Definition:	Freeform text that describes the authority for and/or references supporting the existence of a particular class word.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Optional attribute.
D. Class Word Name	Definition:	The word that identifies a specific category of data (e.g., date, dimension, and code, etc.) that will be represented by data values of a standard data element associated with a particular class word.
	Domain Definition:	A specific domain comprising the qualitative data values listed in procedure 4.2.1.4, *Identify the Class Word Name and Modifier(s).*
	Length:	80
	Type:	Alphabetic
	Edit:	Required attribute. The class word must be in class word table in an approved status unless creating a new class word.

Continued on next page

DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

D. Class Word Name ***(continued)***

E. Class Word Position Identifier	Definition:	The number identifying the location of the class word in the data element name.
	Domain Definition:	A general domain comprising up to two of the following integer values: 1-99.
	Length:	2
	Type:	Integer
	Edit:	Required attribute
F. Class Word Decimal Place Count Quantity	Definition:	The quantity of decimal places allowable for a given class word
	Domain Definition:	A general domain comprised the ASCII characters: 0-99.
	Length:	2
	Type:	Numeric
	Edit:	Required attribute for class word only if the class word type name is fixed-point. This attribute is displayed at the data element level and cannot be changed.
G. Class Word Definition Text	Definition:	Freeform text that represents the definition of a given class word.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Required attribute
H. Class Word Domain Definition Text	Definition:	Freeform text that describes the overall meaning or general characteristics of the domain of a particular class word.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Required attribute.

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DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

H. Class Word Domain Definition Text ***(continued)***

I. Class Word Domain Value Definition Text

	Definition:	Freeform text describes the meaning of a domain value of a given class word.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Required attribute if there are no low-range or high-range identifiers.

J. Class Word Domain Value Identifier

	Definition:	The unique identifier that represents a particular value within the domain of a specific class word.
	Domain Definition:	A general domain comprising the following ASCII characters: A-Z, 0-9, hyphen (-), point (.), slash (/), underscore (_), and ampersand (&).
	Length:	35
	Type:	Alpha-numeric
	Edit:	Required attribute for quantitative data if there are no low-range and high-range identifiers or no source list text.

K. Class Word High-Range Identifier

	Definition:	The unique identifier that denotes the highest allowable value permitted in the domain range of a given class word.
	Domain Definition:	A general domain comprising all real numbers.
	Length:	15
	Type:	Numeric
	Edit:	Required attribute if there are no domain value identifiers or source list text. If there is a high-range identifier, it must not be greater than the maximum character count quantity.

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DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

*K. Class Word High-Range Identifier (**continued**)*

L. Class Word Low-Range Identifier

L. Class Word Low-Range Identifier	Definition:	The unique identifier that denotes the lowest allowable value permitted in the domain range of a given class word.
	Domain Definition:	A general domain comprising the following ASCII characters: 0-9, point (.), and minus (-).
	Length:	15
	Type:	Numeric
	Edit:	Required attribute if there are no domain value identifiers or source list text.

M. Class Word Maximum Character Count Quantity

M. Class Word Maximum Character Count Quantity	Definition:	The maximum quantity of characters that can be stored for a domain value associated with a given class word.
	Domain Definition:	A specific domain of quantitative data values ranging from 0001-9999.
	Length:	4
	Type:	Numeric
	Edit:	Required attribute.

N. Class Word Name

N. Class Word Name	Definition:	The long standard name of a specific type of data element (class word) that describes and identifies a generic structure and domain. A class word has no organizational or application context. The structured name format comprises zero to "n" modifiers and one class word. The general name format comprises: modifier and/or modifier and/or class word.
	Domain Definition:	A general domain comprising the following ASCII characters: A-Z, hyphen (-), and space.
	Length:	80
	Type:	Alpha-numeric
	Edit:	Required attribute. The class word must be in the class word table unless the user is creating a new class word.

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DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

O. Class Word Security Classification Name	Definition:	A code that defines the security classification of the existence of a specific class word or its metadata.
	Domain Definition:	A specific domain comprising the following qualitative data values: • NATO (North Atlantic Treaty Organization) Top Secret Atomal • NATO Top Secret • Top Secret • NATO Secret Atomal • NATO Secret • Secret Restricted • NATO Confidential Atomal • NATO Confidential • Confidential • Confidential Restricted • NATO Restricted • For Official Use Only • Unclassified Sensitive • Unclassified
	Length:	25
	Type:	Alphabetic
	Edit:	Required attribute. The default is unclassified (may be changed).
P. Class Word Type Name	Definition:	The name of the data type associated with a specific class word.
	Domain Definition:	A specific domain comprising the following qualitative data values: bit-string, integer, character string, fixed-point, and floating-point.
	Length:	16
	Type:	Alpha-numeric
	Edit:	Required attribute

Continued on next page

DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

*P. Class Word Type Name (**continued**)*

Q. Information Element Justification Category Name	Definition:	The positional justification of data values within a storage field.
	Domain Definition:	A specific domain comprising the following qualitative data values: left and right.
	Length:	5
	Type:	Alphabetic
	Edit:	Required attribute for a class word and display only for a data element.
R. Information Element Standardization Authority Code	Definition:	The branch of service, government, or international organization that approved the element.
	Domain Definition:	A specific domain comprising the following qualitative data values: • ANSI American National Standards Institute • DOD Department of Defense • FIPS Federal Information Processing Standards • ISO International Organization for Standardization • NATO North Atlantic Treaty Organization • USCG United States Coast Guard
	Length:	4
	Type:	Alphabetic
	Edit:	Optional attribute
S. Information Qualitative Data Value Accuracy Number Percent Rate	Definition:	An indicator of how accurate a qualitative data value must be.
	Domain Definition:	A specific domain comprising qualitative data values (0-9) ranging from 1 to 100.
	Length:	3
	Type:	Numeric
	Edit:	Required attribute if data is qualitative.

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DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

S. Information Qualitative Data Value Accuracy Number Percent Rate ***(continued)***

T. Information Quantitative Data Accuracy Code

T. Information Quantitative Data Accuracy Code	Definition:	A character string indicating how accurate a quantitative data value must be.
	Domain Definition:	A specific domain comprising the following qualitative data values: • 1 nearest million • 2 nearest 100,000 • 3 nearest 10,000 • 4 nearest 1,000 • 5 nearest 100 • 6 nearest 10 • 7 nearest 1 • 8 nearest .1 • 9 nearest .01 • 10 nearest .001 • 11 nearest .0001 • 12 nearest .00001 • 99 none
	Length:	2
	Type:	Numeric
	Edit:	Required attribute if data is quantitative
U. Prime Word Name	Definition:	The name of the primary object (i.e., person, place, thing, or concept) of interest that a given data element describes.
	Domain Definition:	A general domain comprised the ASCII characters A-Z and hyphen (-).
	Length:	170
	Type:	Alphabetic
	Edit:	Required attribute. The prime word name is a variable length field comprising zero to n modifiers and a prime word.

Continued on next page

DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

U. Prime Word Name (continued)

V. Prime Word Name Definition Text

	Definition:	A narrative describing the context of a principal term that has a precise meaning as it relates to an entity standard.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Required attribute

W. Prime Word Steward Name

	Definition:	The designated proponent for each prime word name derived from an information model.
	Domain Definition:	A general domain comprising the following: TBS
	Length:	10
	Type:	Alpha-numeric
	Edit:	Required attribute

X. Prime Word Using Proponent Model Name

	Definition:	The name of the proponent for which the prime word name is contained in an information model.
	Domain Definition:	A general domain comprising the ASCII character set.
	Length:	10
	Type:	Alpha-numeric
	Edit:	Optional attribute

Y. Prime Word Modifier Name

	Definition:	A character string that further describes a characteristic of an object, a relationship between objects or the object itself.
	Domain Definition:	A general domain comprising the ASCII characters: A-Z, hyphen (-), and underscore (_).
	Length:	170
	Type:	Alpha-numeric
	Edit:	Optional attribute. Cannot be a class word.

Z. Prime Word Position Identifier

	Definition:	The number identifying the location of the prime word name in the data element name.
	Domain Definition:	A general domain comprising integer values 0-9
	Length:	2
	Type:	Numeric
	Edit:	Required attribute

Continued on next page

DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

Z. Prime Word Position Identifier ***(continued)***

AA. Standard Data Element Access Name	Definition:	An abbreviated name representing the specific data element. An access name is used to reference a data element in a database and must conform to the syntactical requirements of the database management system (DBMS) or programming language of the application in which a data element is used.
	Domain Definition:	A general domain comprising the following ASCII characters: A-Z, 0-9, hyphen (-), underscore (_), and period (.).
	Length:	30
	Type:	Alpha-numeric
	Edit:	Required at the time a data element is identified for use in an automated system.
AB. Standard Data Element Authority Reference Text	Definition:	Freeform text that describes the authority for and/or references supporting the existence of a particular data element.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Optional attribute
AC. Standard Data Element Comment Text	Definition:	An administrative narrative regarding a class word, standard data element, or nonstandard data element.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Optional attribute
AD. Standard Data Element Component Code	Definition:	A code that denotes the Coast Guard organization that uses a given data element within its systems
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Optional attribute

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DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

AE. Standard Data Element Data Value Source List Text	Definition:	The source in which a lengthy list of data values is enumerated.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Optional attribute. For qualitative data if you have source list text, you will not have domain value identifiers.
AF. Standard Data Element Decimal Place Count Quantity	Definition:	The quantity of decimal places allowable for a given data element.
	Domain Definition:	A general domain comprising the ASCII characters 0-9.
	Length:	2
	Type:	Numeric
	Edit:	Required attribute for class word if element type name is fixed-point. This attribute is displayed at the data element level and cannot be charged. If there is a decimal place count quantity at the class word level and the element type name is other than fixed-point, the system will display the decimal place count quantity, and it can be changed to be equal to or less than the decimal place count quantity at the class word level.
AG. Standard Data Element Definition Text	Definition:	Freeform text that represents the definition of a given data element.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Required attribute

Continued on next page

DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

AG. Standard Data Element Definition Text (***continued***)

AH. Standard Data Element Domain Definition Text

Definition:	Freeform text that describes the overall meaning or generic characteristics of the domain of a specific data element.
Domain Definition:	A general domain comprising the characters in the ASCII character set.
Length:	999
Type:	Alpha-numeric
Edit:	Required attribute (entered at class word level and displayed at data element level). It can be changed at data element level.

AI. Standard Data Element Domain Value Definition Text

Definition:	Freeform text that describes the meaning of a domain value of a given data element.
Domain Definition:	A general domain comprising the characters in the ASCII character set.
Length:	999
Type:	Alpha-numeric
Edit:	If there are domain value definitions at the class word level, they will be displayed at the data element level. If the domain value identifier is deleted, the domain value definition will be deleted at the same time. The domain value identifiers and definitions must be the same or a subset of the class word.

AJ. Standard Data Element Domain Value Identifier

Definition:	The unique identifier that represents a value within the domain of a specific data element.
Domain Definition:	A general domain comprising the following ASCII characters: A-Z, 0-9, hyphen (-), point (.), 0-9, slash (/), underscore (_), and ampersand (&). When the data element is quantitative, allowable values are 0-9 and decimal point(.).
Length:	35
Type:	Alpha-numeric
Edit:	If there are domain value identifiers, there will not be a high-range and low-range identifier. If there are domain value identifiers at the class word level, the system will display them at the data element level. They can be changed but must be the same set or subset of the class word.

Continued on next page

DATA ELEMENT ATTRIBUTE DESCRIPTIONS,

AJ. Standard Data Element Domain Value Identifier (***continued***)

AK. Standard Data Element Formula Definition Text	Definition:	Freeform text that describes the specific mathematical formula or process required to calculate the value of a given quantitative data element.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	999
	Type:	Alpha-numeric
	Edit:	Optional attribute.
AL. Standard Data Element High-Range Identifier	Definition:	A unique identifier that denotes the highest allowable quantity permitted in the range of domain values of a given data element.
	Domain Definition:	A general domain comprising the set of all real numbers.
	Length:	15
	Type:	Numeric
	Edit:	If there is a high-range identifier at the class word level, the system will display it. It can be changed to be equal to or less than the high-range identifier of the class word. If there is a high-range identifier, it must not be greater than the maximum capable of being stored according to the character count quantity of the data element.
AM. Standard Data Element Low-Range Identifier	Definition:	A unique identifier that denotes the lowest allowable quantity permitted in the range of the domain values of a given data element.
	Domain Definition:	A general domain comprising the set of all real numbers
	Length:	15
	Type:	Numeric
	Edit:	If there is a low-range identifier at the class word level, this value should be made equal to or greater than the low-range identifier of the class word.

Continued on next page

DATA ELEMENT ATTRIBUTE DESCRIPTIONS, Continued

*AM. Standard Data Element Low-Range Identifier **(continued)***

AN. Standard Data Element Maximum Character Count Quantity	Definition:	The maximum quantity of characters that can be stored for a data element
	Domain Definition:	A general domain comprising integer values ranging from 1 to 9999.
	Length:	4
	Type:	Numeric
	Edit:	Required attribute. This is a display field brought over from the class word. This field can be less than the length of the class word.
AO. Standard Data Element Name	Definition:	The long standard name that describes and identifies a given data element. Structured name format will consist of a prime word name and a class word name.
	Domain Definition:	A general domain comprising the following ASCII characters: A-Z and hyphen (-).
	Length:	250
	Type:	Alpha-numeric
	Edit:	Required attribute. Class word name indicated must be a DOD-approved element. The data element name cannot already exist in the DDRS.
AP. Standard Data Element Origin Office Name	Definition:	The name of the office that originated or proposed the metadata about a specific element.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	100
	Type:	Alpha-numeric
	Edit:	Required attribute
AQ. Standard Data Element Review Comment Text	Definition:	A narrative that provides remarks pertinent to the evaluation of a candidate element.
	Domain Definition:	A general domain comprising the characters in the ASCII character set.
	Length:	9999
	Type:	Alpha-numeric
	Edit:	Optional attribute.

Continued on next page

DATA ELEMENT ATTRIBUTE DESCRIPTIONS, Continued

AQ. Standard Data Element Review Comment Text ***(continued)***

AR. Standard Data Element Security Classification Name

Definition: A code defines the security classification of the existence of a given data element and its metadata.

Domain Definition: A specific domain comprising the following qualitative data values:

- NATO top secret atomal
- NATO top secret
- Top secret
- NATO secret atomal
- NATO secret
- Secret
- Secret restricted
- NATO confidential atomal
- NATO confidential
- Confidential
- Confidential restricted
- NATO restricted
- For official use only
- Unclassified sensitive
- Unclassified

Length: 25

Type: Alphabetic

Edit: Required attribute. Default is unclassified.

AS. Standard Data Element Steward Name

Definition: The name of the office responsible for managing the metadata of a specific data element.

Domain Definition: A general domain comprising the following ASCII characters: A-Z, hyphen (-), and 0-9.

Length: 250

Type: Alpha-numeric

Edit: Required attribute

Continued on next page

DATA ELEMENT ATTRIBUTE DESCRIPTIONS, Continued

AS. Standard Data Element Steward Name ***(continued)***

AT. Standard Data Element Timeliness Code	Definition:	An indication of how often data values must be updated.
	Domain Definition:	A specific domain comprising the following qualitative data values: • AR As Required • A Annually • BI Biennially • BM Bimonthly • BW Biweekly • D Daily • H Hourly • M Monthly • OT One Time • Q Quarterly • QDY Quarter Day • QI Quinquennially • QD Quadrennially • RT Real Time • SA Semiannually • TD Twice Daily • TH Twice Hourly • TRA Thrice Annually • TRI Triennially • Z None
	Length:	3
	Type:	Alphabetic
	Edit:	Required attribute
AU. Standard Data Element Unit Measure Name	Definition:	The word or combination of words that express the designation of how the data values for a data element are measured (e.g., Inches, Pounds, Dollars, Gallons).
	Domain Definition:	A general domain comprising the following ASCII characters: A-Z, hyphen (-), and slash (/).
	Length:	30
	Type:	Alpha-numeric
	Edit:	Required attribute for elements containing quantitative class names

APPENDIX D
FORMS AND WORKSHEETS

Introduction

The intent of this manual is that the data administration guidelines, including forms, are product-independent. Use of these forms and worksheets ensures that candidate data elements will be defined to be consistent with DoD as well as Coast Guard metadata, and industry-standard repository tools.

Note: In an automated system, a number of the fields on the *Data Element Development Worksheet and Data Element Request* form would be pre-filled based on the selected Class Word and Data Steward.

Data Element Development Worksheet and Data Element Request

TO: US Coast Guard Data Administration FROM: (Originator Address & Address Telephone)

1. TYPE OF SUBMITTAL: (Mark one) _______ New *Candidate* _____ *Archive* Candidate

_______ *Modified* Candidate

2. DATA ELEMENT NAME:
(*Mandatory*)

_______	_______	_______	_______	_______	_______	_______	_______	_______
(Modifier)	(Prime Word)	(Modifier)	(Modifier)	(Modifier)	(Modifier)	(Class Word)	(Qualifier)	(Qualifier)

Optional *Mandatory* *Optional*-----------------------------------> *Mandatory* *Optional*---------->

3. DATA ELEMENT DEFINITION TEXT:
(Enter a narrative describing the meaning of the data element name.)

4. AUTOMATED INFORMATION SOFTWARE SYSTEM IDENTIFIER

5. AUTOMATED INFORMATION SOFTWARE SYSTEM NAME

6. CLASS WORD AUTHORITY REFERENCE TEXT

7. CLASS WORD CLASS WORD POSITION IDENTIFIER

8. CLASS WORD DECIMAL PLACE COUNT QUANTITY

9. CLASS WORD DEFINITION TEXT

10. CLASS WORD DOMAIN DEFINITION TEXT

11. CLASS WORD DOMAIN VALUE DEFINITION TEXT

12. CLASS WORD DOMAIN VALUE IDENTIFIER

13. CLASS WORD HIGH-RANGE IDENTIFIER

14. CLASS WORD LOW-RANGE IDENTIFIER

15. CLASS WORD MAXIMUM CHARACTER COUNT QUANTITY

16. CLASS WORD SECURITY CLASSIFICATION NAME

17. CLASS WORD TYPE NAME

18. INFORMATION ELEMENT JUSTIFICATION CATEGORY NAME

19. INFORMATION ELEMENT STANDARDIZATION AUTHORITY CODE

20. INFORMATION QUALITATIVE DATA VALUE ACCURACY NUMBER PERCENT RATE

21. INFORMATION QUANTITATIVE DATA ACCURACY CODE

22. PRIME WORD NAME DEFINITION TEXT

23. PRIME WORD STEWARD NAME

24. PRIME WORD USING PROPONENT MODEL NAME

25. PRIME WORD POSITION IDENTIFIER

26. STANDARD DATA ELEMENT ACCESS NAME

27. STANDARD DATA ELEMENT AUTHORITY REFERENCE TEXT

28. STANDARD DATA ELEMENT COMMENT TEXT

29. STANDARD DATA ELEMENT COMPONENT CODE

30. STANDARD DATA ELEMENT DATA VALUE SOURCE LIST TEXT

31. STANDARD DATA ELEMENT DECIMAL PLACE COUNT QUANTITY

32. STANDARD DATA ELEMENT DEFINITION TEXT

33. STANDARD DATA ELEMENT DOMAIN DEFINITION TEXT

34. STANDARD DATA ELEMENT DOMAIN VALUE DEFINITION TEXT

35. STANDARD DATA ELEMENT DOMAIN VALUE IDENTIFIER

36. STANDARD DATA ELEMENT FORMULA DEFINITION TEXT

37. STANDARD DATA ELEMENT HIGH-RANGE IDENTIFIER

38. STANDARD DATA ELEMENT LOW-RANGE IDENTIFIER

39. STANDARD DATA ELEMENT MAXIMUM CHARACTER COUNT QUANTITY

40. STANDARD DATA ELEMENT ORIGIN OFFICE NAME

41. STANDARD DATA ELEMENT REVIEW COMMENT TEXT

42. STANDARD DATA ELEMENT SECURITY CLASSIFICATION NAME

43. STANDARD DATA ELEMENT STEWARD NAME

44. STANDARD DATA ELEMENT TIMELINESS CODE

45. STANDARD DATA ELEMENT UNIT MEASURE NAME

Metadata Submittal Checklist

Identification of Submittals

Use this checklist when preparing or receiving a metadata package. The data model submittal package includes the following components:

✓	Item	Description
	1	Application, project, or function name and identifier
	2	Coast Guard sponsoring organization and point of contact
	3	Function or project data administrator name and organization
	4	Submittal date
	5	Version number and date of the subset (view) standard metadata that was provided to initiate this modeling process
	6	Version number and date of the enterprise data model the proposal is being compared to
	7	Information systems within the CG with which the application shares data
	8	Information systems outside the CG with which the application shares data
	9	Information system(s) supported by the E-R Diagram
	10	Model component count
	11	CASE Tool (and version) used to generate the E-R Diagram

Checked by: ____________________________ *Date:* __________

Identifier: ____________________________

Disposition:

Fleet Logistics Data Administration Program

Metadata Submittal Identifier

Metadata Identifiers

Metadata Item Name:	Submitted as Part of: ❐ Conceptual model ❐ Logical data model ❐ Attributed data model ❐ Request for Change in Standard Metadata)	Metadata Item Type ❐ Entity, ❐ Relationship, ❐ Attribute or Data Element) ❐ Other:
Security Designation or Other Restrictions:	Date of Submittal from Developer/Requester to DA:	CASE tool and version used: *
Version number and date of the fleet logistics standard data model referenced by this request or submittal:		CDRL Number(s) of Related DBDD(s) and IDD(s): *
Other identifiers:	FL DA Request Identifier:	

* Not applicable for requests submitted by Data Stewards or Quality Action Teams.

Submitter Identifiers

System, Project, or Business Process Name:		Abbreviation:	Contract Number or Other Prog. Identifier:
Coast Guard Proponent Organization:	Program Manager's Name: *	PM Org. Code: *	PM Phone: *
Acquisition or Funding Organization: *	Acquisition Contracting POC: (COTR, Budget Manager): *	Acquisition (or Funding) Org. Code: *	Acq. POC Phone: *
Submitter Organization Name:	Data Administration Point of Contact Name:	Submitter POC Org. Code:	DA POC Phone:
Submitter Org. Address:	Config. Mgmt. POC:	CM Org. Code:	CM Phone:
Other Org. Identifiers:			

Request:

Systems Supported or Affected by Request:

Use this format as a cover sheet for submittals of metadata deliverables, resolution of discrepancies, and change requests.

Metadata Request Log

Dates:

Log-in each request with Req. ID, date, req. DA, type, and suspense date.

Request Identifier *(DA-Assigned)*	Date Rec'd	Requesting Organization	Program Name.	Request Type	Format Checked by/date	Stewards Assigned by/date	Disposition	Response Date

Retain original in DA records for 5 years.

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Fleet Logistics Data Administration Program

Metadata Discrepancy Report

Submitter Identifiers

System, Project, or Business Process Name:		Abbreviation:	Contract Number or Other Prog. Identifier:
Coast Guard Proponent Organization:	Program Manager's Name: *	PM Org. Code: *	PM Phone: *
Acquisition or Funding Organization: *	Acquisition Contracting POC: (COTR, Budget Manager): *	Acquisition (or Funding) Org. Code: *	Acq. POC Phone: *
Submitter Organization Name:	Data Administration Point of Contact Name:	Submitter POC Org. Code:	DA POC Phone:
Submitter Org. Address:	Config. Mgmt. POC:	CM Org. Code:	CM Phone:
Other Org. Identifiers:			

Metadata Identifiers

Metadata Item Name:	Submitted as Part of: ❒ Conceptual model ❒ Logical data model ❒ Attributed data model ❒ Request for Change in Standard Metadata)	Metadata Item Type ❒ Entity, ❒ Relationship, ❒ Attribute or Data Element) ❒ Other:
Security Designation or Other Restrictions:	Date of Submittal from Developer/Requester to DA:	CASE tool and version used: *
Version number and date of the fleet logistics standard data model referenced by this request or submittal:		CDRL Number(s) of Related DBDD(s) and IDD(s): *
Other identifiers:		

* Not applicable for requests submitted by data stewards or Quality Action Teams.

Fleet logistics data administration has found the following discrepancy in the metadata request identified above. Please correct the indicated discrepancy, re-check the item, and re-submit.

Discrepancy Level:

❒ Submittal Packaging, Labeling, and Format
❒ Names and Aliases
❒ Congruence with Standard Data Model
❒ Entities and Relationships
❒ Attributes and Definitions
❒ Other Metadata:

Discrepancy Found:

Recommended Remedy:

Transmittal

DA Name:	DR Response Date:	DA Signature:
Data Steward(s):		FL DA Req. ID:
DR Transmitted (Date)	Transmitted by:	Attachments:

Data Steward's Log

Steward:

Information Class:
Dates:

Log-in each request with Req. ID, date, req. DA, type, and suspense date.

Request Identifier	Date Received	Requesting DA	Program or Org.	Request Type	SME Consulted	Recommen -dation	Suspense Date	Response Date

Send copy of log to DA quarterly. Retain original in Data Steward records for 5 years.

Page ___

Data Steward's Review Response

Steward:

Information Class:
Date:

To *(DA)*:

I have reviewed your request number _________, dated _________.

Subject Matter Experts consulted:

Findings

Impact on CG Information Systems: From analysis of the available information regarding Coast Guard information systems, the proposed change will have the following effect(s):

Therefore, we recommend the following modifications to the request before further consideration for acceptance:

Legal, Standards, and Business Practice Compliance: From review of the applicable laws, regulations, standards, and professional practices, the proposed change requires the following change(s) before further consideration for acceptance:

Enterprise Metadata Standards: From the current enterprise data model as it pertains to this information class, the proposed change must be modified as follows before further consideration for acceptance:

Recommendation

In light of the above findings, we recommend the following action regarding this request:

- ☐ ***Accept*** the request as-written.
- ☐ ***Modify*** the request as indicated and re-submit.
- ☐ ***Deny*** the request for the following reason(s):

(Data steward's signature block)

Fleet Logistics Data Administration Program

Planning Worksheet for Data Conversion

Current System:

Version: Release Date: Location:

Current (Physical) Attributes			Standard (Logical) DE	Resolution			Status
File Name	Field Name	Attribute Differences	Standard DE Name	Share-able?	Direct Match?	Conver-sion Required?	Date Completed

Page ___ of ___ Prepared by: ____________________ Date: __________

APPENDIX E

GLOSSARY

Access control	The process of limiting access to the resources of an AIS only to authorized persons, processes, or devices (including other AIS's in a computer network). Access control is accomplished through use of appropriate physical, administrative, and technical controls.
Account-ability	The quality or state which enables violations or attempted violations of AIS security to be traced to individuals who may then be held responsible.
Accreditation	The official authorization that is granted to an AIS to process classified and /or sensitive information is its operational environment. Accreditation is based on the determination the AIS is operating at an acceptable level of risk, after a comprehensive security evaluation and consideration of other management factors (e.g., criticality of operations, cost to implement controls, impact on operations, planned changes in AIS operations.). *This is a security designation, separate from registration as a standard fleet logistics information system.*
Acquirer	An organization that procures software products for itself or another organization.
AIS	Automated information systems include traditional ADP systems (mainframe and minicomputers), microcomputers, office information systems, networks which connect them, and applications (software) which run on them. It is any assembly of computer facilities, equipment, personnel, software, and administrative procedures configured for the purpose of classifying, sorting, calculating, computing, summarizing, storing, and retrieving data and information with a minimum of human intervention.
Alias	The nonstandard name (that is, the nonstandard synonym) of a data element used in a specific information system at a specific location. [The alias will be used to bridge current nonstandard names used in fielded information systems or external data standards to the DoD standard data elements. As information systems are redesigned, data element aliases will be eliminated.]
Algorithm	An unambiguous procedure for solving a problem in a finite number of steps.
Approval	Written notification by an authorized representative of the acquirer that a developer's plans, design, or other aspects of the project appear to be sound and can be used as the basis for further work. Such approval does not shift responsibility from the developer to meet contractual requirements.

Architecture The organizational structure of a system or CSCI, identifying its components, their interfaces, and a concept of execution among them.

Attribute A property or characteristic of one or more entities (for example: color, weight, sex). Also, a property inherent in an entity or associated with that entity for database purposes.

Attribute value The data value given to an attribute (for example: The attribute, hair color, can have an attribute value of brown.

Audit An independent review and examination of system records and activities in order to test for adequacy of system controls, to ensure compliance with established policy and operational procedures, and to recommend any indicated changes in controls, policy, or procedures. An Internal Audit is conducted by personnel responsible to the management of the organization being audited. An External Audit is conducted by an organization independent of the one being audited.

Audit trail A set of records that collectively provide documentary evidence of processing used to aid in the reconstruction, review, and examination of the sequence of events leading towards a particular final result.

Authentication The process of establishing the validity of a claimed identity of a subject (person, process, or device) to verify the subject's eligibility to access specific AIS assets, most often categories of information.

Authorization The granting, to a person, process, or device, the right of access to an AIS asset. Authorization frequently refers to the right to access (read, write, modify, create, or delete) data.

Behavioral design The design of how an overall system or CSCI will behave, from a user's point of view, in meeting its requirements, ignoring the internal implementation of the system or CSCI. This design contrasts with architectural design, which identifies the internal components of the system or CSCI, and with the detailed design of those components.

Business data Data that supports the business processes of the enterprise.

Business rules The restrictions and logical links that describe the relationship between two or more data elements. For example, a purchase order line item can belong to only one purchase order number. A vessel name can be associated with only one hull number.

CASE Computer-Aided Software Engineering, which refers to a suite of tools to accomplish business process analysis, functional decomposition, data flow analysis, data element definition, state transition, modeling, user interface construction, and prototype code generation. Analysis, modeling, and prototyping tools are referred to as “upper CASE,” while code generation, performance analysis, middleware, conversion, and similar technical tools are referred to as “lower CASE.”

CDIF CASE Data Interchange Format, a standard that can be used for importing and exporting diagrams, data dictionary information, and CASE projects between a variety of CASE tools. CDIF was developed in 1986 by Cadre Technologies, and has since been adopted by several CASE vendors as an import - export interface.

Character-string A series of characters. The term "characters" typically includes alphabetic, numeric, and special characters (unless otherwise indicated).

Class name The specific class of data (for example: dimension, identifier, code) that is stored in data items of a standard data element associated with a particular generic element.

Class word See *Class name.*

Classified information Official information which requires protection against unauthorized disclosure in the interests of the national security of the United States, and which has been so designated in accordance with the provisions of Executive Order 12356. COMDTINST M5500.11 and M5510.21 provide CG policy and guidance for the handling of classified information. *Storage media containing classified data require external and internal markings.* Except in time of national defense emergency condition, only the Commandant (G-C) and the Chief, Office of Law Enforcement and Defense Operations (G-O) have the authority to originally classify information. See *Confidential*, *Secret*, and *Top Secret.*

Compromise Disclosure of classified information to a person who is not authorized access to that information. Compromise can occur to Level 1 or Level 2 data types. Unauthorized disclosure may have occurred unknowingly, willfully, or through negligence. The compromise of classified information presents a threat to national security.

Computer Graphics Metafile (CGM) A vendor-independent standard for transferring vector graphics between applications. CGM follows FIPS 128.

Conceptual data model A data model that is concerned with concepts and knowledge within a universe of discourse.

Conceptual schema A schema that defines a conceptual model of a database.

Confidential A Classification designation applied to information or material, the unauthorized disclosure of which could reasonably be expected to cause identifiable damage to the national security. Examples of "damage" include the compromise of information which indicates the strength of ground, air and naval forces in the United States and overseas areas; disclosure of technical information used for training, maintenance and inspection of classified munitions of war; revelation of performance characteristics, test data, design and production data on munitions or war.

Confidentiality
A concept that applies to data that must be held in confidence and that describes the status and degree of protection that must be provided for such data about individuals as well as organizations. Examples of data confidentiality include data that is subject to the Privacy Act and proprietary data that is governed by nondisclosure agreements.

Configuration
The physical and logical elements of an information system, and the manner in which they are organized and connected. The term may refer to hardware or software (including data).

Configuration item
An element of a configuration that is subject to configuration management.

Configuration management (CM)
(or Configuration Control, or Change or Version Control) A discipline applying technical and administrative direction and surveillance to (a) identify and document the functional and physical characteristics of a configuration item, (b) control changes to those characteristics, and (c) record and report change processing and implementation status.

Cross-Functional System (CFS)
An information system that supports organizational processes relating the activities of several programs or functional divisions, rather than activities of a single program.

CSCI
Computer Software Configuration Item; a unit of an information system that is defined and managed separately. Usually a CSCI is a major functional unit of a larger system.

Data
A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means. “Information” is data that is placed in a meaningful context.

Data administration (DA)
The activity that assures the cost-effective availability of data to support the cost-effective operation of functions. DoD 8320.1 describes DA as "... procedures, guidelines, and methods for effective data planning, analysis, standards, modeling, configuration management, storage, retrieval, protection, validation, and documentation." The fleet logistics DA program includes a data modeling and data element definition process, data administrators, data stewards, a tailored set of standards and guidelines, and a repository. Section 2 describes the components of the DA program.

Data administrator (DA)
The role responsible for carrying out the procedures identified in this manual.

Data aggregation
A collection of data primitives or other collected data. Data aggregation is used typically in “rolled-up” reports, summarizing a collection of comparable data values.

Data architecture The framework for organizing and defining the interrelationships of data in support of an organization's missions, functions, goals, objectives, and strategies. Data architectures provide the basis for the incremental, ordered design and development of systems of subject databases based on successively more detailed levels of data modeling.

Data contamination A deliberate or accidental act or process that results in a change in the integrity of the original data. Contamination can include inclusion of inaccurate or nonstandard values, or by introducing errors that make the data unreadable.

Data-dependent Protection of data at a level commensurate with the sensitivity level of the individual data elements, rather than with the sensitivity of the entire file which includes the data elements.

Data dictionary (a) A specialized type of database containing metadata that is managed by a data dictionary system. (b) A repository of information describing the characteristics of data used to design, monitor, document, protect, and control data in information systems and databases.

Data element A template for determining how data is described and stored. A data element name is the name for the data matching the template. A data element may have a standard name (see Standard Data Element) or a nonstandard name (see Nonstandard Data Element).

Data element alias See *alias*.

Data element standardization The process of evolving the specificity of a *standardization* data element to the point where it is unique and its name is unambiguous.

Data entity In a data model, an object (person, place, thing, or concept) about which an organization wishes to maintain information.

Data integrity The state that exists when the accuracy, completeness, timeliness, and synchronization of the data is of the highest achievable technical validity.

Data management The function of managing data used in manual or automatic information systems. It includes the activities of strategic data planning, data element standardization, information management control, data security, data synchronization, and database development and maintenance. See also *Data Administration.*

Data mapping Matching a data field in a legacy system (definition and attributes) to a standard data element name, definition, and attributes. The "map" is the document that shows the translation between legacy system fields and standard data elements.

Data Migration Matching a data field in a legacy system (definition and attributes) to a standard data element name, definition, and attributes. The "map" is the document that shows the translation between legacy system fields and standard data elements.

Data model A graphical and textual representation of the data and data relationships needed by an organization to achieve its missions, functions, goals, objectives and strategies, and to manage and operate the organization.

Data model diagram A diagram that shows a collection of data entities that belong to the user's environment along with the relationships between them.

Data quality The correctness, timeliness, accuracy, completeness, relevance, and accessibility that make data appropriate for use.

Data repository A specialized type of database containing information about data, such as meaning, relationships to other data, origin, usage, and format, and including all the important information resources needed by an organization.

Data retirement capability The means by which data is retired from operational usage, and preserved for later use.

Data security All procedures, policies, standards, and processes performed by data management personnel for the purpose of safeguarding data from unauthorized access or use. Data security is required to ensure the protection of data from unauthorized (accidental or intentional) modification, destruction, or disclosure, and that data is available when and where planned. The data administration component is the addition of access information to data element definitions, thereby ensuring that all uses of the data element will be subject to the same access restrictions.

Data synchronization The state in which the timeliness of data in the database is compatible with current requirements for that data. Typically, synchronization refers to the sequence in which data values must be updated to preserve data integrity.

Data type Specifies the categorization of an abstract set of possible values, characteristics, and set of operations for a standard data element. Integers, real numbers, character strings, and enumerations are examples of data types.

Data Type (Levels I, II, III) Three categories of data used to determine the degree of protection to be afforded data and automated information systems processing such data. This is a CG categorization which groups other recognized data/information categories for the convenience of prescribing automated information system security requirements.

a. Level 1. Classified data.
b. Level II. Unclassified, sensitive data requiring special protection; for example, Privacy Act, For Official Use Only, technical documents restricted to limited distribution.
c. Level III. All other unclassified data.

Data value Qualitative and quantitative data expressions that represent the contents of a data element.

Data view A subset of a conceptual, logical, or physical data model that is used by a process, procedure, data store, or external agent.

Database A collection of interrelated data, often with controlled redundancy, organized according to a schema to serve one or more applications. The data is stored so that it can by used by different programs without concern for the data structure or organization.

Database administration The activity responsible for the enforcement of the policies and standards established by the Data Administrator, to include providing technical support for physical database definition, design, implementation, maintenance, integrity, and security, and coordinating with computer operations technicians, system developers, vendors and users. Database administration is oriented toward technical support for databases and the effective and efficient use of information technology resources.

Database administrator The role providing technical support, including: enforcing the policies and standards set by the data administrator (DA) for the database; providing technical support for database definition, design, maintenance, and integrity; and coordinating with computer operations technicians, system developers, vendors, and users.

Database architecture The structure that portrays relationships between and among all elements of the database.

Database management system A computer based system used to establish, make available, and maintain the integrity of a database. The system may be invoked by non-programmers or by application programs to define, create, revise, retire, interrogate, and process transactions, and to update, back up, recover, validate, secure, and monitor the database.

Design Those characteristics of a system or CSCI that are selected by the developer in response to the requirements. Some will match the requirements; others will be elaborations of requirements, such as definitions of all error messages in response to a requirement to display error messages; others will be implementation related, such as decisions about what software units and logic to use to satisfy the requirements.

Developer An organization that creates or develops software products ("develops" may include new development, modification, reuse, reengineering, maintenance, or any other activity that results in software products). The developer may be a contractor or a Government agency.

Disclosure (unauthorized) The unauthorized release or access of Level I or II data to someone lacking proper clearance and a need to know. Also see Compromise.

Domain A generic or specific set of acceptable values a data value is allowed to have. Examples of domains include the alphabet, yes/no, numbers one through ten, or a set of transaction identifiers.

Enterprise An identifiable organization that works together to accomplish a mission. The scope of the enterprise is likely to evolve over time as the requirement and opportunity for information sharing increases. Use of the term "enterprise" in this manual refers exclusively to the fleet logistics enterprise, not the corporate CG enterprise as a whole.

Enterprise Model A model that shows the activities and processes that are necessary in running the enterprise.

Enterprise Data Model A description of the categories of information (entities) and the relationships of that information, as it is used throughout the enterprise. It includes definitions, attributes, and domains for the data elements in the model. When the enterprise data model is fleshed out with data element detail (the attributed data model), then designers of individual systems can select from the central standard (the enterprise data encyclopedia) the definitions they need to build their respective application data models and physical databases.

Entity A person, place, thing, concept, event, or activity about which an organization wishes to keep information.

Entity relationship diagram A modeling technique that employs diagrams to illustrate the associations or relationships among entities. E-R diagrams pictorially illustrate entities, their key attributes, and their relationships.

Evaluation The process of determining whether an item or activity meets specified criteria.

External schema A logical description of an enterprise that may differ from the conceptual schema upon which it is based in that some entities, attributes, or relationships may be omitted, renamed, or otherwise changed.

File A set of related records treated as a unit.

For Official Use Only (FOUO) Information designation assigned to unclassified official information of a privileged, proprietary, or personal nature which must be protected against unauthorized public release. Release of FOUO information must be accomplished in accordance with Freedom of Information Act directives.

Fleet logistics Fleet logistics is not a single CG organization, but is a collection of supply, maintenance, and shipboard configuration management functions that have created a community of interest across several organizations. The use of this generic term is meant to emphasize the critical nature of the information shared by fleet logistics functions.

GOSIP Government Open Systems Interconnect Profile, FIPS 146

IV&V Independent verification and validation (IV&V). Systematic evaluation of software products and activities by an organization that is not responsible for developing the product or performing the activity being evaluated.

Information The meaning that is assigned to data by persons who are aware of the known conventions used in its representation. Information is a shared resource and is not owned by any organization unless restricted by security, sensitivity, or proprietary rights.

Information class A category of logically related information that supports the things of lasting interest the organization wishes to keep data about. Information classes are created when the information requirements of a process are defined.

Information engineering The imposition of engineering discipline on the development of information/data systems. A highly disciplined approach that includes a set of standard techniques and procedures imposed on all life cycle stages.

Information processing model A model that represents the processes, entities, information flows, and elements of an organization and all relationships between these factors.

Information product A product containing information that is used for decision making or problem solving.

Information object An object that is concerned with the handling, usage, or presentation of information.

Information resource All information created manually or by automated means that an enterprise treats as a resource for decision making and problem solving. Information resources encompass information and the assets which store, process, maintain, and manage information. These resources include hardware, telecommunications, system software, applications, data, policies, and procedures.

Information resource management (IRM) The policy, action, and procedures concerning information, both automated and non-automated, that management establishes to serve the current and future needs of an enterprise. COMDTINST 5230.41 states that "information resources will be managed as any other Coast Guard assets, and will not be treated as free goods."

Internal schema A description of data as it is physically stored, including all aspects of the environment where a database resides.

Information security (or Data Security) The security that is required to assure the protection of data from unauthorized (accidental or intentional) modification, destruction, or disclosure, and that data is available when and where planned. The data administration component is the addition of access information to data element definitions, thereby ensuring that all uses of the data element will be subject to the same access restrictions.

Interface In software development, a relationship among two or more entities (such as CSCI-CSCI, CSCI-HWCI, CSCI-user, or software unit-software unit) in which the entities share, provide, or exchange data. An interface is not a CSCI, software unit, or other system component; it is a relationship among them. Interfaces that permit the exchange of data are documented in Interface Description Documents (IDD), which are reviewed by DA.

IRDS Information Resource Dictionary System (FIPS 156), a standard for evaluating the capabilities of metadata repositories. IRDS is the CG data dictionary standard.

Joint review A process or meeting involving representatives of both the acquirer and the developer, during which project status, software products, and/or project issues are examined and discussed.

Legacy system An information system that is not part of the current standard, that is, one which was inherited and must be utilized as-is. From a data administration point of view, legacy systems are likely to contain nonstandard, and therefore unreliable, data values. To be used by standard systems, the data from legacy systems must be migrated to the standard, or an interface must be mapped between the standard data resource and the legacy system.

Literal data Clear text representation of a data value that requires no translation before use.

Logical data model A representation of the information requirements of an organization. The model is formed by arranging the data into a logical structure that is independent of how the data is to be used.

Logical Database Design (LDBD) Describes the objects (entities), the attributes of those objects, and the relationships between the objects. The LDBD provides the complete, normalized set of logical tables necessary to support the functions of an organization.

Logical -to-physical data mapping This type of map links the legacy (physical) data element to the appropriate standard data element in the fleet logistics logical data model. The attribute name from the fleet logistics logical data model is given to the appropriate legacy data element. Logical-to-physical mapping is applied to legacy data elements that must be standardized (for sharing, reference, compatibility with imported data or other requirement).

Metadata Information that describes the attributes or characteristics of data such as definition, source, format, range of values, where and how the data is used, and the organization responsible for the data. Metadata is often defined as data about data; that is information about data that is stored in data dictionaries, data models, schema, and their computerized representations.

Migration system An information system for which a successor is planned or is in development, and from which data must be transferred and converted to the new standard.

Model A structured representation of physical objects, concepts, and/or a system that helps organize, clarify, and unify knowledge. A model contains a system of rules, data, and inferences presented as a formal, logical description of a system of objects and their states of affairs or interactive behavior. A model also facilitates analysis, experimentation, simulation, or comprehension.

National security information Information or material, the unauthorized disclosure if which could reasonably be expected to cause damage to the national defense, and which usually bears a security classification.

Nonstandard data element Any data element that exists in a system or application program and does not conform to the conventions, procedures, or guidelines established by the DoD Data Administrator.

Need to know The necessity for access to, knowledge of, or possession of certain information required to carry out official duties. Responsibility for determining whether a person's duties require that possession of or access to such information and whether the individual is authorized to receive it rests upon the individual having current possession, knowledge, or control of the information involved and not upon the prospective recipient(s).

Normalization The process of decomposing more complex data structures, according to a set of dependency rules, in order to derive simpler, more stable, data structures.

Personal information (or DATA) Any item of information about a person that is not a matter of public record and is usually considered to be personal to an individual. It includes but is not limited to: social security number (SSN), information about the individual's financial, family, social, and recreational affairs, the individual's medical, educational (except military training), employment, political, or criminal history, information that identifies, describes, or gives a basis for inferring personal characteristics.

Physical database The form in which the database is physically stored on the storage media, including all pointers or other means by which the data interconnects.

Physical model A physical representation of one or more real world objects.

POSIX Portable Operating System Interface Definition (FIPS 151), provides a standard for reusable code (to the system call level) that is portable across many vendors' computers and operating systems.

Privacy The right of an individual to determine for himself when, how, and to what extent information about him can be obtained or communicated to others. Privacy also includes the right of individuals to know that recorded information is accurate, pertinent, complete, up to date, and reasonably secure from unauthorized access, either accidental or intentional. Privacy Act regulations restrict the types of information that can be collected and stored about an individual, and under what conditions the information may be released.

Procedure A prescribed sequence of business actions.

Process An organized set of related tasks that use the resources of the business to produce specified results and that comprise a repeatable sequence of activities that have measurable input(s), value - added activities, and measurable output(s).

Process model A formal, logical representation of process task sequences and relationships. A process model includes representations and relationships of data inputs and outputs, process control rules, input materials, and product output. It also represents the mechanisms and other resources employed in the tasks and identifies the responsible roles.

Qualification testing Testing performed to demonstrate to the acquirer that a CSCI or a system meets its specified requirements.

Qualitative data A data value that is a non-numerical description of an entity.

Quantitative data Numerical expressions upon which mathematical operations can be performed.

Re-engineering The process of examining and altering an existing system to reconstitute it in a new form. May include reverse engineering (analyzing a system and producing a representation at a higher level of abstraction, such as design from code), restructuring (transforming a system from one representation to another at the same level of abstraction), re-documentation (analyzing a system and producing user or support documentation), forward engineering (using software products derived from an existing system, together with new requirements, to produce a new system), re-targeting (transforming a system to install it on a different target system), and translation (transforming source code from one language to another or from one version of a language to another).

Registration For fleet logistics information systems, the process by which DA indicates that the data values in a specific system meet the enterprise metadata standard, and are therefore shareable as part of the enterprise information resource.

Relationship An association between two entities.

Repository A database of knowledge about an enterprise, its goals, entities, records, organizational units, functions, processes, procedures, and application and information engineering. (A dictionary contains names and descriptions of data items, processes, data handling facilities, etc.) A repository contains: (a) complete coded representations of plans, models, and designs with tools for cross checking, correlation analysis, and validation and (b) many rules relating to knowledge stored and how to employ rule processing (the artificial intelligence technique) to help achieve accuracy, integrity, and completeness of the plans, models, and designs. Thus, it is a knowledge base that not only stores development information but also helps to control its accuracy and validity.

Repository Metamodel

Shows the three levels of metadata in the fleet logistics metadata repository:

- *Conceptual data architecture:* describes the kinds of information that are of interest to the fleet logistics enterprise.
- *Logical data model:* describes the logical entities and data elements of the enterprise in a manner that is independent of any application system or physical database design.
- *Physical data model:* describes the implementation of the logical data model in the physical database designs of fleet logistics standard application systems.

This three-tier approach is described in greater detail in **Appendix A.**

Note: This model does not match any specific commercial repository software product. It represents the requirements for three levels of metadata needed by the DA repository function. Implementation may require a series of closely linked tools rather than use of a single product.

Repository system

An information system that is used to manage the content, security, and quality of the repository in a manner that supports the management and control of enterprise information management and information technology resources.

Responsibility

A designated area of accountability.

Risk assessment

(or Risk Analysis) An analysis of assets and vulnerabilities, and threats to those assets to determine the level of risk to an AIS. Risk is "measured" either quantitatively or qualitatively by determining the impact of threats on the facility, system, information, personnel, and supported organizations or other users.

Role

A collection of responsibilities. In this manual, roles such as data administrator, configuration manager, data steward, developer, and maintainer are used to describe data administration functions that may or may not be the individual's primary job responsibility.

Requirement

(1) A characteristic that a system or CSCI must posses in order to be acceptable to the acquirer. (2) A mandatory statement in a standard or contract.

Schema

A description or global model of the structure of a database.

Secret

A Classification designation applied only to information or material the unauthorized disclosure of which could reasonably be expected to cause serious damage to the national security. Examples of "serious damage" include disruption of foreign relations significantly affecting the national security; significant impairment of a program or policy directly related to the national security; revelation of significant military plans or intelligence operations' compromise of significant military plans or intelligence operations; and compromise of significant scientific or technological developments relating to the national security.

Security
The effectiveness level of the controls which allow access to an AIS such that only properly authorized individuals, or processes operating on their behalf, will have access to read, write, create, or delete information, or interfere with the timely processing of information.

Also the measures required to protect against unauthorized (accidental or intentional) disclosure modification or destruction of AIS's and data and denial of service to process data. Components include Physical Security Administrative Security Personnel Security and Technical Security (hardware software and communications). See definitions for each item listed.

Sensitive Information
(or Data) Information that, as determined by a competent authority, must be protected because its unauthorized disclosure, alteration, loss, or destruction will at least cause perceivable damage to someone or something. Classified information, which is also sensitive information, is always designated as classified.

An abbreviated designation commonly used for unclassified, sensitive information. This type of information includes, but is not limited to, certain personal, budget, financial and management information, and information generally categorized as For Official Use Only (e.g., proprietary and privileged information). A generic designation for unclassified information that must be protected from unauthorized disclosure, alteration, loss, or destruction because it would cause perceivable damage to someone or something. This type of information includes but is not limited to certain personal, budget, financial and management information, and information generally categorized as For Official Use Only (e.g., proprietary and privileged information).

Software
Computer programs and computer databases. Note: Although some definitions of software include documentation, MIL-STD-498 limits the definition to computer programs and computer databases in accordance with Defense Federal Acquisition Regulation Supplement 227.401.

Software development
A set of activities that results in software products. Software development may include new development, modification, reuse, reengineering, maintenance, or any other activities that result in software products.

Software transition
The set of activities that enables responsibility for software development to pass from one organization, usually the organization that performs initial software development, to another, usually the organization that will perform software support.

Standard
An exact value, a physical entity, or an abstract concept established and defined by authority, custom, or common consent to serve as a reference, model, or rule in measuring quantities or qualities, establishing practices or procedures, or evaluating results.

Standard data element name
The name of a data element that was derived from a data model, and whose name and attributes were standardized according to the data standards and conventions established by the DoD Data Administrator (DA).

Standardization The process for evolving a standard. Standardization requires comparing and reconciling the details of each item with those of related items and with intended or normalized criteria.

Strategic data planning A method that takes a long-range view of the enterprise's data requirements and provides intermediate steps to achieve the long-range goal. Strategic data planning advocates separation of data from the applications that create and process the data, establishment of subject area databases, and agreement on validated standard metadata definitions. In most approaches, proactive data administration starts with strategic data planning. Strategic data planning recognizes the enterprise's data as a resource that is separate from the enterprise's organizations, functions, locations, or software systems. In addition, the strategic planners estimate the scope of the corporate data resource thirty years or more into the future, and attempt to predict which other organizations will be included in data-sharing arrangements.

Structured Query Language (SQL) A vendor-independent language for submitting data display and report requests to various database management systems. SQL follows FIPS 127-1. SQL is the CG data management and data access standard.

Subject area A rational, logical grouping of data related to a common business activity.

Synonym A word, expression, or symbol accepted as a figurative or symbolic substitute for another word or expression; that is, and alternative name for the same thing. See "Alias."

System An organization of physical, information, personnel, and managerial assets which is directed toward some common purpose. The key words are "organization" and "purpose." These provide the unity, direction, and control which distinguish systems from mere collections of resources.

Term One or more words or symbol sets referenced as a unit.

Top secret A classification designation applied only to information or material the unauthorized disclosure of which could reasonably be expected to cause exceptionally grave damage to the national security. Examples of "exceptionally grave damage" include armed hostilities against the United States or its allies; disruption of foreign relations vitally affecting the national security; the compromise of vital national defense plans or complex cryptologic and communications intelligence systems; the revelation of sensitive intelligence operations; and the disclosure of scientific or technological developments vital to the national security.

Transparent data sharing Data stored in an information system that can be transferred or accessed by another, separately developed information system transparently, that is, without analysis, interpretation, mapping, or conversion, while maintaining data quality. Transparent sharing of data requires that both systems have been designed and built using the same (standard) logical data model, data element names, and data element definitions.

Unclassified Information that does not require protection in the interest of national security, and so does not require the classification levels of Top Secret, Secret, or Confidential. Unclassified information can be subject to other restrictions, such as Privacy Act, For Official Use Only, proprietary or trade secret nondisclosure, or procurement-sensitive.

User A person or organization receiving products or services produced by an automated system either by access to the system or by other means. Users of fleet logistics standard information are stakeholders in the data administration process.

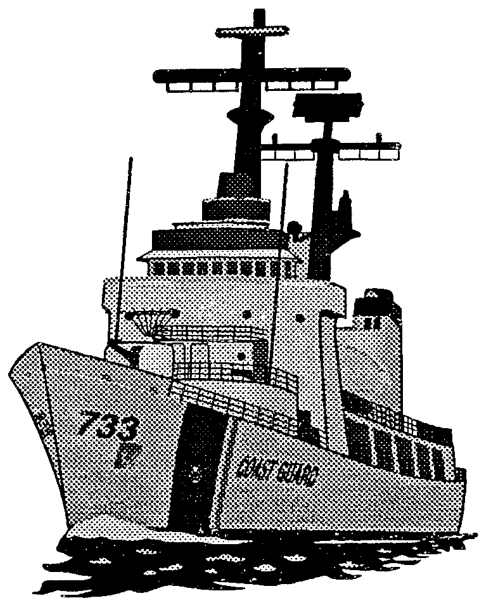
Validation The process of checking data for correctness or compliance with applicable standards, rules, and policies.

View An external relation consisting of attributes retrieved or derived from other attributes stored in one or more base relations and joined, as defined, in the view relation.

Vocabulary All the words, abbreviations, or phrases of a language.

Fleet Logistics System

Data Administration Plans and Procedures Manual



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