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COMMAND CONTROL
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MEMORANDUM FOR GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
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DEPUTY ASSISTANT SECRETARY OF THE NAVY (C4I/EW/SPACE PROGRAMS)
DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE (COMMUNICATION, COMPUTERS AND SUPPORT SYSTEMS)

SUBJECT: Department of Defense (DoD) Enterprise Data Model Development, Approval, and Maintenance Procedures (DoD 8320.1-M-x)

The development and implementation of data standards is one of the Department's highest priorities and a key element of the Defense information management program. Inherent in DoD data standardization is the development of a DoD Enterprise Data Model.

Informal coordination of draft procedures to develop, approve, and maintain a DoD Enterprise Data Model has been completed and the majority of the comments incorporated into the attached manual. Guidance from the Assistant Secretary of Defense for Command, Control, Communications and Intelligence on rapid data standardization also has been included in the document.

The attached procedures are provided as interim guidance, and should be applied when developing data standards that are to become part of the DoD Enterprise Data Model. In accordance with DoD Directive 8320.1, these procedures apply to all data standards across the DoD except those unique to cryptologic activities. These procedures will be combined with the "Data Element Standardization Procedures" (DoD 8320.1-M-1) and coordinated.

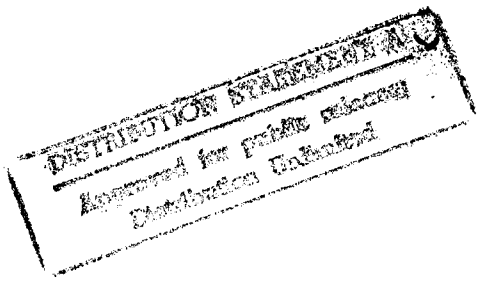
C Kendall
Cynthia Kendall
Deputy Assistant Secretary of Defense
(Information Management)

Attachment

DoD 8320.1-M-x

Department of Defense

DOD ENTERPRISE DATA MODEL DEVELOPMENT, APPROVAL, AND MAINTENANCE PROCEDURES



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14. Abstract This manual is issued under the authority of DoD Directive 8320.1, "Department of Defense Data Administration", 26 September 1991. It prescribes procedures for the development, approval, and maintenance of the DoD Enterprise Data Model and management necessary to support the polices of DoD Data Administration as established by DoD Directive 8320.1

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FOREWORD

This manual is issued under the authority of Department of Defense (DoD) Directive 8320.1, "Department of Defense Data Administration," 26 September 1991. It prescribes procedures for the development, approval, and maintenance of the DoD Enterprise Data Model and management necessary to support the policies of DoD Data Administration as established by DoD Directive 8320.1.

This manual applies to the Office of the Secretary of Defense (OSD), the Military Departments, the Chairman of the Joint Chiefs of Staff and Joint Staff, the Unified Commands, the Inspector General of the Department of Defense (IG DoD), the Defense Agencies, and the DoD Field Activities (hereafter referred to collectively as "the DoD Components"). Its provisions are applicable to all new initiatives to develop, modernize, or migrate information systems, whether automated or non-automated.

This manual is effective immediately; its use by all DoD Components is mandatory.

Send recommended changes to the manual to:

Center for Software
Chief, Data Administration Department
5600 Columbia Pike
Falls Church, VA 22041

The DoD Components may obtain copies of this manual through their own publications channels. Defense contractors and other Federal Agencies may obtain copies from:

Defense Technical Information Center (DTIC)
Building 5, Cameron Station
Alexandria, VA 22034 - 6145
Commercial telephone: 1-800-225-DTIC (1-800-225-3842)

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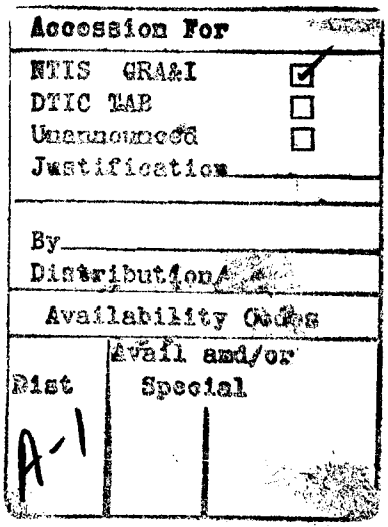

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REFERENCES

(a) "DoD IDEF Workshop Participant Guide," Department of Defense Data Administration Program Management Office, July 1, 1992

(b) DoD Manual 8320.1-M-1, "Data Element Standardization Procedures," January 1993 authorized by DoD Directive 8320.1, September 16, 1991

(c) DoDD 8000.1, "Defense Information Management (IM) Program," October 27, 1992

(d) DoD Manual 8320.1-M, "Data Administration Procedures," March 1994 authorized by DoD Directive 8320.1, September 26, 1991

(e) DoD Directive 8320.1, "DoD Data Administration," September 26, 1991

(f) DoD Directive 8120.1 "Life-Cycle Management (LCM) of Automated Information Systems (AISs)," January 14, 1993

(g) DoD Directive 5025.1-M, "DoD Directives System Procedures," December 1990

(h) NIST Special Publication 500-173, "Guidelines to Data Administration," October 1989

(i) FIPS PUB 184, "Specifications for Integration Definition for Information Modeling (IDEF1X)," December 21, 1993

(j) Memorandum for Secretaries of the Military Departments, "Accelerating Department of Defense (DoD) Data Standardization," May 23, 1994

(k) "Defense Data Repository System (DDRS) End User Manual," September 1, 1994

(l) DoD Directive 5137.1, "Assistant Secretary of Defense for Command, Control, Communication, and Intelligence," February 12, 1992

(m) DoD Directive 8120.2 "Automated Information Systems (AISs) Life-Cycle Management (LCM) Process, Review, and Milestone Approval Procedures," January 14, 1993

(n) Paul A. Strassmann, Memorandum for Directors of the Defense Agencies, "Interim Management Guidance on Functional Process Improvement (DoD 8020.1-M), Change 1," January 15, 1993

DEFINITIONS

1. Activity Models. (See Modeling)

2. Alternate Key. Attribute(s) that can be used to uniquely identify an entity instance, but that is not designated as part of the entity primary key. DoD IDEF Workshop Participants Guide (reference (a)).

3. Approved Standard Data Element. A standard data element that has been coordinated through the standardization process and approved for use in DoD systems and models. DoD 8320.1-M-1 (reference (b)).

4. Associative Entity. An entity that inherits its primary key from two or more other entities and documents multiple associations (relationships) between those entities. The primary use of associative entities is to reconcile non-specific (many-to-many) relationships between two or more entities. An associative entity has no unique key attributes; if it does, it becomes an attributive entity. The difference between an associative entity and an attributive entity is the number of identifying relationships to the parent. An attributive entity has only one identifying relationship, and an associative entity has more than one. An associative entity is also known as an intersecting entity.

5. Attribute. A property or characteristic of an entity or entity class. For example, COLOR, WEIGHT, GENDER. All attributes describe an entity. There are two types of attributes: key and non-key.

a. Key Attribute. An attribute that may be used to uniquely identify an instance of an entity or entity class. There are three types of key attributes: primary keys, alternate keys, and foreign keys.

b. Nonkey Attribute. Attribute or group of attributes that describe an entity but that can not be used to uniquely identify the entity or relate the entity to another entity.

6. Attributive Entity. An entity that accommodates repeating attributes for the parent entity. Additional attributes are appended to the key structure of the attributive entity that do not appear in the key structure for the parent entity. These additional key attributes uniquely distinguish between multiple values for the repeating attributes. An attributive entity is a dependent entity with exactly one identifying parent. Attributive entities are created to support the first rule of normalization: eliminating repeating attributes from the parent entity. Also known as a characteristic entity.

7. Business Rule. A statement or fact that defines the constraints governing how data are processed (e.g., referential integrity constraints for add, change, and delete transactions against records in a database). Business rule statements describe these constraints. For example,

referential integrity constraints can be derived from relationships defined in a data model. For this type of constraint, each business rule statement should be constructed so that the parent entity name is the subject, the relationship name is the verb phrase, and the child entity name is the object.

8. Candidate Identifier. (See Attribute - Key Attribute & Candidate Key)

9. Candidate Key. Property or characteristic of an entity that is considered to be a potential primary key. Also known as candidate identifier.

10. Cardinality. A statement of the number of entity instances that may or must participate at each end of a relationship. (See Relationship). Cardinality is the combination of degree and nature.

a. Degree. An expression describing the number of instances from one entity occurrence that may be associated to another entity occurrence. Expressions include one (1), many (N or M), or predetermined number (e.g., 2). For example, Each EQUIPMENT ITEM supports zero, one, or many WEAPON SYSTEMS(s); Each WEAPON SYSTEM *is* supported *by* one or many EQUIPMENT ITEMS(s). Entity relationships degrees are generally described as one-to-one, one-to-many, or many-to-many. Specific numbers (two through infinity) are optional.

b. Nature. Expresses whether the association from one entity occurrence to another entity occurrence is mandatory (obligatory) or optional (nonobligatory). Expressions include one (1) for mandatory and zero (0) for optional. If, for example, EQUIPMENT ITEM supports zero, one or many WEAPON SYSTEMS(s), then WEAPON SYSTEM is in optionally related to EQUIPMENT ITEM; If WEAPON SYSTEM is supported by one or many Equipment Item(s), then EQUIPMENT ITEM is in a mandatory relationship to WEAPON SYSTEM. An ambiguous many-to-many relationship is permitted only at the entity-relationship level of a data model. Dependency cannot be discerned in nonspecific relationships. It must be identified at the key-based level.

11. Category Discriminator. An attribute that determines to which category a generic parent instance belongs.

12. Category Entity. A subset of the instances of a single parent entity (referred to as a generalization entity or generic parent). The subset inherits common attributes and/or relationships from the parent, including its primary keys (which become foreign keys in the category entity). The category entity contains additional attributes and/or relationships that are related to the parent but that are distinct from other related subsets. It also contains some attributes and/or relationship(s) that apply only to instances of the subset and not to all instances of the parent. Category entities are used to help migrate a data model to fourth-normal form, because they eliminate null attribute values in the parent entity. Also known as subentity or secondary entity.

13. Characteristic Entity. (See Attributive Entity)

14. Child Entity. The entity to which a relationship contributes a foreign key.

15. Class Word. A word in the name of a data element (attribute) describing the category to which the data element belongs, e.g., "quantity," name," "code." The word establishes the general structure and domain of a standard data element. (NBS Special Pub 500-149)

16. Composite Attributes. Composite attributes describe multiple concepts. When an attribute is formulated to describe multiple concepts, its definition and meaning can easily partially overlap with the definition of another attribute. This redundancy sets the stage for data inconsistencies, increases system maintenance costs, and restricts the use of a data element to a narrow range of applications.

17. Conceptual Schema. (See Schema - Conceptual Schema)

18. Data. A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means. (FIPS Pub 11-3)

19. Data Administration. That function of the organization that oversees the management of data across the enterprise and is responsible for central information planning and control.

20. Data Administrator (DAd). A person or group that ensures the utility of data used within an organization. Responsibilities include defining data policies and standards, planning for the efficient use of data, coordinating data structures among organizational components, performing logical database designs, and defining data security procedures.

21. 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 based on successively more detailed levels of data modeling. (DoD 8320.1-M)

22. Data Definition Language (DDL). The language used to define physical data structures in a database management system.

23. Data Dependence. The property of data where the existence of the data depends on the existence of other pieces of data.

24. Data Dictionary. A specialized type of database containing metadata that are managed by a data dictionary system; a repository of information describing the characteristics of data used to design, monitor, document, protect, and control data in information systems and databases; an application of a data dictionary system. (NBS Spec Pub 500-152)

25. Data Element. A named identifier of each of the entities and their attributes that are represented in a database (DoD 8320.1-M).

26. Data Element Standardization. The process of documenting, reviewing, and approving unique names, definitions, characteristics, and representations of data elements according to established procedures and conventions. (DoD 8320.1-M-1)

27. Data Entity. See Entity

28. Data Independence. A property of data where the structure and format of the data are independent of the applications that access the data.

29. Data Integrity. A property of data in which all assertions (accurate, current, consistent, complete) hold.

30. Data Model. In a database, the user's logical view of the data in contrast to the physically stored data or storage structure. The organization of data described in a manner that reflects the information structure of an enterprise (DoD 8320.1-M). (See also Modeling - Data Models)

31. Data Object. A term used to refer to either an entity or an attribute.

32. Data Requirements. A specification of data needed to support a business function. Data models and data element characteristics (e.g., name and definition) required in proposals for standard data elements are used to document what data the organization needs to support its business or mission.

33. Data Steward. The person or group that manages the development, approval, creation, and use of data associated with a specific prime word managed within a specified functional area. It is the data steward's responsibility to support cross-function and review of the data so they can be used to satisfy data requirements throughout the enterprise. (DoD 8320.1-M-1)

34. Data Structure. The logical relationships that exist among units of data and the descriptive features defined for those relationships and data units; an instance or occurrence of a data model. (NBS Spec Pub 500-152)

35. Database. A collection of interrelated data, often with controlled redundancy, organized according to a schema to serve one or more applications; the data are stored so that they can be used by different programs without concern for the data structure or organization. A common approach is used to add new data and to modify and retrieve existing data. (FIPS Pub 11-3)

36. Database Administrator (DBA). A person or group that enforces policy on "how," "where," and "in what manner" data are stored and maintained in each database. Provides

information to the data administrator on organizational use of data within the subject database. (DoDD 8000.1)

37. Database Management System. A computer-based system used to establish, make available, and maintain the integrity of a database, that may be invoked by nonprogrammers 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. (FIPS Pub 11-3)

38. Degree. (See Cardinality)

39. Dependent Entity. An entity that depends on the existence of one or more other entities for its identification. The entities on which it depends can be either independent or dependent. The primary key for a dependent entity contains foreign keys contributed by the entities on which it depends. There are three basic types of dependent entities: category entity, attributive entity, and associative entity.

40. Derived Data. Derived attributes represent the results of computational operations performed on other attributes. The computations may involve algorithms supported by two or more attributes within a single entity instance, or algorithms summarizing attribute values across multiple entity instances within a single entity or across multiple entities.

41. Domain. The set of permissible data values from which actual values are taken for a particular attribute or specific data element. In a relational database, all of the permissible tuples for a given relation. (FIPS Pub 11-3)

42. Enterprise. The highest level in an organization; includes all missions and functions.

43. Enterprise Model. A high-level model of an organization's mission, functions, and information architecture necessary for running the enterprise. The model consists of an activity model and a data model.

44. Entity. An object about which the organization wishes to collect information; a person, place, thing, event, or concept of importance to the enterprise that is singular, exclusive, and identifiable. An entity is also known as an entity type or entity class.

45. Entity Class. (See Entity)

46. Entity Type. (See Entity)

47. Entity Relationship Diagram (ERD). The graphic representation of a data model that shows the major entities, entity relationships, and often the attributes that support all or part of an enterprise.

48. External Schema. (See Schema - External Schema)

49. Facilitator. A person whose declared role is to guide a meeting toward its objective (e.g., development of activity and data models for an organization).

50. Foreign Key. An attribute or group of attributes in an entity that are inherited from another entity through a relationship. Foreign keys show relationships between child or dependent entities and parent entities. The foreign key may or may not become part of the primary key of the child or dependent entity.

51. Fully Attributed Model. A third normal-form information model that includes all entities, attributes, relationships, and integrity rules needed by the functional activity being modeled.

52. Functional Activity. The primary subdivision of a functional area, made up of a collection of processes that can be managed together using policies and procedures not specifically applicable to other functional activities within the functional area. (DoD 8320.1-M)

53. Functional Area. A functional area encompasses the scope (the boundaries) of a set of related functions and data for which an OSD Principal Staff Assistant or the Chairman of the Joint Chiefs of Staff has DoD-wide responsibility, authority, and accountability. A functional area (e.g., personnel) is composed of one or more functional activities (e.g., recruiting), each of which consists of one or more functional processes (e.g., interviews). Also known as a business area. DoDD 8000.1 (reference(c)).

54. Functional Area Data Model. Business area model of data requirements that support specific information needs within or between the major functional areas of an enterprise. It is used for business area analysis to support functional area integration.

55. Fundamental Entity. (See Independent Entity)

56. General Domain. A specified range of values a data element is permitted to have. In general, these domains are too large to be completely enumerated easily. For example: The general domain of a data element named "PERSON BIRTH DATE" is any date falling in the range 1 Jan 1850 through the current date. Although the domain is constrained (e.g., possibly to refer to only people who are currently alive), there is a large number of values.

57. Generalization Entity. (See Generic Parent)

58. Generic Element. A generic element is the part of a data element that establishes a structure and limits the allowable set of values of a data element. A generic element has no functional or application context other than to define a general class of data and ensure consistency in structure and domain. (DoD 8320.1-M-1)

59. Generic Parent. The entity at the top of any level of a hierarchy of entities. The parent entity of a categorization relationship.

60. Group Attribute. An attribute that is a collection of other attributes called constituents.

61. IDEF. (See Integrated Computer Aided Manufacturing Definition)

62. IDEF0. A standard methodology used for modeling an enterprise's processes and activities.

63. IDEF1X. A standard methodology used for modeling an enterprise's data requirements.

64. Identifying Relationship. A relationship in which all primary key attributes of the parent entity become part of the primary key of the child entity.

65. Independent Entity. An object of interest to the enterprise that can be identified using primary key attributes that characterize the object without referring to Foreign Keys migrated from any other entity. Also known as a fundamental, principal, primary, independent entity class, and supertype.

66. Independent Entity Class. (See Independent Entity)

67. Information. Any communication or reception of knowledge through facts, data, or opinions, including numerical, graphic, or narrative forms, whether oral or maintained in any medium including computerized databases, paper, microform, or magnetic tape. The meaning that is assigned to data by persons who know the conventions used in its representation.

68. Information Engineering. A disciplined methodology that creates an organization-wide architectural framework for application and database development.

69. Information Model. A model that represents the processes, entities, information flows, and elements of an organization and all relationships between these factors. DoD 8320.1-M (reference (d)).

70. Information System. The organized collection, processing, maintenance, transmission, and dissemination of information in accordance with defined procedures, whether automated or manual. (DoD Directive 5200.28, as modified by OMB Cir A-130)

71. Integrated Computer-Aided Manufacturing Definition (IDEF). A technique used for modeling an enterprise's processes and data.

72. Integrity Constraint. A statement in an information model that specifies one or more assertions regarding how specific instances of data objects are captured and managed.

73. Internal Schema. (See Schema - Internal Schema)

74. Intersecting Entity. (See Entity - Dependent, and Associative Entity)

75. Key Attribute. (See Attribute)

76. Logical Data Model. A model of the data that represents the inherent structure of that data and is independent of individual applications of the data and also of the software or hardware mechanisms employed to represent and use the data.

77. Metadata. Information describing the characteristics of data; data or information about data; descriptive information about an organization's data, data activities, systems, and holdings. (NBS Spec Pub 500-152)

78. Methodology. The principles, practices, etc., of orderly thought or procedure applied to a particular branch of learning (i.e., data modeling). A set of standards and procedures used to guide the development of a data model.

79. Modeling. Application of a standard, rigorous, structured methodology to create and validate a physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process.

a. Activity Models. Models of the processes that make up the functional activity showing inputs, outputs, controls, and mechanisms through which the processes of the functional activity are (or will be) conducted.

b. Data Model. In a database, the user's logical view of the data in contrast to the physically stored data or storage structure. A description of the organization of data in a manner that reflects the information structure of an enterprise.

80. Nature. (See Cardinality)

81. Non-identifying Relationship. A relationship in which the primary key of the parent entity does not become part of the primary key of the child entity.

82. NonKey Attribute. (See Attribute)

83. Non-standard 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 organization. (DoD 8320.1-M-1)

84. Non-specific Relationship. A relationship in which no foreign keys are contributed, and in which many of one entity are related to many of another entity.

85. Normalization. The process of removing inaccurate, inconsistent, and/or overly complex assertions from an information model.

86. Null. Having no value. An attribute can have a null value if the value is unknown or the value is not applicable.

87. Parent Entity. The entity from which a relationship receives a foreign key.

88. Physical Data Model. A representation of the technologically independent requirements in a physical environment of hardware, software, and network configurations representing them in the constraints of an existing physical environment. (FIPS Pub 11-3)

89. Primary Entity. (See Entity - Independent Entity)

90. Primary Key. An attribute or group of attributes chosen to uniquely identify an entity. Primary keys are never null. Each entity or entity class has one and only one primary key. A primary key is migrated through relationships to become a foreign key in child or dependent entities. Primary keys are also known as determinants or identifiers.

91. Prime Word. A word included in the name of a data entity that represents the logical data grouping (in the logical data model) to which it belongs. (NBS Spec Pub 500-149)

92. Principal Entity. (See Entity - Independent Entity)

93. Relationship. A meaningful association between two or more entities. In semantic data modeling, relationships are labeled as verbs or verb phrases. For example: EQUIPMENT ITEM *supports* WEAPON SYSTEM; WEAPON SYSTEM *is supported by* EQUIPMENT ITEM. A connection relationship has cardinality and may be either a Specific Relationship or a Nonspecific Relationship (See Specific Relationship and Nonspecific Relationship). Basic components of a relationship are The Relationship Name, Degree of Cardinality, and Nature of Cardinality. (See Relationship Name and Cardinality)

94. Relationship Name. Always a verb or verb phrase; the label given to a relationship. The name of the relationship reflects the activity or function that takes place between two entities. When read in sequence (entity-relationship-entity), a statement is made about the organization operations. Attributive and category entities will always be associated with at least one independent entity; and an associative entity will have a minimum of two related parent entities. Also known as a relationship label.

95. Schema. Descriptive representation of data and/or data requirements that describe conceptual, internal, or external views of information/data needs.

a. Conceptual Schema. A descriptive representation of data and data requirements that support the "logical" view or data administrator's view of the data requirement. This view is represented as a semantic model of the information that is stored about objects of interest to the functional area. This view is a single integrated definition of the data and is unbiased toward any single application of data and is independent of how the data are physically stored or accessed. An attributed, normalized data model is also referred to as conceptual schema. The conceptual schema is used for data standardization and database design. The conceptual schema is used to support application integration. It provides a consistent definition of the meanings and interrelationships of the data used to integrate, share, and manage the integrity of data within and across applications.

b. Internal Schema. A descriptive representation of data and data requirements as they are physically stored and includes all aspects of the environment in which a database is to reside. The internal schema is often referred to as the "physical" view or database administrator's view of the data requirement. This view, also known as a physical database design, is described by the data definition language (DDL) and physical storage methods used to implement the data requirements described under a conceptual schema. The denormalization of conceptual schema data requirements may occur in connection with system performance and technological constraints. Any denormalization must be coordinated with the manager of the conceptual schema (i.e., Data Administrator).

c. External Schema. A descriptive representation of data and data requirements that supports the "user" view or application view of the data. This view is represented by reports, transactions, and screens that are designed to support the individual worker in the performance of tasks or activities. The external schema may differ from the conceptual schema upon which it is based: some entities, attributes, or relationships may be omitted, renamed, or otherwise transformed. The design and development of an external schema is equivalent to the design and development of the human-computer interface (HCI) for the automatic information system (AIS) and supports integration at the local and personal levels of the information management integration architecture.

96. Secondary Entity. (See Category Entity)

97. Specific Domain. The precise set of possible values for a data element (attributes).

98. Specific Relationship. A relationship between two entities in which dependency can be determined and keys migrated from the parent to the child. The cardinality from the parent to child may vary, but the child may be related to one and only one parent. Specific relationships are the only type permitted at the key-based and fully attributed levels. DoD IDEF Workshop Participant Guide (reference (a)).

99. Standard Data Element. A data element that has been approved formally in accordance with the organization's data element standardization procedures. (DoD 8320.1-M-1)

100. Strategic Data Model. High-level model of data requirements that support the information needs across the corporate enterprise. It is used for strategic data planning and policy purposes.

101. Subentity. (See Category Entity)

102. Supertype Entity. (See Entity - Independent Entity)

103. Technique. The working methods or manner in which rules, syntax, semantics are applied within a given methodology.

104. Tuple. A row in a relation.

105. View. An external schema comprising entities, attributes, and relations retrieved or derived from one or more base internal schema or a conceptual schema.

ABBREVIATIONS AND/OR ACRONYMS

AIS	Automatic Information System
ASD	Assistant Secretary of Defense
BPR	Business Process Reengineering
C3I	Command, Control, Communications and Intelligence
CDAd	Component Data Administrator
Cfdad	Component-Level Expert
CIM	Center for Information Management
DAd	Data Administrator
DAPMO	Data Administration Program Management Office
DASD	Deputy Assistant Secretary of Defense
DASP	Data Administration Strategic Plan
DDL	Data Definition Language
DDRS	Defense Data Repository System
DMP	Data Management Plan
DoD	Department of Defense
ERD	Entity Relationship Diagram
FAPM	Functional Activity Program Manager
FDAd	Functional Data Administrator
FIM	Functional Information Manager
HCI	Human Computer Interface
IDEF1X	Integration Definition for Information Modeling
IM	Information Management
IRM	Information Resource Management
NIST	National Institute of Standards
OSD	Office of the Secretary of Defense
PSA	Principal Staff Assistant
SME	Subject Matter Expert
1NF	First Normal Form
2NF	Second Normal Form
3NF	Third Normal Form
4NF	Fourth Normal Form
5NF	Fifth Normal Form

CHAPTER 1

GENERAL INFORMATION

A. INTRODUCTION

1. The procedures outlined in this document provide the structure to extend, approve, and maintain the Department of Defense (DoD) Enterprise Data Model. Results of implementing these procedures will be the standardization of data entities as prime words and identification and entry of model based data elements (attributes) ready for standardization in accordance with DoD 8320.1-M-1 (reference (b)).

2. The DoD Enterprise Model is a representation of the activities and data of the DoD. The model embodies top-level processes and standard data interfaces relevant to every DoD major mission and function. It is the basis for defining, coordinating, and integrating DoD missions and functions.

3. The DoD Enterprise Model is needed to support the defense mission from warfighting to acquisition and logistics. It will enable the Department's leaders and managers to better understand and direct their areas of responsibility and to integrate business process reengineering initiatives within and across functional and organizational boundaries.

4. The initial version of the DoD Enterprise Data Model was developed in conjunction with the activities of the DoD Enterprise Model through comprehensive analysis of the top-level processes and a thorough review of the fundamental guiding documents for the Department. The DoD Enterprise Data Model extends down to the level of attributes and relationships in concert with the definition of more detailed DoD activities. Expansion and maintenance of the DoD Enterprise Data Model is performed and managed by the DoD Data Administration Program Management Office (DAPMO).

5. Functional area and Component data modeling and associated information requirements are the driving force behind expansion and maintenance of the DoD Enterprise Data Model. These modeling efforts drive DoD data element standardization through identification, cross-functional review, and approval of extensions to the DoD Enterprise Model from which data standards proposals originate.

6. Functional area and Component modeling efforts are being performed in accordance with required DoD activities such as business process reengineering (BPR) and migration system activities; required legacy system reengineering; modification, and/or maintenance activities; and as deemed necessary by the various functional areas and Components within DoD. Requirements for compliance with the DoD Data Administration procedures are discussed under Applicability and Scope in 8320.1 (reference (e)). Additional conformance requirements specific to data standardization are discussed under Applicability and Scope in

8320.1-M-1 (reference (b)). Procedures for checking, measuring, and ensuring data standardization compliance in automatic information systems (AISs) are specified in DoD Directives 8120.1 (reference (f)) and 8120.2 (reference (g)).

7. The DoD Enterprise Data Model development, approval, and maintenance process integrates information requirements, as they are identified, into one cohesive and coherent information frame of reference for all of DoD. The fundamental objective of the DoD Enterprise Data Model is to provide the basic data architecture for effective administration of data needed across the Department.

B. PURPOSE

This manual promulgates the procedures for developing, approving, and maintaining the DoD Enterprise Data Model. DoD Directive 8320.1, "DoD Data Administration" (reference (e)) established policy and authorized the implementation guidelines as set forth in DoD Manual 8320.1-M (reference (d)).

C. SCOPE AND APPLICABILITY

1. The scope and applicability are identical to that described in DoD Directive 8320.1, "DoD Data Administration" (reference (e)).

2. Systems not required to conform to DoD data administration procedures (such as prototype system development efforts) should consider voluntary application of this and other 8320.1 procedures in the early stages of development to whatever extent possible. This is especially true if they expect to eventually implement these systems in a production environment, or if there is any possibility of future data sharing with other DoD AISs. Early compliance will save time, money, and other resources in downstream AIS life-cycle management activities. An organization's ability to obtain future funding for development and maintenance on these and other DoD AISs could be negatively affected by a lack of effort within their organization to comply with these and other DoD data administration procedures.

D. OBJECTIVES

The objective of DoD data administration is to support the development and management of useful, suitable, available, and accessible information to enable the successful execution of the missions of the Department. The objectives are to:

1. Develop a DoD Enterprise Data Model that depicts overall DoD mission needs and supports operational capabilities requiring the collection, storage, and exchange of data.

2. Develop data elements for standardization through data modeling efforts.

3. Create a base of shared information through the DoD Enterprise Data Model and

standard data structures and elements. This will enable functional and technical personnel to perform their tasks in an integrated, effective, and efficient manner.

CHAPTER 2

ROLES AND RESPONSIBILITIES

A. INTRODUCTION

Expansion of the DoD Enterprise Data Model and development of DoD data standards through functional area data modeling is supported by many organizations. This chapter identifies the key participants who contribute to the DoD Enterprise Data Model development, approval, maintenance, and integration process and summarizes their responsibilities within this process. Additional DoD Data Administration responsibilities discussed below can be found in DoD Directive 8320.1 (reference (e)) and DoD 8320.1-M (reference (d)).

B. ROLES

1. Model Originator

A model originator is the DoD organization who prepares and submits a model to update/extend the DoD Enterprise Data Model.

2. Functional Data Administrator (FDAd)

a. FDAds represent various functional area views within the DoD. They are responsible for ensuring that models being developed, reviewed, and approved as extensions to the DoD Enterprise Data Model are functionally correct. The FDAd is also tasked to integrate new and modified functional area data models within their functional area data architecture with the DoD Enterprise Data Model.

b. FDAds are assigned functional areas by Office of the Secretary of Defense Principal Staff Assistants (OSD PSAs), unless the functional areas are represented by OSD PSAs themselves. FDAds work directly with other FDAds, Component Data Administrators (CDAds), the DoD Data Administrator (DoD DAd), OSD PSAs, other subject matter experts (SMEs), and designated representatives, to coordinate and perform data model development, review, maintenance, and integration tasks.

c. FDAds who are assigned functional data stewardship responsibilities coordinate functional area model development, review, integration, and maintenance activities prior to the formal review process. They also work with the DoD DAd and the DAPMO to support model review, approval, and maintenance during the formal review process and functional integration, expansion, and maintenance of the DoD Enterprise Data Model.

d. There are three types of functional data stewards:

(1) Proposal Package Functional Data Steward

An FDAd assigned to coordinate the informal review of a proposal package, to chair associated rapid data standardization guidance collaborative sessions, and to work with the DoD DAd and designated representatives during the formal review process.

(2) Entity Functional Data Steward

An FDAd assigned to support the proposal package functional data steward with coordination, questions, decision making, and issue resolution associated with a given entity in a proposal package.

(3) Attribute Functional Data Steward

An FDAd assigned to support the entity and proposal package functional data stewards with coordination, questions, decision making, and issue resolution associated with a single attribute in the proposal package.

e. Functional data stewardship is initially assigned by either the model originator or representatives of a rapid data standardization collaborative session. The functional data steward assigned to a proposal package, entity, or attribute should be the FDAd who is assigned responsibility for the functional area that creates and/or manages data associated with the particular proposal package, entity, or attribute.

(1) The same FDAd should be assigned functional data steward responsibilities for all entity instances and attributes associated with a given prime word.

(2) A single FDAd can be assigned functional data stewardship responsibilities for multiple proposal packages, entities, and attributes.

(3) Management of each entity will be assigned to a single functional data steward (functional area), even if some of the attributes within it are assigned to different attribute functional data stewards. The entity functional data steward will coordinate overall review and maintenance of the entity while working with the various associated attribute functional data stewards.

(4) A current list of FDAd functional areas of responsibility is available in the Defense Data Repository System (DDRS) and from the DoD DAd.

f. The stewardship assignments are validated during subsequent review and integration activities. If issues associated with data steward assignment arise that cannot be resolved, they should be submitted to the DoD DAd. All functional data stewardship assignment questions and issues submitted to the DoD DAd will be resolved within 48 hours

of identification and documentation. The DoD DAd is the final authority on data stewardship assignment issues.

3. Component Data Administrator (CDAd)

CDAds represent cross-functional views of information for a given DoD Component, which includes the DoD services (Army, Navy, Air Force, etc..) and the specified and unified commands. CDAds are responsible for ensuring that models being developed, reviewed, and approved as extensions to the DoD Enterprise Data Model are functionally correct and are properly integrated with component-level data models and the DoD Enterprise Data Model. CDAds are selected by each Component head. CDAds work directly with other CDAds, FDAds, the DoD DAd, OSD PSAs, SMEs, and designated representatives to support data model development, review, maintenance, and integration.

4. Department of Defense Data Administrator (DoD DAd)

The DoD DAd is responsible for implementing DoD procedures for data modeling and integration, data standardization, data security, data quality assurance, and database operations. The DoD DAd and designated representatives within the DAPMO support informal reviews and are responsible for rapid data standardization collaborative sessions, DoD Enterprise Data Model integration, and technical and cross-functional reviews. The DoD DAd is selected by the Assistant Secretary of Defense for Command, Control, Communications and Intelligence (ASD(C3I)).

5. Data Administration Program Management Office (DAPMO) Representative

The DAPMO office supports the DoD DAd with procedure development and implementation, model review, integration, data standardization, publication of the DoD Enterprise Data Model, physical database design, and requirements and training for the DDRS. DAPMO plays a critical role in the DoD data modeling and standardization processes while supporting related activities associated with migration system projects, database development efforts, and the DoD BPR process.

6. Subject Matter Expert (SME)

SMEs are functional and technical experts within DoD who support the design, development, review, implementation, and maintenance of DoD data products. SMEs include Functional Activity Program Managers (FAPMs), DoD Functional Information Managers (FIMs), Technical Information Managers, component-level experts (Cfdads), functional area system and/or database administrators/experts, Component system and/or database administrators/experts, registered users of standard DoD data products, OSD PSAs, FDAds, and CDAds. SMEs can also be designated representatives for any of these organizations.

7. Functional Activity Program Managers (FAPM)

FAPMs are designated representatives of the OSD PSAs and the Chairman, Joint Chiefs of Staff. FAPMs work with the FDAds and OSD PSAs to support Business Process Improvement (BPI), modeling, and data standardization. FAPMs are SMEs for the functional activities they represent.

8. Office of the Secretary of Defense Principal Staff Assistant (OSD PSA)

OSD PSAs are responsible for functional area model adherence to DoD Data Administration policy, procedures, and standards. OSD PSAs designate FDAds for each functional area for which they are responsible and support them throughout the data model development, review, and maintenance process. They also support the FDAds and the DoD DAd during integration of functional area data models into the DoD Enterprise Data Model.

9. Deputy Assistant Secretary of Defense for Information Management (DASD(IM))

DASD(IM) develops policy, procedures, and related standards for Information Resource Management (IRM), including data administration, and makes recommendations to the ASD(C3I) for approval. During functional area data model review and integration into the DoD Enterprise Data Model, DASD(IM) works with the OSD PSAs and the DoD DAd to resolve issues that cannot be resolved in the formal review process by FDAds, CDAds, DoD DAd, and associated SMEs. When an issue cannot be resolved at DASD(IM) level, DASD(IM) reports to ASD(C3I) to communicate, coordinate, and return a resolution.

10. Assistant Secretary of Defense for Command, Control, Communications and Intelligence (ASD(C3I))

ASD(C3I) is the designated senior information management official within DoD (DoD Directive 5137.1, reference (l)). ASD(C3I) works with DASD(IM) to resolve issues for which a resolution cannot be reached during the cross-functional review or by the DASD(IM). ASD(C3I) has final authority on all issues.

C. RESPONSIBILITIES

Each category of proponents/participants that contribute to development, approval, and maintenance of the DoD Enterprise Data Model has a specific set of responsibilities associated with this process. These responsibilities are discussed below.

1. Model Originator

a. Proposes to extend or update the DoD Enterprise Data Model by preparing a functional area data model proposal package for submission.

b. Submits the functional area data model proposal package to their respective FDAd or CDAd (depending on the model content), in accordance with functional or component procedures. This begins the data model review process.

c. Works with the FDAd or CDAd to ensure functional and technical compliance and to prepare the model for informal review.

d. Works with proposal package data stewards to answer functional questions and to help resolve functional and technical issues during model review and integration into the DoD Enterprise Data Model.

e. Supports modification of the model and the associated proposal package(s) as needed based on feedback from the review process.

2. Functional Data Administrator (FDAd)

a. Proposes functional area projects for rapid data standardization collaborative session support.

b. Co-chairs and supports rapid data standardization collaborative sessions for projects within or associated with the functional areas for which they are responsible.

c. Acts as designated functional issue decision-making authority during rapid data standardization collaborative sessions.

d. Serves as advisor and reviewer for data models developed within or in support of functional areas for which they are responsible.

e. Works with model originators, other FDAds, and SMEs to coordinate and integrate proposed entities and attributes across the functional areas for which they are responsible. The DoD Enterprise Data Model should be considered during this functional area integration.

f. Acts as or works with functional data stewards to support development, review, integration, and maintenance of functional area data models being proposed to extend or modify the DoD Enterprise Data Model.

g. As a proposal package functional data steward:

(1) Ensures that proposal packages adhere to functional and technical requirements prior to submission for formal review.

(2) Enters or coordinates entry of entities and attributes associated with proposal packages into the DDRS.

(3) Coordinates proposal package informal reviews with entity and attribute functional data stewards, other FDAds, OSD PSAs, CDAds, the DoD DAd, DAPMO representatives, and appropriate SMEs to ensure that their views are fully represented.

(4) Submits proposal packages, prime words (entities) and data elements (attributes) to, and supports the DoD DAd during the formal review process.

(5) Assists the DoD DAd, and the DAPMO Data Model Integration Team, with the integration of functional area models into the DoD Enterprise Data Model.

(6) Helps resolve issues associated with the proposed model and coordinates resolutions and proposed changes with the submitting FDAd or CDAd and other model stakeholders.

(7) Tracks status of proposals and keeps the submitting FDAd or CDAd informed on progress and results.

(8) Notifies the DoD DAd of actions taken against disapproved proposals.

h. Supports proposal package functional data stewards when assigned entity/attribute data stewardship responsibilities by coordinating functional expertise for the entity(s)/ attribute(s) they are responsible for.

i. Supports cross-functional review of model packages proposing new, modified, archive of and/or reinstatement of data entities, associated attributes, and relationships.

j. Functionally approves or disapproves (standard) data under their stewardship.

k. Elevates, to the appropriate OSD PSAs, cross-functional area issues that cannot be resolved among affected FDAds.

l. Maintains functional area data products in the DDRS and the DoD Interim IDEF Repository.

m. Proposes entities and associated attributes and relationships for archival.

n. Registers use of approved entities (prime words) and attributes (data elements) in models and systems within the functional areas for which they are responsible in the DDRS.

o. Identifies functional requirements not supported by the DDRS and

submits the requirements to the DoD DAd.

3. Component Data Administrator (CDAd)

a. Proposes component-level projects for rapid data standardization collaborative session support.

b. Plans rapid data standardization collaborative sessions along with FDAds and the DoD DAd, and supports them through contribution of component-level experts (Cfdads and SMEs).

c. Serves as advisor and reviewer during the preliminary review for data models developed within or in support of their Component organization.

d. Submits component-level models to the FDAd, designated as the proposal package functional data steward, for informal review and submission to the formal review process.

e. Works with model originators, FDAds, and SMEs to coordinate and integrate proposed entities and attributes across all functional areas within the Component organization.

f. Works with FDAds to represent Component views and objectives during informal proposal package reviews.

g. Submits prime words (entities) and data elements (attributes) for formal cross-functional review.

h. Supports cross-functional review of model packages proposing new, modified, archive of and/or reinstatement of data entities, associated attributes, and relationships.

i. Maintains component-level data products in the DDRS and the DoD Interim IDEF Repository.

j. Registers use of approved entities (prime words) and attributes (data elements) in component-level models and systems in the DDRS.

k. Identifies functional requirements not supported by the DDRS and submit the requirements to the DoD DAd.

l. Acts as a liaison between functional areas within the Component, FDAds, and the DoD DAd.

4. Department of Defense Data Administrator (DoD DAd)

a. Selects data model integration projects to be accomplished using rapid data standardization collaborative sessions.

b. Plans rapid data standardization collaborative sessions along with FDAds and CDAds.

c. Assigns DAPMO representatives to help coordinate and support rapid data standardization collaborative sessions, informal and preliminary proposal package reviews, formal technical and cross-functional reviews, and integration of functional area data models into the DoD Enterprise Data Model.

d. Supports CDAds and FDAds during preliminary and informal reviews as needed.

e. Validates data stewardship assignments and settles data stewardship assignment issues.

f. Performs final technical review for all models being proposed to extend the DoD Enterprise Data Model.

g. Coordinates formal review of all proposals to extend or update the DoD Enterprise Data Model.

h. Resolves proposal package issues or works with the DASD(IM) to coordinate a resolution if the issue cannot be resolved between affected FDAds, other functional stakeholders, and SMEs.

i. Provides suggestions to FDAds and CDAds for entities (prime words) and attributes (data elements) that should be considered for archive based on a lack of registered implementation in the DDRS.

j. Establishes requirements for models, methods, tools, data, and information technology to support development of an integrated data architecture for DoD.

5. Data Administration Program Management Office (DAPMO) Representative

a. Develops procedures for collaborative modeling, model coordination and review, model integration, and DoD Enterprise Model configuration management.

b. Manages rapid data standardization collaborative sessions:

(1) Arranges for facilities, facilitator, data entity and attribute

packaging, and administrative support for sessions whenever possible.

(2) Acts as an arbitrator who hears issues and rules on and enforces procedural and technical data modeling and metadata rules.

c. Supports the DoD DAd in performing technical reviews on all proposals to extend the DoD Enterprise Data Model.

d. Technically approves or disapproves (standard) data.

e. Works with the DoD DAd on technical issues that cannot be resolved through coordination with FDAds, CDAds, and SMEs.

f. Identifies and documents extensions of data topics into out-of-scope areas during reviews and collaborative sessions.

g. Identifies and documents data interchange and interface issues that may require additional data model integration sessions among principals.

h. Documents resolutions to all functional and technical issues that arise during technical and formal cross-functional reviews.

i. Validates proposed integration of entities and attributes and prepares expanded/modified versions of the DoD Enterprise Data Model for review and approval.

j Maintains an audit trail of all entities and attributes reviewed and integrated into the DoD Enterprise Data Model.

k. Publishes the DoD Enterprise Data Model quarterly.

l. Implements, maintains, and provides training on automated tools available to support the DoD Enterprise Model review, integration, and maintenance.

m. Supports the DoD DAd, as needed, with other activities associated with the DoD Enterprise Data Model development, approval, and maintenance process.

6. Subject Matter Expert (SME)

a. Brings detailed knowledge of data details, usage in AISs, and reporting requirements to collaborative sessions and functional reviews.

b. Supports developers and reviewers of functional area data models with functional guidance and assistance for issue resolution.

c. Supports integration of functional area data models into functional area data architectures and into the DoD Enterprise Data Model, as needed.

7. Functional Area Program Managers (FAPM)

a. Implements Defense IM program within their functional activity.

b. Coordinates functional activity issues with OSD PSAs, the Chairman, Joint Chiefs of Staff, FDAds, and other SMEs.

c. Assists FDAds with development, reconciliation, and maintenance of functional area activity and data models. This includes validating that data requirements are completely and correctly represented for the functional activities they represent.

d. Provides technical and functional expertise to FDAds during review of proposed functional area data models and standard data elements.

e. Requires development of candidate standard data elements to support information system and application software program development.

f. Plans for and manages implementation of process, and data and information system standards and changes approved as part of functional area model and data standards maintenance.

8. Office of the Secretary of Defense Principal Staff Assistant (OSD PSA)

a. Designates an FDAd in each functional area for which they are responsible. OSD PSAs can designate themselves as the FDAd for any of their functional areas.

b. Works with proposal package data stewards, FDAds, and other SMEs as needed to ensure accurate functional representation in all data models being proposed to extend the DoD Enterprise Data Model.

c. Reviews and approves all functional area data models prior to submission for formal review and integration into the DoD Enterprise Data Model.

d. Resolves all proposal package/collaborative session issues that adversely affect readiness or inability to comply with the law.

e. Supports the DASD(IM) in resolving issues that cannot be resolved by FDAds, CDAds, the DoD DAd, and other SMEs during the formal review process.

9. Deputy Assistant Secretary of Defense for Information Management (DASD(IM))

a. Resolves technical and/or functional data model issues that still exist after the formal cross-functional review and that can not be resolved by the DoD DAd, FDAds, CDAds, and other SMEs.

b. Forwards issues that cannot be resolved by the DASD(IM), the DoD DAd, FDAds, CDAds, and other SMEs with recommended actions to the ASD(C3I) for final disposition.

c. Distributes information on issues resolved by the DASD(IM) and/or the ASD(C3I) to the DoD DAd and OSD PSAs.

10. Assistant Secretary of Defense for Command, Control, Communications and Intelligence (ASD(C3I))

a. Issues policy and guidance on DoD Data Administration.

b. Designates a DoD DAd.

c. Resolves issues that can not be resolved during rapid data standardization collaborative sessions by the DoD DAd, FDAds, CDAds and other SMEs.

d. Resolves data model issues that remain after the cross-functional review and that cannot be resolved by the DASD(IM), DoD DAd, FDAds, CDAds, and other SMEs.

CHAPTER 3

DATA MODELING CONCEPTS

A. INTRODUCTION

This chapter presents concepts that are fundamental to data modeling. The information provides a basis for understanding the development, approval, and maintenance procedures for the DoD Enterprise Data Model.

B. DATA MODEL CONCEPTS

1. A data model is the graphical and textual representation of data a business needs to accomplish its mission. It is a representation of data objects that can be shared and reused across application systems, organizational boundaries, and different functional areas.

2. The DoD Enterprise Data Model is developed and continuously extended based on reviews of data models developed to document data requirements across DoD functional areas. As shown in Figure 3-1, multiple views of the DoD Enterprise Data Model provide an architectural structure from which standard data elements and data structures originate. The DoD Enterprise Data Model, together with the DoD Enterprise Activity Model, comprise the DoD Enterprise Model. The relationship between the BPR process and the DoD Data Administration process is discussed in Appendix B.

3. Models

a. Provide information about the interests of an enterprise.

b. Facilitate improvements in strategies, tactics, and operations.

c. Provide a basis for information systems database design.

d. Provide a basis for accuracy and integrity of information.

e. Facilitate understanding of data that leads to the identification of data sharing possibilities.

f. Help reduce redundant data entry and unintentional replication of data.

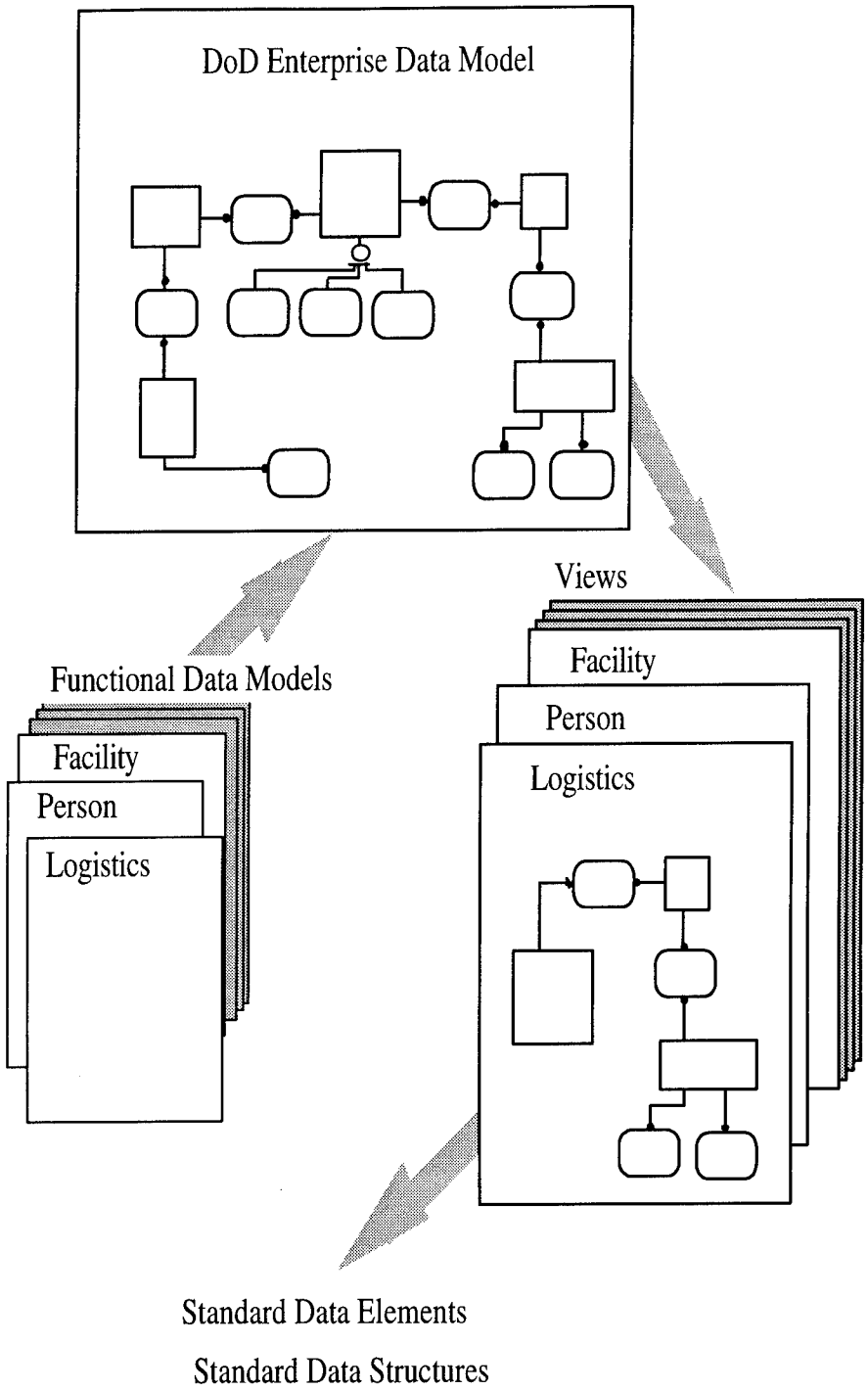

Figure 3-1: Context for Standardizing DoD Data for Improved Data Exchange and System Interoperability

4. Data models and schema(s) are used to depict information needs or data requirements from a number of views. These views are typically mapped to one another to support the integration of strategic planning, business area planning, system requirements identification, and AIS design, development, and maintenance. Two types of data models and three types of schemas are used to support the information management integration architecture.

a. Data Models

Two types of data models are used to support enterprise, mission, and functional area integration. The models are descriptive representations of the data requirements that support strategic or functional area business needs.

(1) Strategic Data Models

High-level models of data requirements that support the information needs across the corporate enterprise. A strategic data model is typically used for strategic data planning and policy purposes. The DoD Enterprise Data Model is an example of a strategic data model. It supports DoD enterprise and mission-level integration.

(2) Functional Area Data Models

Business area models of data requirements that support specific information needs within or between the major functional areas of a business. A functional area data model is typically used for business area analysis to support functional area integration.

b. Schemas

Three types of schemas (conceptual, internal, and external) are used to support application, local, and personal-level integration. Figure 3-2 graphically presents an overview of these three schema types. The schema views of data requirements include (reference (h)):

(1) Conceptual Schema

The conceptual schema represents the "logical" view or data administrator's view of the data requirement. This view is represented as a data model, using a structured technique such as Integrated Definition for Information Modeling (IDEF1X), to specify what information is stored about objects of interest to the functional area. This view is a single integrated definition of the data that is unbiased toward any single application of data and is independent of how the data are physically stored or accessed. An attributed, normalized data model is also referred to as a conceptual schema. The conceptual schema is used for data standardization and database design. It is also used to support application integration. Conceptual Scheme provides a consistent definition of the meanings and interrelationships of the data used to integrate, share, and manage the integrity of data within and across applications.

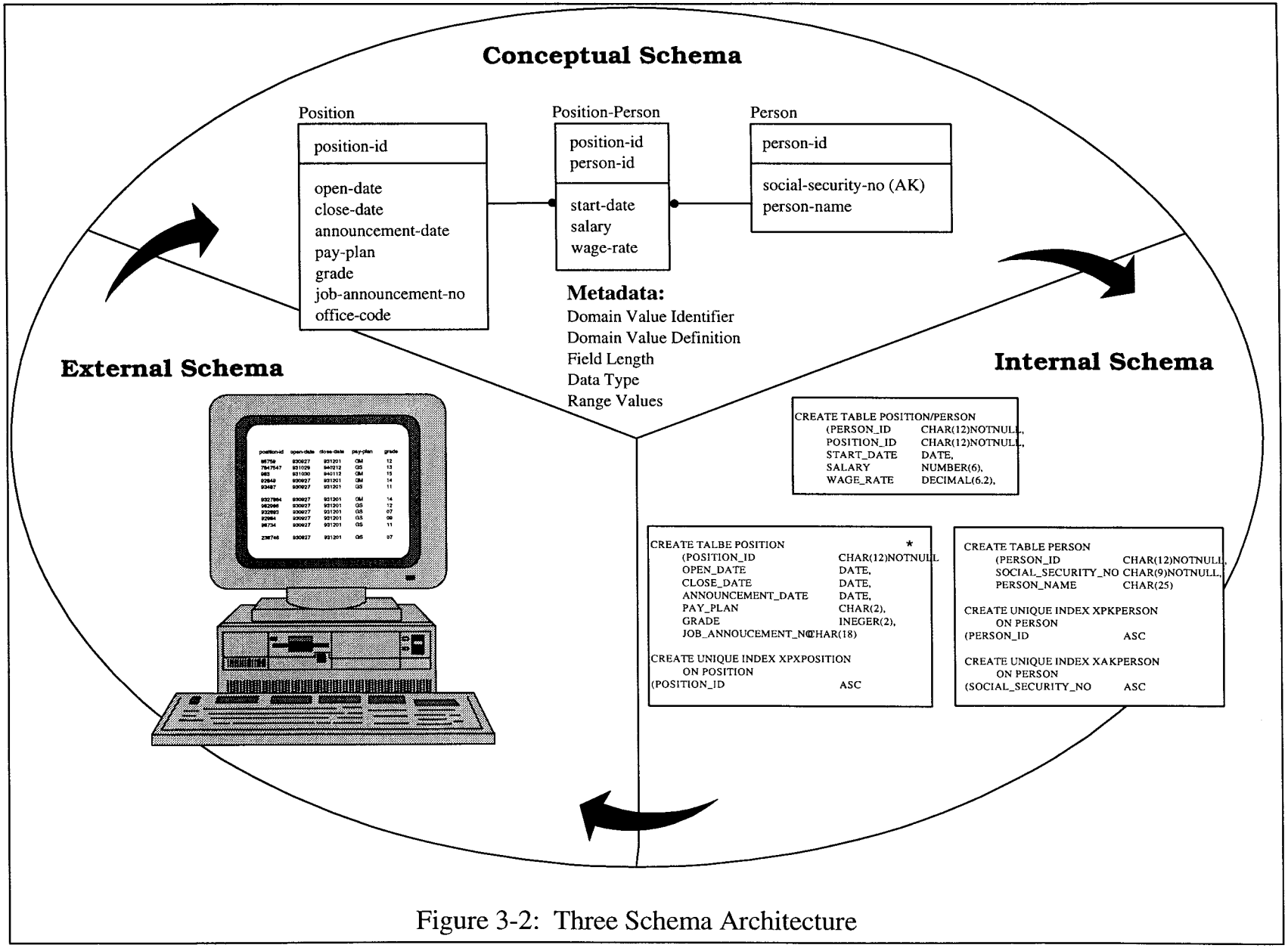

Figure 3-2: Three Schema Architecture

(2) Internal Schema

The internal schema represents the "physical" view or database administrator's view of the data requirement. This view, also known as a physical database design, is described by a data definition language (DDL) and physical storage methods used to implement the data requirements described under a conceptual schema. The denormalization of conceptual schema data requirements may occur in connection with system performance and technological constraints. Any denormalization shall be coordinated with the manager of the conceptual schema (i.e., Data Administrator). The internal schema is also referred to as a physical data model. The design and development of internal schema supports integration at the application and local levels.

(3) External Schema

The external schema represents the "user" view or application view of the data requirement. This view is represented by reports, transactions, and screens that are designed to support the individual worker in the performance of tasks or activities. The external schema is referred to as the end-user view(s). The design and development of external schema(s) is equivalent to the design and development of the human-computer interface (HCI) for the AIS and supports integration at the local and personal levels of the information management integration architecture.

5. IDEF1X has been established as the DoD standard technique for data model presentation and integration. DoD rules, syntax, and techniques for IDEF1X are presented in the National Institute of Standards (NIST) publication FIPS PUB 184 entitled "Specifications for Integration Definition for Information Modeling (IDEF1X)," (reference (i)). Other modeling techniques exist and are being used within DoD. Models using non-IDEF1X techniques will be accepted by DoD for review and integrated into the DoD Enterprise Data Model under certain circumstances. These circumstances will be evaluated on a case-by-case basis between the functional area submitting the model, the DoD DAd, and representatives from DAPMO who are responsible for integrating proposed model components into the DoD Enterprise Data Model.

6. The basic components of a data model are entities, attributes, and relationships.

a. Entity

An object about which the business wishes to collect information; a person, place, thing, event, or concept of importance to the enterprise that is singular, exclusive, and identifiable. An entity is also known as an Entity Type or Entity Class.

(1) The entity occurrence is an instance of the entity. Each entity instance shall be distinguishable from all other instances of the same entity.

(2) The entity relationship diagram (ERD), depicted in Figure 3-3, is a graphic representation of a data model. The basic icons or symbols are a rectangle containing a name for an entity and a line with cardinality depicting a relationship. An ERD is supported by a narrative description of the object occurrences represented by icons. Figure 3-3 uses IDEF1X terms and techniques.

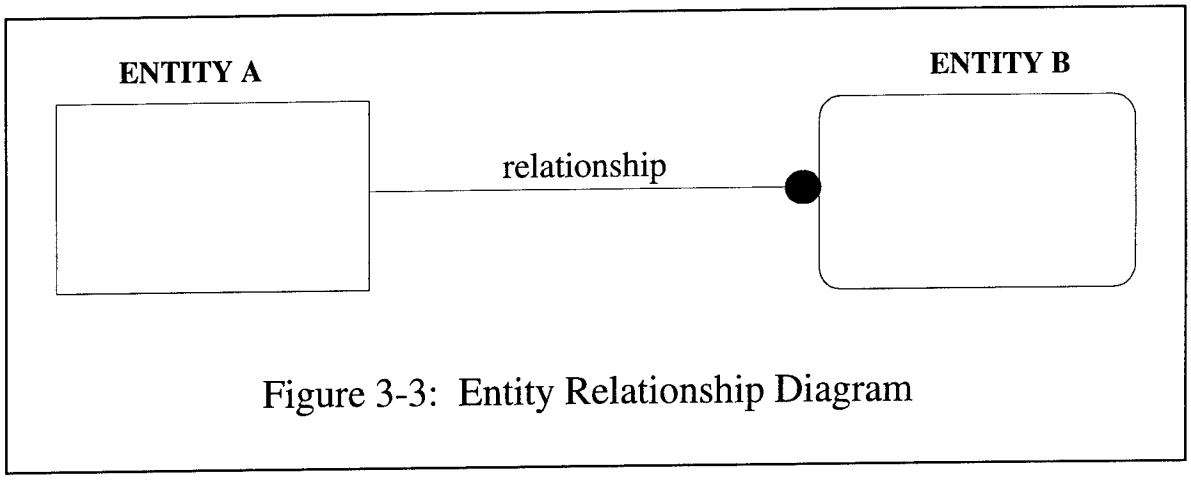

Figure 3-3: Entity Relationship Diagram

(3) There are two basic categories of entities: independent and dependent.

(a) Independent Entity. An object of interest to the business that does not depend on any other entity for its existence. Each entity occurrence of an independent entity can be identified using primary key attributes that characterize the object without referring to foreign keys migrated from any other entity. Also known as fundamental, principal, primary, independent entity class, and supertype.

(b) Dependent Entity. An entity that depends on the existence of one or more other entities for its identification. The entities on which it depends can be either independent or dependent. The primary key for a dependent entity contains foreign keys contributed by the entities on which it depends. There are three basic types of dependent entities: category, attributive, and associative.

1 Category Entity. A subset of the instances of a single-parent entity (referred to as a generalization entity, or generic parent). Figure 3-4 shows two category entities (i.e., MILITARY MEMBER and CIVILIAN EMPLOYEE) for the parent entity named PERSON. The category entity appropriate for a specific instance of the parent entity is determined by a category discriminator attribute in the parent entity (e.g., Person Service Type Code in Figure 3-4). Each category entity inherits common attributes and/or relationships from the parent, including its primary keys (which become foreign keys in the category entity). The category entity contains additional attributes and/or relationships that are related to the parent but that are distinct from other related subsets. It also contains some attributes and/or relationship(s) that apply only to instances of the subset and not to all instances of the parent. Category entities are used to migrate a data model to fourth-normal form, because they eliminate null attribute values in the parent entity. A category entity is known as subentity or secondary entity.

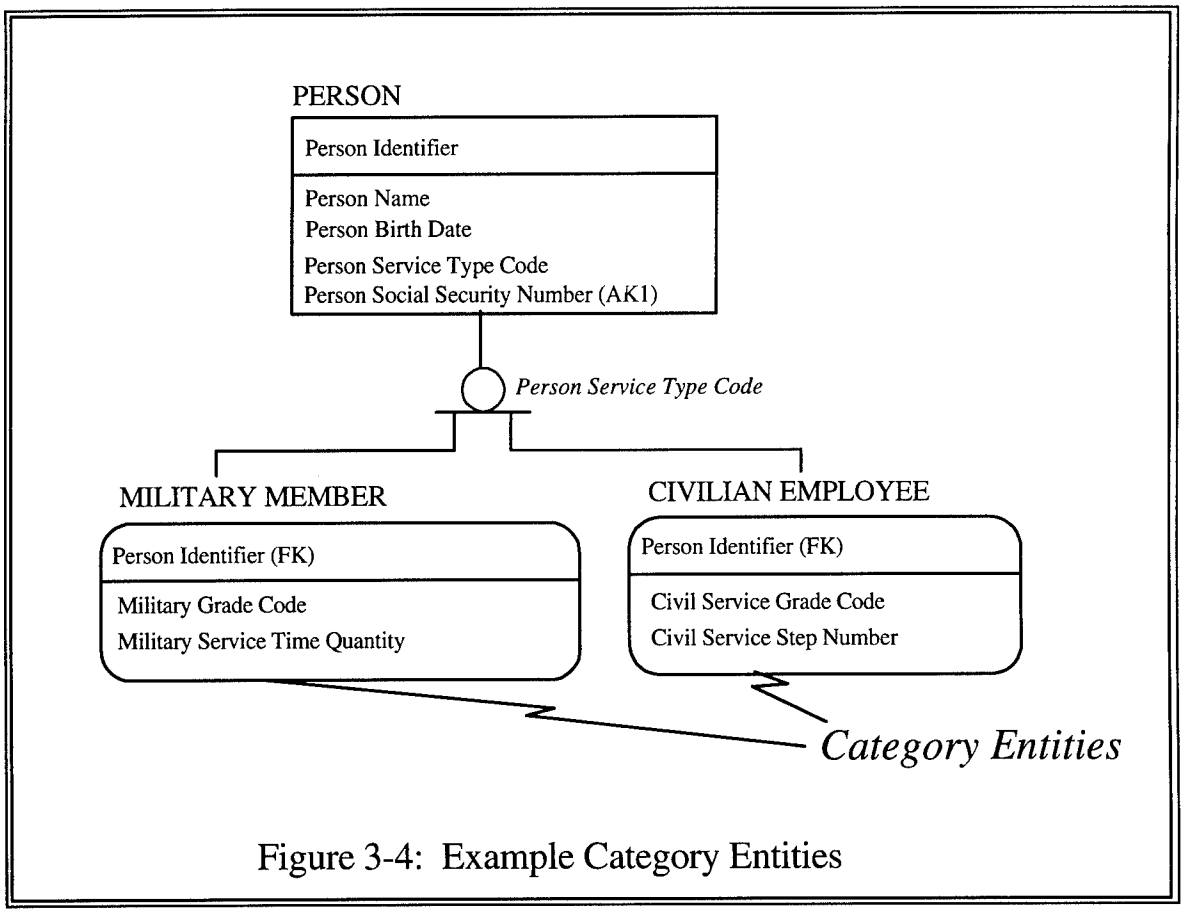

Figure 3-4: Example Category Entities

2 Attributive Entity. An entity that accommodates repeating attributes for the parent entity. Figure 3-5 is an example of an attributive entity named PERSON LANGUAGE that documents the multiple languages a person might speak and/or write. Additional attributes (e.g., Language Identifier) are appended to the key structure of the attributive entity that do not appear in the key structure for the parent entity. These additional key attributes uniquely distinguish between multiple values for the repeating attributes. An attributive entity is a dependent entity with exactly one identifying parent. Attributive entities are created to support the first rule of normalization: eliminating repeating attributes from the parent entity. An attributive entity is also known as a characteristic entity.

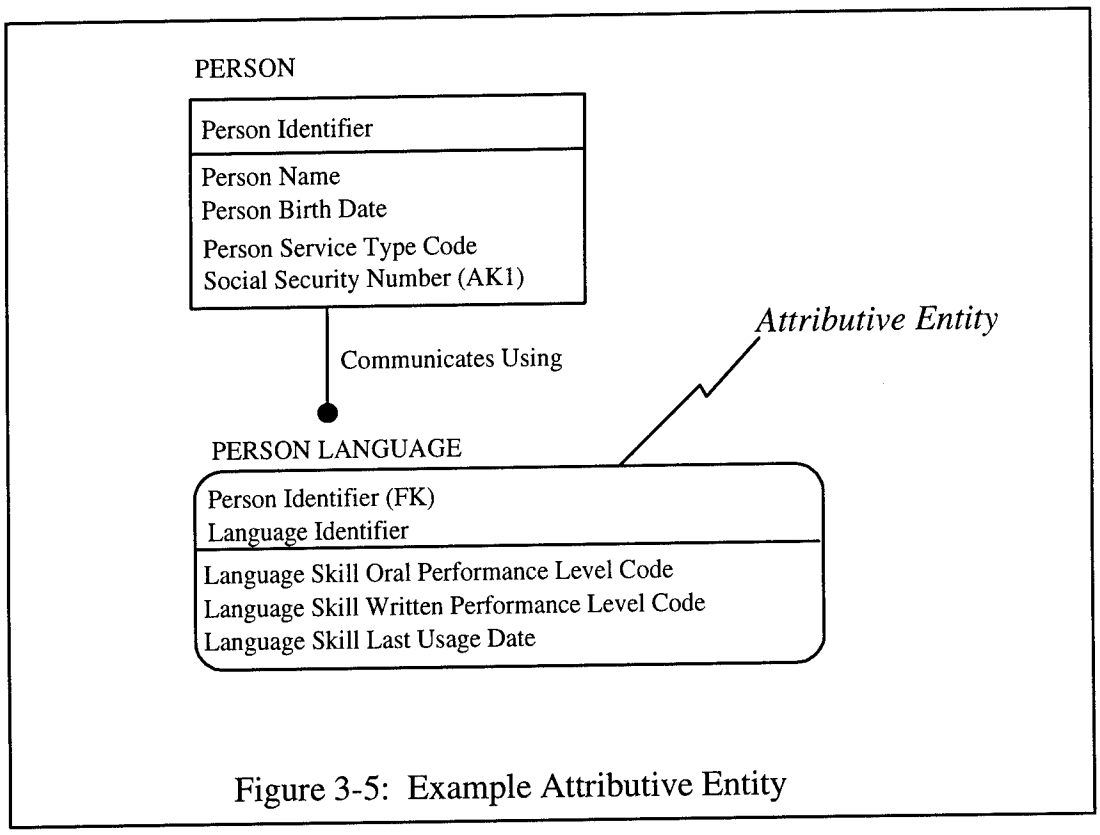

Figure 3-5: Example Attributive Entity

3 Associative Entity. An entity that inherits its primary key from two or more other entities and records multiple associations (relationships) between those entities. The primary use of associative entities is to reconcile nonspecific (many-to-many) relationships between two or more entities. An associative entity has no unique key attributes; if it does, it becomes an attributive entity. Figure 3-6 is an example of an associative entity named PERSON SKILL resolving the many-to-many relationship between two parent entities named PERSON and SKILL. The difference between an associative entity and an attributive entity is the number of identifying relationships to the parent. An attributive entity has only one identifying relationship and an associative entity has more than one. An associative entity is also known as an intersecting entity.

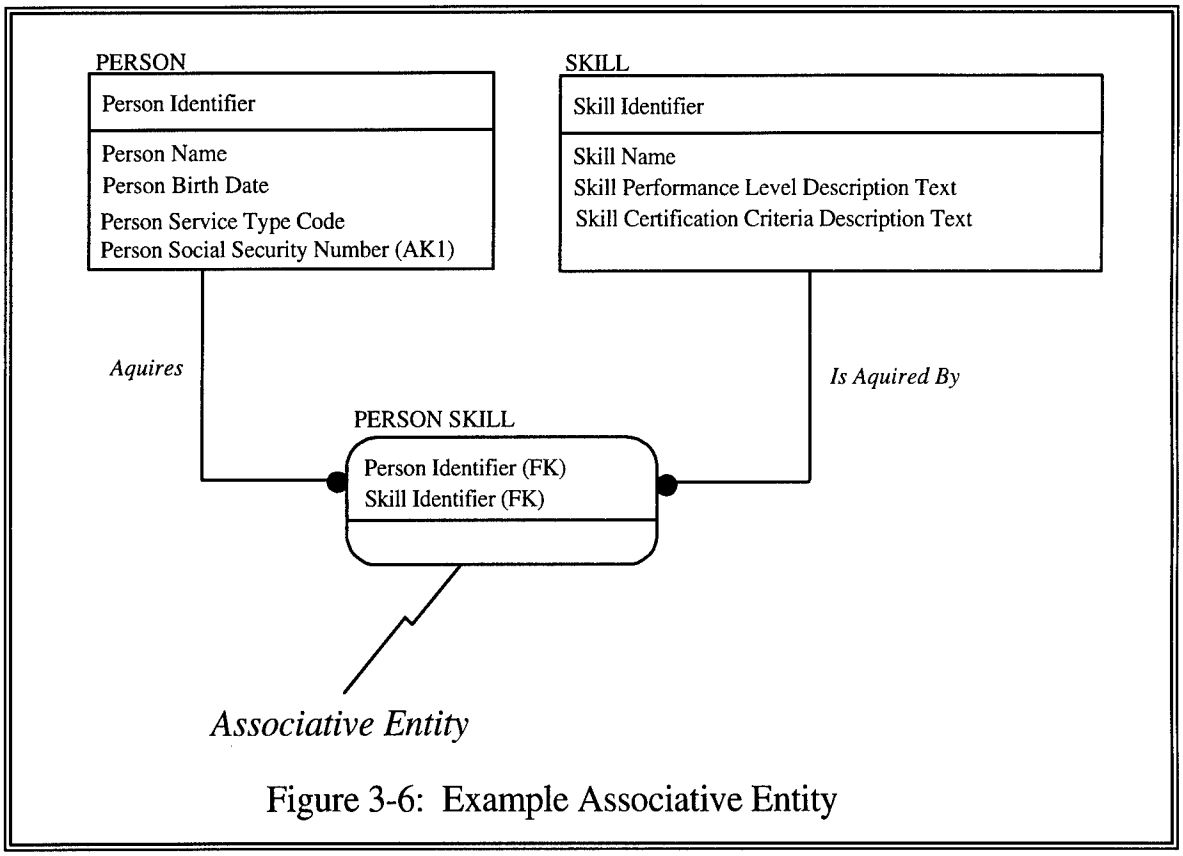

Figure 3-6: Example Associative Entity

(4) Each entity in a data model is assigned a functional data steward. The data steward is the FDAd of the functional area that manages the development, approval, and creation of the data representing the entity and all or part of its attributes. The data steward ensures that the data are used to satisfy information requirements throughout DoD and documents the appropriate business requirements. The data steward is determined by identifying the functional area that manages the process that creates the data. The assignment, responsibilities, and issue resolution associated with assignment of functional data stewards are discussed in greater detail in Chapter 2.

b. Attribute

A property or characteristic of an entity or entity class. For example, COLOR, WEIGHT, GENDER. All attributes describe an entity. One or more of these attributes are used to uniquely identify an instance of an entity. Only logical attributes should be represented in a logical data model. Logical attributes are atomic characteristics of an entity. There are two types of attributes: key and nonkey.

(1) Key Attribute. One or more attributes that may be used to uniquely identify an instance of an entity or entity class. There are three types of key attributes: primary keys, alternate keys, and foreign keys.

(a) Primary Key. An attribute or group of attributes chosen to uniquely identify an entity. In Figure 3-6, for example, person identifier is the primary key for the entity named PERSON. In IDEF1X, attributes are designated as primary keys by placing them in the primary key area of the entity box (i.e., above the horizontal line). Primary keys are never null. Each entity or entity class has one and only one primary key. A primary key is migrated through relationships to become a foreign key in child or dependent entities. Primary keys are also known as determinants or identifiers. Rules for primary keys are described in Chapter 6.

(b) Alternate Key. Attribute(s) that can be used to uniquely identify an entity instance, but is not designated as part of the entity primary key. In Figure 3-6, for example, social security number is designated as an alternate key by the letters "AK1" in parenthesis to the right of the attribute name. Numbers (e.g., AK1, AK2, AK3) are used to distinguish among multiple alternate keys specified for a single entity.

(c) Foreign Key. An attribute or group of attributes in an entity that are inherited from another entity through a relationship. Foreign keys show relationships between child or dependent entities and parent entities. The foreign key may or may not become part of the primary key of the child or dependent entity. In Figure 3-6, the attributes person identifier and skill identifier are foreign keys for the associative entity named PERSON SKILL. In IDEF1X, foreign keys are designated by placing the letters "FK" in parenthesis to the right of the attribute names.

(2) Nonkey Attribute. Attribute or group of attributes that describe an entity but that cannot be used to uniquely identify the entity or relate the entity to another entity. In Figure 3-6, the attributes person name and person birth date are examples of nonkey attributes for the entity named PERSON.

(3) Derived Attribute. Characteristic representing the results of computational operations performed on other attributes. Derived attributes are inherently redundant to both primitive sources from which they are assimilated and to other derived attributes. Furthermore, the derived attributes communicate decisions about procedures and applications that should be removed from logical models. Derived attributes should be

represented in a logical functional data model when they support accounting, auditing, legal policy, or business rule enforcement. Derived attributes may be included in data models for decision support applications that document specifications for external views of the logical conceptual model.

(4) Composite Attributes. Characteristic that describes multiple concepts. When an attribute is formulated to describe multiple concepts, its definition and meaning can easily partially overlap with the definition of another attribute. This redundancy sets the stage for data inconsistencies. An attribute should be designed to communicate a single concept when represented in a logical data model. However, many composite legacy elements are institutionalized and well understood by the functional community. The decision to redesign an institutionalized composite legacy element should be based on a consideration of the impacts this effort will have on improving the Department's ability to share data. If little or no improvement is foreseen (i.e., the risk for poor data quality and poor ability to share data is low for the existing legacy element), then consider partial redesign or acceptance of the legacy element as it stands.

(5) Metadata. Information describing the characteristics of data; data or information about data; or descriptive information about an organization's data, data activities, systems, and holdings. NIST Special Publication 500-173 (reference (h)).

c. Relationship

A relationship is a meaningful association between two entities. The basic components of a relationship are: cardinality, relationship name, and business rules.

(1) Cardinality. A statement of the number of entity instances that may or shall participate at each end of a relationship. Cardinality is the combination of degree and nature.

(a) Degree. The number of instances from one entity occurrence to another entity occurrence. It expresses the number of permitted associations between entity occurrences. Expressions include one (1), many (N or M), or predetermined number (e.g., 2). For example, Equipment Item SUPPORTS many Weapon System(s); Weapon System IS SUPPORTED BY many Equipment Item(s). Entity relationships are also described as one-to-one, one-to-many, or many-to-many. Specific numbers (two through infinity) are optional.

(b) Nature. Expresses whether the association between an entity occurrence and another entity occurrence is mandatory or optional; also referred to as obligatory or nonobligatory. Expressions include one (1) for mandatory and zero (0) for optional. For example, Equipment Item SUPPORTS zero or many Weapon System(s); Weapon System IS SUPPORTED BY one or many Equipment Item(s).

(2) Relationship Name. Always a verb or verb phrase, the label given to

a relationship. The name of the relationship reflects the activity or function that takes place between two entities. When read in sequence (entity-relationship-entity), a statement is made about the organization operations. Multiple relationships between the same entities are best described by roles given to an entity or reasons given to an association. Significant relationships include parent entities upon which one or more other entities depend. Attributive and category entities will always be associated with at least one independent entity; and an associative entity will have a minimum of two related parent entities. A relationship name is also known as a relationship label.

(3) Business Rules. A statement or fact that defines the constraints and relationships between attributes. This statement describes the constraints the business environment imposes on how two entities are related. Each business rule statement should be constructed so that the parent entity name is the subject, the relationship name is the verb phrase, and the child entity name is the object.

EXAMPLES:

Every PROJECT is always supported by one or many ACCOUNT(s)

A MAINTENANCE-REQUEST may generate zero, one, or many MAINTENANCE TASK(s)

d. In addition to the basic components of the data model, there are various associations to other models, such as activity models and organizational and geographic structures, which provide a comprehensive view of the architecture of the enterprise. A broader explanation of the relationship between activity models and data models is provided in Appendix B.

C. PRIME WORD (ENTITY) STANDARDIZATION PHASES

The procedures described in this manual relate to those in DoD 8320.1-M-1 (reference (b)). As a model proposal moves through the model review process, its entities and attributes move through the data element standardization process as prime words and data elements. The following summarizes the standardization phases for a prime word (entity) and how it is related to the model review process:

1. Developmental. A prime word (entity) is considered developmental before release by the originator(s) for consideration as an extension of the DoD Enterprise Data Model. A developmental prime word is coordinated for preliminary/informal review to resolve functional and technical issues based on procedures described in Chapter 5.

2. Candidate. A prime word (entity), having met preliminary/informal review requirements, is changed to a Candidate status when its proposal package is submitted into the formal approval process by the FDAd, designated as the proposal package functional data steward. As a result of the cross-functional review, conducted during the formal approval

process, the decision will be made to approve, disapprove, or submit the candidate prime word (entity) for issue resolution.

3. Approved. A prime word (entity) is approved when it has been coordinated through the formal functional and technical review process and has been approved for use. An approved prime word is considered an extension to the DoD Enterprise Data Model.

4. Disapproved. A candidate prime word (entity) is changed to disapproved if it is determined to be technically or functionally noncompliant during the formal review process.

5. Modified. When an approved prime word (entity) in the DoD Enterprise Data Model is being considered for change, a proposal package describing the modified prime word is submitted. The proposal shall undergo a preliminary and/or informal review, whereby it shall satisfy functional and technical requirements. After the informal review, the modified prime word undergoes the same formal review process as a new candidate. If the modified proposal is approved, the new version of the prime word becomes part of the DoD Enterprise Data Model. A history of modifications made to a prime word is tracked over time through version numbers assigned to subsequent approved versions of the prime word in the DDRS.

6. Archived. When an approved prime word (entity) in the DoD Enterprise Data Model is no longer considered a DoD information requirement, a proposal is submitted that identifies the prime word as a candidate for archive. The archive proposal undergoes the same formal review process as a new candidate. If approved, the status of the latest version of the prime word (entity) is changed to Archived.

7. Reinstated. An archived prime word (entity) is changed to a reinstated status when the archived entity is being considered for reinstatement without modification to the DoD Enterprise Data Model. A reinstated prime word (entity) undergoes the same formal review process as the candidate. An archived entity being considered for reinstatement with modification is processed as a new developmental prime word.

CHAPTER 4

DoD ENTERPRISE DATA MODEL DEVELOPMENT AND APPROVAL PROCEDURES

A. INTRODUCTION

1. This chapter describes procedures for developing and approving extensions to the DoD Enterprise Data Model. New versions of the DoD Enterprise Data Model, resulting from these procedures, will be used to produce standard data. Specifically, approved entities will become standard prime words with functional data stewards. As entities are approved, their attributes will become candidate data elements for approval in accordance with DoD 8320.1-M-1 (reference (b)).

2. Proposal packages shall be prepared in accordance with proposal package preparation guidelines provided in Chapter 5, technical and functional requirements described in Chapter 6, and DoD 8320.1-M-1 (reference (b)).

3. There are two alternative paths for preparing and submitting functional data model proposal packages to extend and/or modify the DoD Enterprise Data Model. The first is through the use of rapid data standardization collaborative sessions introduced in the Rapid Data Standardization Guidance document (reference (j)). The second is through FDAd, CDAd and functional data steward coordinated reviews. Both of these alternatives produce a data model proposal package(s) for submission to the formal 8320.1-M-x review process.

4. The rapid data standardization collaborative sessions alternative is shown in Figure 4-1. The goal of these sessions is to minimize the amount of time required to prepare a proposal package for submission to the formal review process. This is done by bringing functional stakeholders and SMEs into one place for rapid proposal preparation, review, and issue resolution. This process consists of the following three basic steps:

a. Identify and Select Projects. Collaborative session candidate projects are nominated by FDAds and CDAds based on designated migration systems. Projects are reviewed and selected by the DoD DAd. Each project selected will have a migration system or application topic (e.g., GCCS / GSORTS) and a data topic (a DoD Data Model subject area, e.g., Location).

b. Plan and Hold Collaborative Sessions. Collaborative sessions are planned by FDAds, the DoD DAd, and CDAds; managed by the DAPMO and an outside facilitator; and attended by FDAds, CDAds, DAPMO representative(s), Cfdads, and other SME's. The output of rapid data standardization sessions is candidate data in the form of data model proposal packages ready for formal review. These proposal packages contain functionally and technically reviewed data models with entities (prime words) and attributes (data elements) and their supporting metadata.

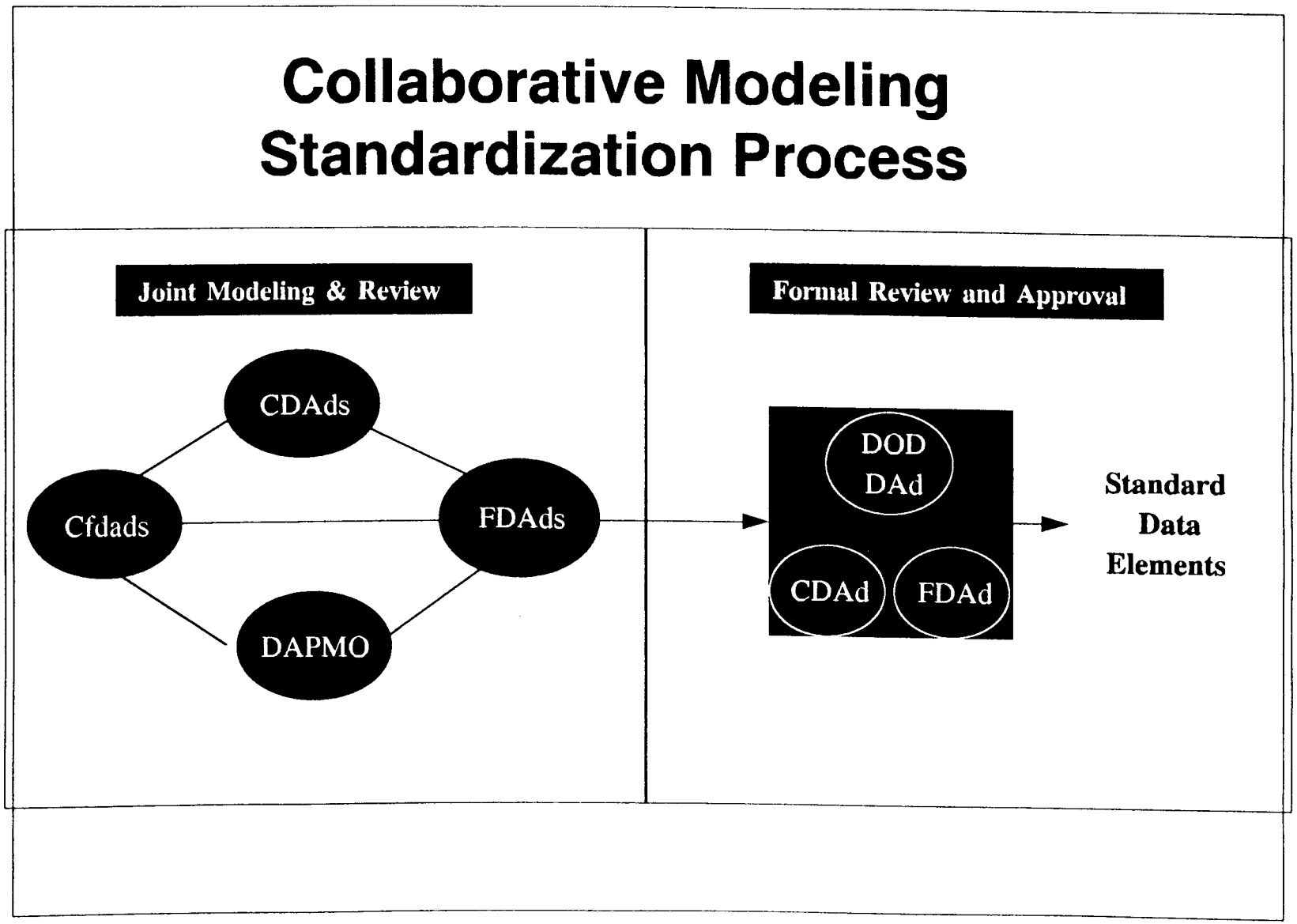

Figure 4-1: Model Development and Review Using Rapid Data Standardization Collaborative Sessions

c. Conduct a Formal Review

(1) During the formal review process, the DoD DAd, supported by representatives from DAPMO, will validate the technical review conducted during the rapid data standardization collaborative sessions. They will create a new proposed view of the DoD Enterprise Data Model and coordinate the cross-functional review.

(2) If changes are proposed to any approved entities or attributes, users of those entities or attributes that are registered in the DDRS will be contacted and invited to contribute to the cross-functional review.

(3) After evaluating the results of the cross-functional review with the FDAd designated as the proposal package functional data steward, the DoD DAd will decide to approve or disapprove the proposal package, or forward issues for resolution to the DASD(IM).

5. The FDAd, CDAd, and functional data steward coordinated reviews alternative, depicted in Figure 4-2, consist of three basic steps: prepare a proposal package and conduct a preliminary review, conduct an informal review, and conduct a formal review.

a. Prepare a Proposal Package and Conduct a Preliminary Review

(1) A proposal package, consisting of a proposed model/model subset, is required to extend or update the DoD Enterprise Data Model. The proposal package is submitted by the originator (any person within DoD or representing a DoD organization) to the originator's respective FDAd or CDAd to begin the data model review process.

(2) Upon receipt of the proposal package, the FDAd or CDAd conducts a preliminary review. The preliminary review is an iterative process between the originator and the FDAd or CDAd to ensure the quality of the proposal package before it is submitted to the FDAd, designated as the proposal package functional data steward, for informal review. The quality of a proposal package will be measured in terms of functional and technical compliance.

(3) The preliminary review includes selecting functional data stewards for the overall proposal, and each proposed entity and attribute. If functional data stewardship assignments cannot be made based on the functional content of the proposal package, an individual entity, or attribute, then the DoD DAd should be consulted. The DoD DAd will work with the FDAd or CDAd to select and assign appropriate proposal, entity, and/or attribute functional data stewards. Functional data steward responsibilities are discussed in Chapter 2.

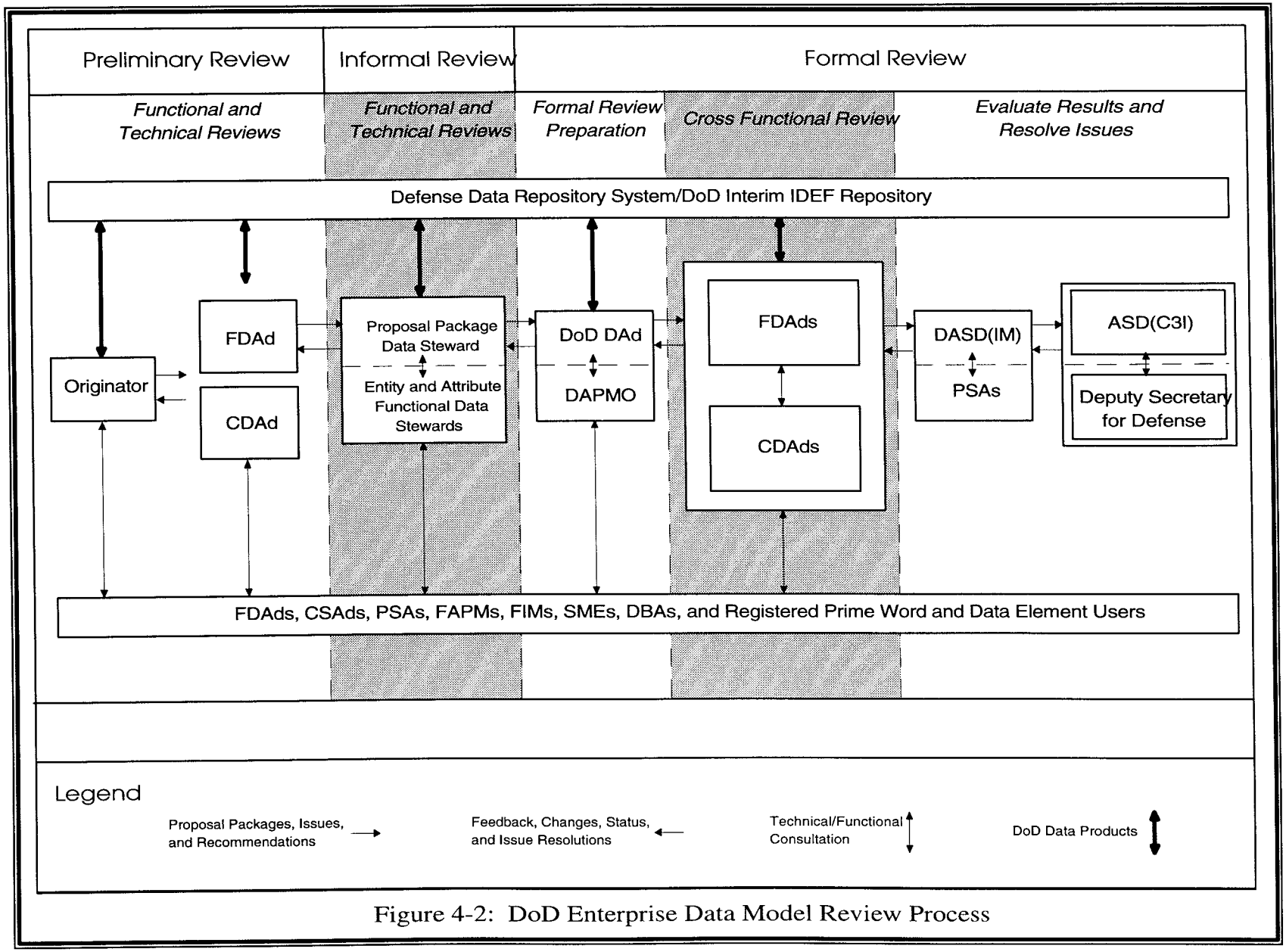

Figure 4-2: DoD Enterprise Data Model Review Process

b. Conduct an Informal Review

(1) The informal review is an iterative process between the FDAd designated as the proposal package functional data steward, entity functional data stewards, attribute functional data stewards, OSD PSAs, CDAds, and other SMEs.

(2) During this iterative process, the proposal package functional data steward coordinates, schedules, and prioritizes model/model subset reviews, validates functional data stewardship assignments and ensures that functional and technical reviews are conducted consistently. If needed, the DoD DAd will also be consulted during this review to resolve functional data stewardship assignment and technical issues.

(3) Upon completing the informal review, the proposed model/model subset is submitted for formal review by the proposal package functional data steward.

c. Conduct a Formal Review

(1) During the formal review process, the DoD DAd, supported by representatives from the DAPMO, will perform a technical review on the proposal package, create a new proposed view of the DoD Enterprise Data Model, and coordinate the cross-functional review.

(2) If changes are proposed to any approved entities or attributes, users of the those entities or attributes that are registered in the DDRS will be contacted and invited to contribute to the cross-functional review.

(3) After evaluating the results of the cross-functional review with the FDAd, designated as the proposal package functional data steward, the DoD DAd will decide to approve or disapprove the proposal package or forward issues for resolution to the DASD(IM).

6. Store/Maintain DoD Data Products

a. Prime words; standard data elements developed from attributes; and associated required metadata produced by the rapid data standardization and FDAd, CDAd, and functional data steward review processes will be stored, reviewed, and maintained in the DDRS. Entities (prime words) and attributes (data elements) should be entered into the system as early as possible to support automated review, access, and comment. Procedures for maintaining DoD Enterprise Data Model entities (prime words) are discussed in Chapter 7. Procedures for maintaining standard data elements are discussed in DoD 8320.1-M-1 (reference (b)). Versions of each prime word and standard data element will be recorded in the DDRS for reference and archive purposes. Contact the DAPMO to obtain access to and documentation for the DDRS.

b. Data models will be stored in the DoD Interim IDEF Repository. This includes both the DoD Enterprise Data Model and individual functional area models used to expand the DoD Enterprise Data Model. Contact the Center for Information Management (CIM) Center for Functional Process Improvement Expertise to obtain access to and documentation for the DoD Interim IDEF Repository.

B. RAPID DATA STANDARDIZATION COLLABORATIVE SESSIONS

1. The goal of these sessions is to minimize the amount of time required to prepare a proposal package for submission to the formal review process. This is done by bringing functional stakeholders and SMEs together for rapid proposal preparation, review, and issue resolution. Note that this process is one technique for completing the package review and approval process and is not required.

This process consists of three basic steps: identify and select projects, plan and hold collaborative sessions, and conduct formal reviews.

2. Identify and Select Projects

a. Candidate projects are nominated by FDAds and CDAds based on important migration system, functional and/or cross-functional standard data, and/or BPR requirements.

b. Each project selected will have a migration system or application topic (e.g., GCCS/GSORTS) and a data topic (a DoD Data Model subject area, e.g., Location).

c. Each project selected will extend a subject area portion of the DoD Data Model in sufficient detail to ensure that data requirements of the system/application at issue are represented and can be standardized.

d. Candidate projects are reviewed and selected by the DoD DAd based on project scope, duration, functional and cross-functional importance to DoD, quality and quantity of available documentation, expertise of participants, and return on investment for the Department.

3. Plan and Hold Collaborative Sessions

a. Collaborative sessions are planned by FDAds, the DoD DAd, and CDAds. Meetings are held to identify what information exists, prioritize subfunctional and interfacing areas to be addressed, identify and prioritize preparatory tasks, set a schedule, and identify who, at a minimum, needs to be involved.

b. DAPMO representatives with input from the co-chairs plan the facilities, sessions, and an agenda to accommodate and facilitate representative participation.

c. Projects are managed by the DAPMO and facilitated by a third party.

d. Projects are controlled by stringent time-lines agreed to by the co-chairs and implemented by the DAPMO and the facilitator.

e. Participants will provide pertinent documentation 10 days before the session and co-chairpersons will consolidate the information and provide copies to the participants before each session.

f. Participants will have the authority to represent their organizations in situations requiring technical and functional decisions.

(1) The DAPMO representative will be the decision authority for all procedural or technical issues.

(2) The FDAd, who has stewardship over the subject area that is the data topic for the rapid data standardization project, shall be the decision authority for intrafunctional or cross-functional issues.

g. Issue resolution outside the rapid data standardization collaborative session will be kept to a minimum. Issues that will be decided outside the collaborative sessions include:

(1) Issues that adversely affect readiness or inability to comply with the law. These issues will be tabled and brought to the attention of the appropriate OSD PSA for resolution.

(2) Data stewardship assignment, and conflicting functional and technical issues. These issues will be documented and brought to the attention of the DoD DAd for resolution within 48 hours.

(3) Issues that can not be resolved by participants in the collaborative session. When a resolution is unattainable, it will be brought to the attention of the ASD(C3I).

h. The output of rapid data standardization collaborative sessions is functionally and technically reviewed candidate data in data model proposal packages ready for formal review.

4. Formal Reviews

The formal review process is covered in detail under Section D, Formal Review.

C. PRELIMINARY AND INFORMAL REVIEWS

1. Prepare a Proposal Package and Conduct a Preliminary Review

a. The purpose of a proposal package is to submit models being proposed to extend or update the DoD Enterprise Data Model. An update may increase or decrease the number of data objects in the DoD Enterprise Data Model. The proposal package is required to begin the DoD Enterprise Data Model review process. Proposal package size, contents, and media for submission are discussed in greater detail in Chapter 5.

b. Ideally, the package should propose a data model/model subset based on a tightly integrated function (existing or proposed) or contained in a single functional area. The number of entities and relationships will be larger if the integrated function covers multiple concepts, activities, or functional areas.

c. When a large model is being used for a proposal, a number of proposal packages, each based on a partition of a manageable size, should be prepared in accordance with guidance provided in Chapter 5.

d. Subsets of the latest version of the DoD Enterprise Data Model should be included in the proposal package permitting better, clearer definition of the context of the proposed entities and relationships. These standardized components will represent model and semantic context rather than additional work tasks.

e. Any person within DoD or representing a DoD organization (i.e., originator) may propose to extend or update the DoD Enterprise Data Model by preparing and submitting a proposal package for preliminary review. A proposal package can only be submitted for formal review by the FDAd designated as the proposal package functional data steward. When preparing the package, the originator is responsible for ensuring that:

(1) The package is complete and contains the requirements described in Chapter 5.

(2) The information in the proposal package adheres to technical and functional requirements as described in Chapter 6 and in DoD 8320.1-M-1 (reference (b)).

f. The originator should submit the proposal package, for preliminary review, to his/her respective FDAd or CDAd in accordance with Functional or Component procedures. Such procedures shall conform to DoD Data Administration policies and procedures. The appropriate channels for submission are:

(1) Proposals originating in support of an OSD functional area or Joint Warfighting requirement will be submitted to the respective FDAd.

(2) Proposals originating within a Component or at the component level will be submitted to the CDAd.

g. Upon receipt of the proposal package, the FDAd or CDAd will conduct a preliminary review. The preliminary review ensures that the proposal package adheres to the content requirements outlined in Chapter 5 and technical and functional requirements described in Chapter 6. Guidelines on the functional and technical components of reviews are described later in this chapter.

h. During the preliminary review, proposed entities are reconciled with the current DoD Enterprise Data Model. Guidelines on entity reconciliation are addressed below.

i. Either the FDAd or the CDAd will review the proposal as follows:

(1) The FDAd will perform a preliminary review of the proposal to ensure compliance with Functional and DoD Data Administration rules and procedures; or

(2) The CDAd will perform a preliminary review of the proposal at the DoD component level to ensure compliance with Component and DoD Data Administration rules and procedures. The Component's functional representatives are encouraged to discuss the proposals with their DoD functional counterparts before submitting the proposals to the CDAd and during the Component preliminary review.

j. Functional data stewardship assignments are validated and/or made during the preliminary review. The proposal package functional data steward will be the primary coordinator for the informal review and will work with the originator, submitting FDAd or CDAd, entity and attribute functional data stewards, the DoD DAd, and SMEs during all subsequent reviews. The entity and attribute functional data stewards will help coordinate questions, issues, and support maintenance for the individual entities and attributes that they represent. If issues exist for a functional data stewardship assignment, the DoD DAd should be consulted for a resolution. Guidance for assigning functional data stewards is discussed in Chapter 2.

k. Upon completing the preliminary review, the FDAd or CDAd will submit the proposal for informal review to the FDAd designated as the proposal package functional data steward. A copy of the proposal package will be furnished to the DoD DAd.

2. Conduct an Informal Review

a. The FDAd designated as the proposal package functional data steward, with guidance from the DoD DAd, will conduct an informal review upon receipt of the proposal package. The informal review consists of both functional and technical reviews and ensures that the proposed model/model subset adheres to mandatory technical and functional requirements described in Chapter 6. The contents of the proposal package will also be

reviewed to ensure that the content requirements outlined in Chapter 5 have been met. Guidelines on the functional and technical aspects of the reviews are discussed below.

b. The DoD DAd will coordinate with the FDAd designated as the proposal package functional data steward to establish a strategy and plan for reviewing the proposed model/model subset and providing feedback to the submitting CDAd or FDAd. The FDAd designated as the proposal package functional data steward will track the status of the proposal and keep the submitting FDAd or CDAd informed of progress and results.

c. The proposal package functional data steward, or a designated representative, should enter all new or modified entities (prime words), attributes (data elements), and associated required metadata into the DDRS during this review. The status of these prime words and data elements will be developmental. Prime words and data elements in the DDRS can be accessed and reviewed by other reviewers. Access to the DDRS can be requested for all stakeholders who do not already have access, through the DAPMO. The DDRS provides automated support for the review process and entry of prime words and data elements is the first step towards preparing for formal review.

d. Proposal package functional data stewards should coordinate with entity and attribute functional data stewards, FAPMs, OSD PSAs, DoD Fibs, and other SMEs to ensure that their views are fully represented. The functional data stewards are also encouraged to discuss proposals with functional counterparts within Components, CDAds, and the proposal originator.

e. The informal review is a critical process in the development of the DoD Enterprise Data Model. It is designed to ensure the quality of the model proposal before it is submitted for formal review. The goal of the informal review is to ensure that the proposal adheres to functional and technical requirements. The FDAd designated as the proposal package functional data steward and the DoD DAd will coordinate efforts to ensure that technical standards are consistently applied, functional and technical reviews are conducted in concert, and technical issues are resolved. The proposal package functional data steward shall apply technical standards during each functional review. The DoD DAd will conduct technical reviews, provide feedback, and resolve technical issues, as needed.

f. The informal review is an iterative process to ensure that functional and technical reviews are conducted concurrently. Over time, it is expected that as experience is gained, lessons are learned, and functional area data models are completed, the number of iterations between functional and technical reviews should decrease dramatically and the need for an informal review will diminish.

g. During the informal review, all efforts will be taken by the FDAd designated as the proposal package functional data steward, to avoid rejecting the proposal. The DoD DAd will work with the proposal package functional data steward to clarify technical issues and resolve conflicts. There are some occasions, however, where it may be

more efficient to reject all or part of a proposal and return it to the submitter. All or part of a proposal can be rejected for the following reasons:

(1) Incomplete or incorrect proposal package contents.

(2) Unreconcilable technical and/or functional problems.

h. If all or part of a proposal package is rejected, it will be returned to the submitter with reason(s) for the rejection and suggestions for improvement. When this happens, the submitter may address the informal review comments and resubmit the proposal. The FDAd will notify the DoD DAd of actions taken against rejected proposals.

i. The FDAd will notify the DoD DAd when proposals are ready for formal review and provide functional recommendations. Proposals that have not undergone a technical review by the DoD DAd may not be submitted for formal review. The FDAd may submit proposals for formal review when:

(1) The FDAd and DoD DAd both agree that functional and technical requirements have been met.

(2) The FDAd feels that functional requirements have been met, but the DoD DAd feels that technical requirements have not been met.

D. FORMAL REVIEW

1. The formal review process will be conducted within 40 workdays. The formal review process consists of:

a. Preparing a formal review package (1-10 workdays),

b. Conducting the cross-functional review (1-20 workdays), and

c. Evaluating results of the formal review (1-10 workdays) and resolving issues.

2. The formal review ensures that the proposed DoD Enterprise Data Model entities and relationships are represented uniformly with a DoD perspective. This review provides all DoD FDAds and CDAds the opportunity to review the proposed extensions to the DoD Enterprise Data Model from a cross-functional perspective. The DoD DAd evaluates any recommendations generated during the cross-functional review and decides to approve, disapprove, or submit issues for resolution. Throughout the formal review process, the DoD DAd will monitor the status of each proposal. See Section E of this chapter for guidelines to be applied when conducting reviews.

3. Prepare Formal Review Package

Within 10 workdays of receiving proposal package functional data steward notification, the DoD DAd will prepare a formal review package consisting of the proposed DoD Enterprise Data Model, information from the original proposal package, functional recommendations, and technical review results. The proposed DoD Enterprise Data Model is prepared by integrating the proposed model view with the current DoD Enterprise Data Model. See Section F, below, for guidelines on integrating data models. Preparation for formal review also includes changing the status of proposed/modified prime words (entities) and data elements (attributes) to Candidate in the DDRS. The DoD DAd will send the formal review package to all FDAds and CDAds and officially notify them of the formal review via the DDRS. If the proposal contains proposed modifications to approved DoD Enterprise Data Model entities (prime words) and attributes (data elements), then the proposal package will also be sent to users of the prime words and data elements registered in the DDRS.

4. Conduct Cross-Functional Review

a. The cross-functional review will be completed within 20 workdays of official notification. The review period begins on the first full day after notification is sent out. The cross-functional review ensures:

(1) The candidate entity(ies) and attribute metadata are clear, meaningful, and consistent with cross-functional area mission and information requirements,

(2) The candidate entity(ies) and associated attributes are represented uniformly with a DoD perspective so that they can be interpreted consistently,

(3) The candidate entity(ies) and associated attributes conform to the technical standards described in Chapter 6 and in DoD 8320.1-M-1 (reference (b)), and

(4) The entity relationships accurately reflect business rules that are implemented uniformly with a DoD perspective.

b. The cross-functional review package will contain a hardcopy of the overall model ERD and proposal package model subset ERD (if applicable), and a list of proposed/modified prime word and data element names in the proposal with DDRS Counter Identifiers.

c. Reviewers should look over the ERD and examine the prime words, data elements, descriptions, and all associated metadata in the DDRS.

d. FDAds are responsible for coordinating with FAPMs, OSD PSAs, DoD Fibs, and other SMEs to ensure that their views are fully represented. FDAds are required to review and provide comments within the specified timeframe. No response indicates

concurrence.

e. CDAds, representing their Component's interest, may review the proposal but are not required to provide comments. They are also encouraged to coordinate with functional area experts within the component organization they represent to ensure that their views are fully represented.

f. Comments may be returned in writing or through the DDRS.

g. Rejection of all or part of a proposal shall be supported by:

(1) A full justification including documentation (source regulations, mission statements, official policy, DoD Directives, Laws, etc.) to support the rejection.

(2) One or more technically and functionally compliant, DoD-consistent alternatives.

h. Comments received after the 20-day window may not be accepted.

5. Evaluate Results of Cross-Functional Review

a. The DoD DAd evaluates the recommendations from the cross-functional review. The purpose of the evaluation is to obtain consensus with the FDAd designated as the proposal package functional data steward on a final decision. The final evaluation should be conducted within 10 workdays after completing the cross-functional review.

b. The DoD DAd will coordinate with the FDAd designated as the proposal package functional data steward to resolve functional and technical issues that were raised during the cross-functional review. Although all efforts will be made by the DoD DAd to resolve issues within 10 workdays, the issues may be coordinated for a longer period of time at the discretion of the DoD DAd.

c. Based upon the results of the evaluation and coordination, the DoD DAd will either approve or disapprove the proposed extensions/modifications to the DoD Enterprise Data Model and resulting prime word(s) or forward issues for resolution.

(1) When the proposed DoD Enterprise Data Model is approved, the DoD DAd will change the status of the affected candidate prime word(s) in the DDRS to Approved. The DoD DAd will notify the OSD PSAs and the FDAd designated as the proposal package functional data steward of the approval. The steward, in turn, will notify the submitter of the change in status.

(2) When the proposed DoD Enterprise Data Model is disapproved, the DoD DAd will change the status of the affected candidate prime word(s) in the DDRS to

disapproved. The FDAd designated as the proposal package functional data steward will notify the submitter of the disapproval and any recommended actions. Either the originator, the submitter, or the proposal package functional data steward may elect to make the necessary changes to the proposal package and resubmit the package for informal review.

(3) Issues requiring resolution will be forwarded to the DASD(IM).

d. Resolve Issues

(1) The only time that extensions, modifications, and new versions of the DoD Enterprise Data Model will come before the DASD(IM) will be when there are issues to be resolved.

(2) The DoD DAd will forward issues for resolution along with recommendations to the DASD(IM). The DASD(IM) will resolve the issue and notify the DoD DAd and the FDAds of the decision.

(3) The DASD(IM) will consult with the OSD PSAs as needed to gather information and recommendations since they were consulted/participated in the preparation and informal review of the proposal packages.

(4) If the DASD(IM) cannot resolve an issue, it will be given to the Defense Senior IM Official ASD(C3I) for resolution or forwarded to the Deputy Secretary of Defense for final resolution.

(5) The DAPMO will record all issues, options, and decisions. For future justification and reference, the DAPMO will record who made them and the rational behind them.

E. FUNCTIONAL AND TECHNICAL REVIEWS

1. The functional and technical components of model reviews are needed to ensure the quality of the DoD Enterprise Data Model. These reviews are conducted throughout the DoD Enterprise Data Model development and approval process at all levels of data administration.

2. Reviews are conducted by CDAds, FDAds, and the DoD DAd. Other functional stakeholders, and SMEs contribute to these reviews through coordination with the FDAds, CDAds, and the DoD DAd.

3. Regardless of the type of review or who is conducting the review, the goal of any DoD Enterprise Data Model review is the same: "To ensure the proposed entities, attributes, and relationships adhere to mandatory technical and functional requirements and are represented uniformly with a DoD-wide perspective." Each review is conducted as a

coordinated iterative process whereby functional and technical standards are consistently applied. Reviews are also conducted to ensure the proposal package contains all required information and to resolve issues.

4. Approval procedures for attributes provided in this document are supportive of approval procedures for data element standards provided in DoD 8320.1-M-1 (reference (b)), but do not replace data standardization approval procedures. Data element standardization approval procedures should be conducted simultaneously with data model approval procedures to ensure that standard data element specifications match attribute descriptions.

5. Functional and Cross-Functional Review

a. The functional review ensures that entity (prime word) and attribute (data element) definitions are clear, meaningful, and consistent with functional area objectives. The cross-functional review ensures that the entity and attribute are represented uniformly with a DoD perspective and that the metadata and business rules expressed in entity relationships are consistent DoD-wide.

b. FDAds are primarily responsible for conducting functional reviews, as functional data stewards, and participating in cross-functional reviews. The CDAd contributes to the informal functional reviews, and although not required, may also participate in cross-functional reviews. When conducting functional reviews, the FDAds should coordinate with OSD PSAs, FAPMs, DoD Fibs, and SMEs to ensure that they are fully represented. They are also encouraged to coordinate with functional counterparts in the Components, CDAds, the proposal originator and any users of the proposed entities (prime words) and attributes (data elements) known and/or registered in the DDRS.

c. During the functional review, the FDAd, designated as the proposal package functional data steward, and the DoD DAd shall coordinate efforts to ensure that technical standards are consistently applied, functional and technical reviews are conducted in concert, and technical issues are resolved.

d. The goals of both functional and cross-functional reviews are to accomplish the following:

(1) Encompass the work and view of the functional areas.

(2) Identify appropriate functional experts from whom to seek assistance.

(3) Obtain cross-functional agreement on entity and attribute definitions.

(4) Identify the DoD office having primary responsibility for the data represented (data steward).

(5) Discuss and possibly identify new entities, attributes, and data stewards.

(6) Validate the need for entities and attributes within the framework of the DoD Enterprise Data Model.

(7) Discuss and validate entity relationships.

(8) Document how entity attribute definitions were validated and agreed upon.

(9) Ensure uniqueness of entities and attributes.

(10) Validate the proposed integrated DoD Enterprise Data Model.

(11) Ensure that technical standards are continuously applied.

6. Technical Review

a. During the technical review, the proposed entities and attribute are reviewed to ensure that they conform to DoD Data Administration requirements and do not conflict with existing approved, candidate, or modified entities. The technical review applies the rules for entity and attribute design, definition, and naming. Before the cross-functional review can be performed, the DoD DAd also performs an impact analysis and validates and/or integrates the proposed extension or changes with the current DoD Enterprise Data Model to create a new proposed integrated view. See Section F, below, for guidelines on integrating data models.

b. FDAds shall continuously apply technical standards when conducting the functional review. The DoD DAd will assist the FDAds by conducting technical reviews, providing feedback, and resolving technical issues. The DoD DAd is responsible for ensuring that technical standards are applied before entities are approved. The DoD DAd will conduct a technical review on every entity before it is submitted as a candidate entity.

c. The goals of the technical review are to accomplish the following:

(1) Further ensure that the candidate entity and attributes do not conflict with any existing candidate or approved entities and attributes.

(2) Ensure that the candidate entity and attributes are represented uniformly within the context of DoD as a whole, rather than a unique functional or

component perspective.

(3) Validate and integrate the proposed model entities and attributes with the current DoD Enterprise Data Model to create a proposed integrated view of the DoD Enterprise Data Model. See Section F, below, for instructions on how to reconcile and integrate data models.

(4) Ensure all entity and attribute metadata information is complete and conforms to the requirements set forth in Chapter 6 and DoD 8320.1-M-1, (reference (b)).

(5) Validate entities within the framework of the DoD Enterprise Model.

(6) Ensure that normalization and key migration are correct.

(7) Verify and evaluate cardinality and relationship names.

(8) Verify and assign functional stewardship. The DoD DAd has final say in all data steward disputes.

F. ENTITY RECONCILIATION AND MODEL INTEGRATION

During all data model reviews described above, proposed entities should be reconciled and the proposed data model/model subsets should be integrated with the DoD Enterprise Data Model using procedures described below.

1. Entity Reconciliation

a. Proposed entities shall be reconciled with the current DoD Enterprise Data Model as follows:

(1) Confirm that a suitable entity does not already exist by reviewing all proposed, approved, disapproved, candidate, modified, and archived entities that have the same or similar names or structure based upon the definition and relationships. This process compares proposed entities with those in the DoD Enterprise Data Model and designates the pair as one of the following:

(a) Identical. There is an exact match in primary key attributes, nonkey attributes, and/or relationships.

(b) Similar. Adjustments can be made to the proposed key and/or nonkey attributes that make the proposed entity identical to an entity in the DoD Enterprise Data Model. The result of these changes shall not alter "what" the proposed entity describes.

(c) Different. There is not an identical or similar match in the DoD Enterprise Data Model.

(d) Identical/Similar with Different Relationships. The DoD Enterprise Data Model entity and the proposed entity have identical/similar attributes, properties, and keys, but there are still nonidentifying relationship differences.

(2) Determine, by comparison, those entities and attributes that are identical. A comparison is done between the proposed view and the DoD Enterprise Data Model. Each proposed name is compared with each name in the DoD Enterprise Data Model. When an entity match occurs, a comparison is done with the definition, relationships, key name, key definition, and instances of each pair of entities. When an attribute match occurs, further comparison is done with the meta attribute information for each pair.

(3) Resolve Synonyms and Homonyms. Compare two names that have some degree of similarity either in the name or the definition or two definitions that have some degree of similarity with different names.

(4) Resolve Relationship Inconsistencies. Identify relationships that duplicate the business rule or meanings within the DoD Enterprise Data Model and consolidate them.

(a) Determine if a new relationship is free of conflict with existing relationships.

(b) Ensure the parent and child direction is correct.

(c) Resolve many-to-many relationships where appropriate for improving the value of the model as a tool for jump starting data modeling efforts and supporting functional integration.

(d) Ensure category entities are a subset of the fundamental entity definition.

(5) After proposed entities and attributes are reconciled, those entities or attributes that are identified as different, newly created, split, or formed as new categorizations are documented in the proposal package. If a reconciliation should produce changes to the proposal, the FDAd, CDAd, or originator should be involved to enhance understanding on both sides and improve the quality of the product.

(6) Entities and attributes that cannot be resolved by the FDAd or CDAd and/or originator are documented and returned to the originator.

(7) Accepted entities and attributes should be further reviewed to

ensure validity and to check that keys and relationships do not conflict or overlap with other entities.

2. Model Integration

a. The proposed data model shall be integrated with the current DoD Enterprise Data Model to create a proposed integrated view. Integration also further reconciles the entities and relationships with the DoD Enterprise Data Model, modifying the proposal or adjusting the DoD Enterprise Data Model based on the new information.

b. Integration is the process of combining and adapting two data model views to produce the best optimal view with a broader scope. The process creates a new view in compliance with data standards and modeling technique rules by identifying entities' similarities and differences. A technical review is done to ensure that normalization and key migration is correct. The new view is considered to be the proposed integrated data model.

c. The resulting view shall uphold the following two major aspects during integration:

(1) The business aspect shall continue to be appropriate to the specific functional area. The Integration Team shall understand and preserve the business view by consulting with functional specialists.

(2) The technical aspect shall be accurate and enforce rules of data standards. The entity names and definitions shall continue to conform to the entity design, naming, and definition rules described in Chapter 6. Attribute names and definitions shall continue to conform to the design, naming, and definition rules described in DoD 8320.1-M-1 (reference (b)).

d. Integration with the DoD Enterprise Data Model is composed of three processes:

(1) Validate proposal and fully develop the proposed view into a complete and error free data model,

(2) Merge the proposed view with the working copy of the DoD Enterprise Data Model to create the proposed integrated view, and

(3) Normalize the DoD Enterprise Data Model to 3NF for formal review.

e. These processes result in proposed entities and attributes being assimilated into the DoD Enterprise Data Model along with relationships and primary keys. The resulting model components shall be evaluated for correctness and assurance that a realistic

representation of the DoD business is reflected after accommodating the changes. Each process requires a review for data standards compliance to ensure rule infractions do not occur when changes are made to entities, attributes, or keys.

CHAPTER 5

PROPOSAL REQUIREMENTS

A. INTRODUCTION

This chapter describes preparation of, and required contents for, a proposal package to extend or update the DoD Enterprise Data Model. The proposal package is used to propose a data model/model subset (generally subset) based on a tightly integrated function (existing or proposed), or contained in a single subject area for incorporation into the DoD Enterprise Data Model. A series of checklists has been developed to support proposal package preparation. These checklists are presented in Appendix C.

B. PROPOSAL PACKAGE SIZE

1. Proposal packages should be of such a size and complexity that the proposed data model/model subset can be understood and placed in context with other models containing related functions or entities.

2. When a large model is being used for a proposal, it should be partitioned into subsets that can be submitted in multiple proposal packages, each with less than or equal to 20 entities and 200 attributes.

a. Each subset proposal package should be prepared in accordance with guidelines in this chapter.

b. Each subset of the larger model should represent a logical grouping of entities based on related functional content.

c. The related subset proposal packages do not need to contain model components that are mutually exclusive.

d. An entity can be proposed in more than one subset proposal package when the entity has a large number of relationships that extend across the larger model into multiple partitions.

e. Each subset should attempt to capitalize on the current DoD Enterprise Data Model components.

C. PROPOSAL PACKAGE CONTENTS AND MEDIA

1. The proposal package shall include a graphic representation of the model/model subset in the form of an ERD. The ERD should be submitted in both hardcopy and softcopy

form with a discussion of the scope, function, and development technique. The preferred technique for developing ERDs is IDEF1X (see discussion in Chapter 2, above). Regardless of the technique used, the ERDs should be logical, attributed (including keys), normalized data models, or data model subsets depicting clusters of related entities. Relevant subsets of the latest version of the DoD Enterprise Data Model should be included for contextual reference and review.

2. If the proposal package represents a partition of a larger model, a graphical high-level ERD summarizing entities and relationships for the entire model should be provided. This ERD should identify the specific entities from the overall model included in the associated proposal package. This high-level ERD should also be submitted in hardcopy and softcopy with a discussion of the scope, functional partitioning approach, and development technique.

3. The proposal package shall also include a list of all entities, attributes, and DDRS Counter Identifiers. This list should include relevant, approved DoD Enterprise Data Model entities and attributes from the latest version of the DoD Enterprise Data Model. This information will provide a better, clearer definition of the context of the proposed entities and their relationships to the DoD Enterprise Data Model. The list of entities and attributes will be distributed with the graphical model diagrams discussed above, to assist reviewers in locating and reviewing proposed entities and attributes in the DDRS during the formal cross-functional review.

4. If there is some technical reason why entities, attributes, and associated metadata cannot be entered into the DDRS, this information will be accepted in hard and softcopy format. The preferred format for softcopy delivery of this information is the DDRS Batch Input Format. This format is defined in the DDRS End User Manual (reference (k)), which is available from the DAPMO.

5. Information entered into the DDRS does not need to be provided in hardcopy or softcopy with the proposal package, with the exception of the list of entities, attributes, and DDRS counter identifiers discussed above. Information not entered into the DDRS should be provided in hardcopy and softcopy with the proposal package diagrams discussed above. This includes basic package information, relationship information, and attribute role names.

D. BASIC PACKAGE INFORMATION

Each proposal package should contain the following basic information:

1. DoD Sponsoring Organization. The DoD sponsoring organization is the organization that developed the proposal. The originator or point of contact is the person who is representing the sponsoring organization. The originator should provide his/her name and the organization's name, address, and telephone number. The originator's organization shall be a DoD organization or represent the DoD sponsoring organization.

2. Version Number of the DoD Enterprise Data Model. The version number, which

includes the date of publication, will be used to identify the version of the DoD Enterprise Data Model that the proposal will modify.

3. FDAd or CDAd's Name and Organization. The FDAd or CDAd is the person who received the proposal package from the originator. This person will review and coordinate all proposal packages for the organizations within his/her functional area or Component.

4. FDAd designated as the proposal package functional data steward.

5. Functional area identification code for the functional area responsible for all or most of the data items being proposed in the package to extend the DoD Enterprise Data Model.

6. Model Component Count. This count is the number of each type of model components (i.e., number of entities, number of attributes, and number of relationships). This information will help determine the size and complexity of the model under review.

7. Name of the tool used to generate the ERD and reports along with a description of the information and format of the softcopy.

8. Identification of any information systems supported by the ERD.

9. Proposal packages based on non-IDEF1X data models shall provide the following information in addition to the other information specified in this chapter:

a. The technique used to develop the ERD.

b. The type of schema (i.e., conceptual, internal, or external as defined in Chapter 2) and the notations used in the ERD.

E. REQUIRED ENTITY INFORMATION

All proposed entities, attributes, and relationships should be depicted on an ERD that represents a model/model subset of related entities. Entity information discussed below shall comply with the technical and functional requirements specified in Chapter 6. Entering entity information into the DDRS is the first step towards reviewing and approving prime words for use in DoD 8320.1-M-1 (reference (b)).

1. Entity name.

2. Entity Definition.

3. Proposed entity functional data steward.

4. Functional area identification code.

5. Attribute names including any key designations (primary key, foreign key, alternate key, or candidate key).

6. Entity Submission Type. For each entity, identify whether it is developmental, candidate, modified, archived, or reinstated:

a. Developmental. Proposed for preliminary or informal review,

b. Candidate. Submitted for formal review,

c. Modified. An approved entity in the DoD Enterprise Data Model that is being modified,

d. Archived. An approved entity in the DoD Enterprise Data Model that is recommended for archival, or

e. Reinstated. An archived entity that is recommended for reinstatement to the DoD Enterprise Data Model.

7. Prime word using model name.

F. REQUIRED ATTRIBUTE INFORMATION

For each entity in the proposal, the following attribute information is needed and should be entered into the DDRS. Identifying and entering this information into the DDRS is the first step toward reviewing and approving these attributes as DoD standard data elements. Information identified below shall comply with the technical and functional requirements specified in DoD 8320.1-M-1 (reference (b)).

1. Attribute Names and Definitions. For each attribute, identify whether it is a primary key, alternate key, foreign key, or nonkey attribute.

2. Attribute Metadata Information. Provide the following metadata information for each attribute. Detailed descriptions of this information can be found in DoD 8320.1-M-1 (reference (b)).

a. Data value source list text.

b. Decimal place count quantity.

c. Authority reference text.

d. Domain definition text.

e. Domain value identifiers.

f. Domain value definition text.

g. High-range identifier (quantitative only).

h. Low-range identifier (quantitative only).

i. Maximum character count quantity.

j. Security classification code.

k. Proposed attribute functional data steward.

l. Functional area identification code.

m. Unit Measure Name (when applicable). When unit of measure name is applicable and more than one possible unit of measure exists, two documentation options exist. If the unit of measure is convertible to other units of measure through standard algorithm (i.e., distance: feet to meters), then the single most commonly used unit of measure should be entered into this metadata field. If multiple possible units of measure exist that cannot be converted using standard algorithms (i.e., cable quantity: cable by weight to cable by length), then a separate attribute (data element) should be added for managing/tracking the appropriate unit of measure for each instance of the entity.

n. Data type name.

o. Derivation type name.

p. Formula definition text.

G. REQUIRED RELATIONSHIP INFORMATION

1. Identify relationships between proposed entities.

a. All known relationships between proposed entities shall be identified.

b. New independent entities may exist and be submitted without association to other proposed entities. This provides functional area modelers the flexibility to identify, get exposure for, and get feedback on new/future information requirements as they are identified. Relationships associated with these entities should be added as they are identified through entity maintenance proposals. Entity maintenance is discussed in Chapter 6.

2. Identify relationships to existing entities in the DoD Enterprise Data Model.

3. Describe the business rule, including cardinality in terms of degree and nature for each relationship. Any additional business rules should be provided.

CHAPTER 6

ENTITY DESIGN, NAMING, AND DEFINITION RULES

A. INTRODUCTION

This chapter provides guidance for designing, defining, and naming entities; normalizing data models; and identifying primary key attributes. Specific rules for designing, defining, and naming attributes are identical to the rules for data elements described in DoD 8320.1-M-1 (reference (b)).

B. ENTITY DESIGN RULES

The quality of the data model is key to the sound foundation for data standardization and for sharing data both cross-functionally and within a functional area. Unless proper consideration is given to the creation, naming, and definition of entities, the level of quality needed to improve data sharing across the resulting data structures will be forfeited. The definition and naming of an entity is an iterative design process with the definition and entity name often being modified as the entity is being developed. The following rules are important to the quality of entities:

1. The entity design should be based on functional information requirements in support of the mission and enterprise.

2. An entity should be designed according to logical and not physical characteristics. Physical characteristics include any connotations regarding technology (hardware or software), physical location (databases, files, reports, forms or tables), organization (functional data steward, components, projects or departments), or application (systems, applications, or programs).

3. An entity should be created based on the information requirement. The entity definition should describe what it is rather than how, where, and when it is used. The entity should be named according to its definition and represent a single concept.

4. There should be no overlap or redundancy of independent entities in either the proposed model or the DoD Enterprise Data Model. For example, CAR, VEHICLE, TRUCK, and AUTOMOBILE represent overlapping concepts that should not appear as independent entities. Independent entities should be mutually exclusive (e.g., FACILITY, PERSON, and BUDGET represent three mutually exclusive concepts).

5. Normalization Rules. Data model normalization rules based on set theory for relational database design shall be applied to all entities in all logical data models. Entities shall be normalized to First, Second, and Third Normal Form (1NF, 2NF, and 3NF) (Note:

Fourth and Fifth Normal Form (4NF and 5NF) are optional). Applying normalization rules to a model often results in changes in the placement of attributes, the primary key structure of many entities, and the definition of business rules. Applying the following rules will promote accuracy and integrity of data structures.

a. First Normal Form (1NF). An entity shall be defined as a table where all instances (rows) have the same number of columns. No entity can have attributes with multiple values that result in variable length records (e.g., First Award Name, First Award Date, Second Award Name, Second Award Date). Each attribute has only one value.

b. Second Normal Form (2NF). When a primary key consists of several attributes, no subset of the primary key should determine the value of a nonkey attribute. All nonkey attributes shall be dependent on all of the primary keys (i.e., the value of a nonkey attribute cannot be learned from knowing values for only part of the primary key).

EXAMPLE

Consider a PROJECT ACCOUNT entity with the attributes project identifier, person identifier, hours worked, and person address. The key consists of project identifier and person identifier. Hours worked is determined by both the project identifier and person identifier, but person address is determined only by person identifier. To conform to 2NF, Person Address should be moved to a separate entity keyed only by Person identifier.

c. Third Normal Form (3NF). No nonkey attribute in an entity should determine the value of another nonkey attribute. The value for any nonkey attribute should depend only on the primary key.

EXAMPLE

Consider the PROJECT entity with the attributes project identifier, project sponsor identifier, and project sponsor phone number. The key consists of project identifier. Project sponsor phone number is determined by project sponsor identifier. To conform to 3NF, a separate entity should be defined to correlate project sponsor identifier and project sponsor phone number.

d. Fourth Normal Form (4NF). An attributive entity should not contain two or more independent nonkey attributes.

EXAMPLE

Consider the PERSON entity with an attributive entity called PERSON EXPERIENCE characterized by the attributes person identifier, person occupation skill code, and language identifier code. A person can have multiple occupational skills and speak multiple languages. However, the occupational skill is independent of the language skill. If a person has

occupational skills as a cook, mechanic, and navigator, and speaks both English and French, there is no basis for correlating the
languages to the occupational skills except through the person. An entity instance containing two or more independent multivalued facts about an entity (i.e., the parent entity), is likely to contain null values (e.g., an entry for Person Occupational Skill Code, but not for Language Identifier). To conform with 4NF, the PERSON EXPERIENCE entity should be split into two entities: (1) PERSON OCCUPATIONAL EXPERIENCE with the attributes person identifier and person occupational skill code, and (2) PERSON LANGUAGE with the attributes person identifier and language identifier.

e. Fifth Normal Form (5NF). No redundancy due to symmetric constraints between nonkey attributes. An entity is in fifth-normal form if it cannot be reconstructed from several entities with fewer attributes and fewer rows.

EXAMPLE

Consider a CAR PARTS SUPPLIER entity characterized by supplier identifier, car manufacturer identifier, and car part type code. Furthermore, suppose there is a constraint in effect: if a supplier sells a car part type (e.g., spark plug, starter, muffler) used in a car produced by a manufacturer the supplier supports (e.g., Ford, GM, Volkswagen), then the supplier will sell the part for the car manufacturer. A single entity with all three attributes could be developed, but there would be redundant information (e.g., for a specific supplier, the car part type "spark plug" would appear for each manufacturer the supplier supports). The information represented by this single entity could be derived from three tables with fewer columns and fewer rows: (1) a MANUFACTURER PARTS entity characterized by Manufacturer Identifier and Car Part Type Code, (2) a SUPPLIER PARTS entity characterized by Supplier Identifier and Car Part Type Code, and (3) a MANUFACTURER SUPPLIER ASSOCIATION entity characterized by Manufacturer Identifier and Supplier Identifier.

6. Primary Key Rules. An entity shall be uniquely identified by one or more attributes grouped into a primary key.

a. The primary key shall never be null. The primary key will always occur.

b. The primary key never repeats. There is only one instance per occurrence (i.e., one record per value).

c. The primary key should have no embedded meanings.

d. When there is no existing attribute or set of attributes that meet the above rules:

(1) Create an identifier that satisfies the rules.

(2) Evaluate the impacts and tradeoffs of using the identifier versus using other candidate keys identified for the entity. In addition to criteria such as improved data exchange and better support for cross-functional integration, the following two criteria shall be considered:

(a) Managing uniqueness of the identifier values across DoD. If the identifier is to be computer generated, controls and responsibilities shall be established for cataloging and possibly distributing the values so they are not rendered unique only to the system that generates them.

(b) Impacts of setting up the identifier (e.g., translating or converting existing data to structures keyed by the new identifier).

(3) Based on the evaluation, select between the created identifier and one of the alternative candidate keys. If the created identifier is selected as the primary key, document the approach for managing its uniqueness in comment text for the attribute and identify one or more alternate keys from the list of candidate keys for the entity.

e. A temporary identifier key may be defined and used as a "place holder" to support a phased modeling effort that will define a functional key at a later date. However, this intention shall be documented in comment text for the attribute.

7. If one or more alternate keys are identified for an entity, these keys shall never be null and shall provide a unique value for identifying each entity instance.

8. Each proposed entity should have at least two attributes.

C. ENTITY NAMING RULES

1. The entity names:

a. Shall be clear, accurate, and self explanatory.

b. Shall include only upper case alphabetic characters (A-Z) and spaces. Entity names may contain hyphens (-) (i.e., associative entity names or to connect multiple words).

c. Shall be a singular noun or noun phrase. A prime-word modifier is not required for standardization.

d. Shall be named according to logical and not physical considerations. Physical characteristics include any connotations regarding technology (hardware or software),

physical location (data bases, files, reports, forms, or tables), organization (data steward), or function (systems, applications, or programs).

e. Shall consist of the minimum number of words for labeling. The name should not be used to redefine the entity nor contain information that more correctly belongs in the definition.

f. May contain a class word, such as date or time, if appropriate. Class words are centrally controlled and managed under DoD 8320.1-M-1 (reference (b)).

2. The entity name shall not:

a. Include abbreviations or acronyms. (Exceptions to this rule may be granted by the DoD DAd in the case of universally accepted abbreviations or acronyms.)

b Include names of organizations, computer or information systems, directives, forms, screens, or reports.

c. Include titles of blocks, rows, or columns of screens, reports, forms, or listings.

d. Express multiple concepts, either implicitly or explicitly.

e. Include the possessive form of any words.

f. Include articles (a, an, the).

g. Include conjunctions (and, or, but, etc.).

h. Include verbs.

i. Include prepositions (at, by, for, from, in, of, to, etc.).

D. ENTITY DEFINITION RULES

1. The entity definition shall:

a. Define WHAT the entity is, not HOW, WHERE, or WHEN the entity is used, or WHO uses it.

b. Be more than just a reiteration of the name or a synonym of the name.

c. Add meaning to the name, not merely rephrase the name.

d. Have one and only one interpretation and not be ambiguous. Terms within the definition with possible differing interpretations shall be clearly explained in the definition.

e. Be reasonable definitions, such as those found in a common dictionary.

2. The entity definition shall not:

a. Restrict shareability with the other DoD functions or Components.

b. Be circular. Avoid one definition pointing to a second definition for further explanation and the second definition pointing back to the original definition.

c. Contain examples. A definition should stand on its own. Use of examples may signify that a definition is not complete. Examples may be captured as separate comments, but definitions shall stand alone.

d. Restate or contain process or functional descriptions that describe how it is calculated, derived, assimilated, or manipulated.

e. Restate or be a mere list of the attributes or meta attributes within the entity.

f. Contain infinitives to begin an entity definition. A simple definition of the entity is all that is needed. (E.g., Definitions do not need to be prefaced by "This entity defines..." or "To describe....")

g. Contain technical jargon, acronyms, and abbreviations that may be unfamiliar to the reader.

h. Contain passive phrases such as "that is" or "which is" in a definition since that only makes the definitions too wordy. Use the active voice in a definition to provide a clearer and more concise meaning.

i. Contain conjunctions such as "and" or "or" since they may indicate ambiguity, multiple concepts, or a process orientation. Avoid conjunctions; when a conjunction appears in the subject of a phrase, it may indicate a multiple concept.

j. Use "Any" or "Some" to begin a definition. Using "A" or "An" expresses a single concept where as using "Any" or "Some" may signify multiple concepts.

CHAPTER 7

DoD ENTERPRISE DATA MODEL MAINTENANCE PROCEDURES

A. INTRODUCTION

1. This chapter describes procedures for storing and updating the DoD Enterprise Data Model. The DoD Interim IDEF Repository and the DDRS will be the primary tools used to support these procedures. The DoD Enterprise Data Model will be stored and maintained in the DoD Interim IDEF Repository. The entities and their attributes (as prime words and standard data elements) will be stored and maintained in the DDRS.

2. Contact the CIM Center for Functional Process Improvement Expertise to obtain access to and documentation for the DoD Interim IDEF Repository. Contact DAPMO to obtain access to and documentation for the DDRS.

3. Configuration management of changes to the DoD Enterprise Data Model is DoD DAd's responsibility. Configuration management efforts are supported by representatives from DAPMO, FDAds, and CDAds.

B. STORE DoD ENTERPRISE DATA MODEL

1. As new entities, attributes, or relationships are approved and incorporated into the DoD Enterprise Data Model, new versions of the DoD Enterprise Data Model will be produced. New versions will be stored in the DoD Interim IDEF Repository.

2. The DDRS will be used to store and maintain prime words (entities) and data elements (attributes). Version numbers will be used to maintain historical versions of prime words and data elements in the DDRS over time. This history of changes will be available for reference and audit purposes. These changes include status changes from Approved, to Archived, to Reinstated, etc.

3. Prime words and data elements should be accessed in the DDRS for review and comment during the review and approval process.

4. Attributes of approved entities may be submitted for approval as standard DoD data elements in accordance with data element standardization procedures outlined in DoD 8320.1-M-1 (reference (b)).

5. New versions of the DoD Enterprise Data Model will be published quarterly.

6. Historical versions of the DoD Enterprise Data Model will be archived and used for reference and audit trail.

C. UPDATE DoD ENTERPRISE DATA MODEL

1. As new information requirements are identified, the DoD Enterprise Data Model will change, therefore causing entities, attributes, and relationships to be added, modified, archived, or reinstated. The following procedures summarize processes for maintaining the DoD Enterprise Data Model. Review procedures to be followed for new, modified, candidate for archive, and candidate for reinstatement proposals are discussed in Chapter 4. A description of the different prime word (entity) and data element (attribute) standardization phases is provided in Chapter 3. More detailed configuration management procedures for the DoD Enterprise Data Model will be published in the *DoD Enterprise Data Model Configuration Management Plan*.

2. New Entities and Attributes. New information requirements are submitted in proposal packages based on functional area data models to extend the DoD Enterprise Data Model. Each new entity (prime word) and attribute (data element) should be entered into the DDRS where a version number, counter identifier, and status of Developmental are assigned. Once entered into the DDRS, reviewers will have centralized access and automated support for reviewing and commenting on the proposed prime words and data elements. Version numbers are assigned to prime words and data elements to record and track changes over time. Unique counter identifiers are identifiers assigned to each prime word and data element for use in quick and easy access by DDRS users. The status is used to record and track progress through the review and approval process for a given version of a prime word or data element.

3. Modifying Approved Entities, Attributes, and Relationships. Modifications may be proposed for any approved entity and associated attributes and relationships. Entities and relationships will be modified in accordance with the same review procedures as new entities and attributes. Approved attributes will be modified in accordance with DoD 8320.1-M-1 (reference (b)). Each time a proposal is made to change an entity or attribute, a new version of the associated prime word or data element will be created in the DDRS with a status of developmental to start the review process. The incremented version number will indicate that the proposal associated with the prime word or data element is a modification. If the modified entity or attribute is approved, the status of the previously approved version will be set to archived, and all registered users of the older version will be notified of the change.

4. Archiving Approved Entities, Attributes, and Relationships

a. Approved entities along with associated attributes and relationships may be archived based on their lack of recorded use. The effected subset of the DoD Enterprise Data Model representing the archived entities, attributes, and relationships will be retained for historical reference and possible reinstatement, based on changing information and reporting requirements. Approved attributes shall be archived as data elements in accordance with DoD 8320.1-M-1 (reference (b)).

b. FDAds will identify entities along with associated attributes and relationships that are no longer deemed as information or business rule requirements. The DoD DAd may notify an FDAd and recommend that entities along with associated attributes and relationships be considered for archive if no information systems are registered in the DDRS as users of a prime word.

c. Archiving may be proposed for any approved entity. The proposal review procedures that apply to approving candidate entities also apply to approving entities for archive along with associated attributes and relationships. When an entity is proposed for archive, a new version of an entity is created in the DDRS to support the review process.

d. Based on the proposed recommendation to archive an entity along with associated attributes and relationships, the FDAds will jointly assess functional needs to retain the entity via the formal review process.

(1) If the FDAd designated as the proposal package functional data steward disapproves the proposal to archive, then the DoD DAd shall retain the approved entity, attributes, and relationships in their existing status.

(2) If the FDAd designated as the data steward determines that there is no functional need and approves the proposal to archive, the DoD DAd will establish the effective date for archiving the entity, attributes, and relationships and will change the status of the latest version of the prime word and associated data elements from Candidate (for archive) to Archived.

5. Reinstating Archived Entities, Attributes, and Relationships

a. A review of the DoD Enterprise Data Model and the DDRS during the data model development or modification process may locate an archived entity along with associated attributes and relationships that are suitable for reuse. In such case, the archived entity, attributes, and relationships may be reinstated. Archived attributes shall be reinstated in accordance with DoD 8320.1-M-1 (reference (b)).

(1) An archived entity, along with associated attributes and relationships, may be proposed for reinstatement without modification. When this happens, a new version of the entity is created in the DDRS with a status of candidate (for reinstatement), and a formal review is performed.

(2) An archived entity along with associated attributes and relationships being proposed for reinstatement with modification shall be submitted as a new developmental entity in accordance with procedures in Chapter 5.

b. FDAds will jointly review the candidate for reinstatement for applicability and accuracy via the formal review process. If the FDAd designated as the

proposal package functional data steward approves reinstatement, the DoD DAd will change the status of the new version of the entity to Approved and assign an effective date.

c. After the archived entity along with associated attributes and relationships are reinstated, models using the prime word (entity) and applications using the standard data elements should be registered in the DDRS in accordance with Section D, below and DoD 8320.1-M-1 (reference (b)).

D. APPROVED ENTITY (PRIME WORD) AND ATTRIBUTE (DATA ELEMENT) REGISTRATION

1. As approved entities (prime words) and attributes (data elements) are implemented in new functional area models and AISs, their use should be registered in the DDRS.

2. Invitations to contribute to the review of change proposals for approved entities (prime words) or attributes (data elements) will be limited to FDAds, CDAds, the DoD DAd, and registered users of the entities (prime words) and attributes (data elements).

APPENDIX A

DATA ELEMENT STANDARDIZATION

A. PURPOSE

This appendix describes concepts that are fundamental to the development of standard data elements. Without an approved DoD Enterprise Data Model, approved entities, and attributes, DoD standard data elements and their metadata cannot exist.

B. DATA ELEMENT STANDARDIZATION

Data element standardization is achieved by using the two-step process of (1) logically identifying and defining data and (2) classifying data.

1. The DoD Enterprise Data Model is a logical representation of DoD data and how it is categorized based upon information requirements. Data elements are derived from this logical grouping of data. The purpose of this logical grouping is to define, name, and identify characteristics of standard data elements to eliminate data redundancy and facilitate the common use and understanding of data.

2. Once standard data elements are identified, the second step of data standardization is to classify the data according to like characteristics. The purpose of this classification is to identify standard rules for creating, sharing, maintaining, manipulating and representing like data. Class words and generic elements facilitate this classification.

C. DATA ELEMENTS

1. A data element is a basic unit of information having a meaning and subcategories (data items) of distinct units and value. Through its name and definition, a data element shall convey a single, informational concept.

2. Data elements are derived from attributes associated with entities identified in logical data models. Each data element represents an entity/attribute combination.

3. All data elements shall be approved and documented in accordance with the DoD standardization procedures and naming conventions as stated in DoD 8320.1-M-1 (reference (b)).

4. Prime words are the approved entity names. The data element name is created by combining the prime word with an attribute name, including class word, from the data model.

5. The class word is selected from a set of approved DoD standard class words. Class words are used to classify data elements based upon domains, representation, storage, or usage. The class word is a requirement of the data element naming convention for data element standardization.

6. During data element standardization, data elements are further categorized within a class to form generic elements.

D. PRIME WORDS

Prime words are centrally controlled and maintained by the DoD DAd. Prime words, as described in DoD 8320.1-M-1 (reference (b)), are the approved entities in the DoD Enterprise Data Model. Prime words are reviewed and approved in accordance with procedures outlined in Chapter 3.

E. CLASS WORDS AND GENERIC ELEMENTS

1. Class words and generic elements are used to classify and subcategorize data elements based on like definitions, domain, data type, and format. Class words classify the data at their highest level. Approved DoD standard class words are described in DoD 8320.1-M-1 (reference (b)). They are centrally controlled and maintained by the DoD DAd.

2. All data elements are required to fit into a class. If a new data element cannot fit into a class, then a proposal may be made to create a new class word. Proposals for new class words are submitted via an FDAd or CDAd to the DoD DAd. The DASD(IM) approves new class words based upon FDAd and DoD DAd recommendations.

3. The approval of new class words shall be based on:

a. The analysis of existing data elements to ensure that an existing class cannot be modified to include the new category,

b. Extension of the DoD Enterprise Data Model to ensure that data elements will be created to fit into this new class, and

c. Information management requirements to manage a new class of data for which standard rules are required.

4. To develop generic elements:

a. First, classify the data element into a standard class.

b. Second, subcategorize the data elements within the class based on like definitions, domain, data type, and format.

5. Generic elements are developed and approved via the procedures documented in DoD 8320.1-M-1 (reference (b)).

APPENDIX B

DATA MODELING AND BUSINESS PROCESS REENGINEERING

A. PURPOSE

1. This appendix provides an overview of how data modeling supports BPR and the Information System Life-Cycle Management Program described in DoD 8120.1. Through the Defense Information Management program, the Department will emphasize the primacy of functional requirements and the supporting role of information technology.

2. The success of BPR lies in the ability of functional managers to completely understand the process or activity being analyzed. This requires information and insight not only about what is being done, but also about the data needed to execute the process, data that result from the process, and business rules that act as constraints on the way the data are processed.

3. Business processes are easier to understand when they are viewed from multiple perspectives. Data models are used to logically and accurately depict the data and information required to support both individual functional processes and cross-functional requirements. Data models help functional managers communicate information requirements for both "AS IS" and "TO BE" activity models representing a process being analyzed for improvement opportunities.

4. Major economic benefits can normally be expected from information system development projects when the systems are designed to support functional processes and data management practices that have been engineered to take advantage of the new technologies available. The new technologies available may make BPR possible, but inserting new technologies into an organization without engineering the processes and supporting data management activities normally produces little or no benefit.

B. OVERVIEW OF DOD 8000 SERIES OPERATIONS

Figure C-1 depicts interdependencies among the three DoD initiatives that share objectives for improving cost effectiveness for DoD operations and management:

1. Business Process Reengineering (BPR)

Functional area program managers identify processes to be evaluated and analyzed for improvement opportunities. BPR initiatives involve FDAds in developing data models to coordinate and communicate data requirements that support improved processes.

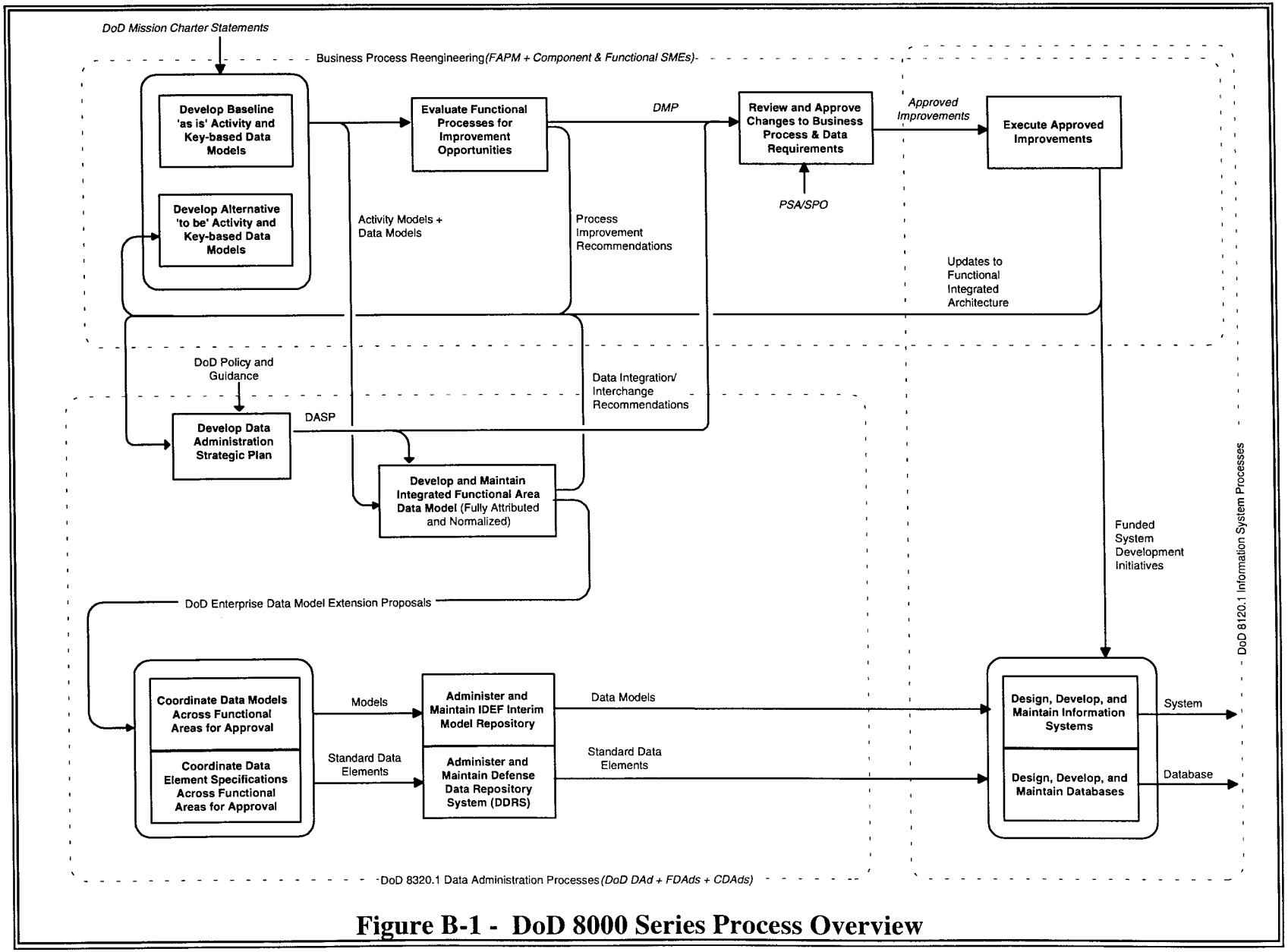

Figure B-1 - DoD 8000 Series Process Overview

a. Teams of component and functional area SMEs assemble to determine the functional management strategy to be followed in streamlining and standardizing processes, and establishing the process, data, and information system baselines (i.e., develop "AS IS" models) from which to begin process improvement.

b. The teams evaluate the functional processes for improvement opportunities to eliminate nonvalue-added processes, simplify and streamline limited value-added processes, and identify more effective and efficient alternatives to the process, data, and system baselines (i.e., develop alternative "TO BE" models). Improvement opportunities include operational considerations for consolidating component systems supporting like functions in different organizations. If multiple alternatives to the baseline are documented, a preferred alternative is selected based upon a preliminary functional economic analysis.

c. FDAds, CDAds, and SMEs assist in developing the "AS IS" data model, identifying changes to data requirements to accommodate process improvements and developing the "TO BE" data models. Submission, review, and approval of these models is performed through the 8320.1 process, which produces an integrated DoD functional area model called the DoD Enterprise Data Model, and standardized data elements.

d. The process improvement recommendations are reviewed and approved by the OSD PSA, providing authorization for updating the Functional Area Integrated Functional Architecture. Approved data models become supporting documents for process improvement implementation plans, evaluation decision packages, and approval decision packages. These plans and decision packages identify actions that will be taken to implement recommended changes to processes, data, and supporting information systems based on results of a process improvement project.

e. Approved process and data changes are implemented, and the revised processes, data, and systems become the new baseline for future process improvement initiatives. The changes include projects that can be completed with and without adjusting supportive automated information systems.

2. DoD Data Administration (8320.1)

a. Annually, the DAPMO assembles a data administration strategic plan from inputs provided by the FDAds and CDAds. The functional area's data administration strategic plan (DASP), prepared by the FDAd, consolidates and integrates all planned and approved changes to data, whether they result from process improvement projects, or from other data administration activities. *The DoD Data Administration Strategic Plan* provides guidance for data administration activities and specifies resource requirements for DoD functional area and Component data administration activities.

b. FDAds merge key-based data models across BPR projects and fully attribute and normalize the models to support data integration and data standardization. These

normalized functional models are then coordinated and reviewed to support developing and extending the DoD Enterprise Data Model, a DoD-wide integrated functional area data model.

c. The DoD Enterprise Data Model integration process categorizes data elements for standardization and provides an analysis tool for assessing data quality and data security-integrity requirements across all functional areas. Data models are coordinated for review and approval across functional areas using procedures described in this manual. Data elements are standardized and coordinated for review and approval using procedures prescribed in DoD 8320.1-M-1 (reference (b)).

d. Data models and standard data elements are maintained in repositories and managed as reusable assets to provide the basis for database development. Data models are managed for reuse in the DoD Interim IDEF Repository. Standard data elements are managed for reuse in the DDRS.

3. DoD 8120.1 Information System Life-Cycle Management

a. AISs are developed to consolidate component systems (migration systems) and to support improved processes. Databases for the AISs are designed based on the data models and standard data elements coordinated for reuse through the DoD IDEF Repository and the DDRS.

b. Data models and data elements reverse engineered from existing legacy systems may provide a basis for developing functional area data models and standard data elements. When reverse engineering is used, however, these models shall be reviewed for approval using procedures specified in this document. Reverse- engineered data elements proposed for standardization shall be reviewed and approved using procedures described in DoD 8320.1-M-1 (reference (b)).

C. RELATIONSHIP OF DATA MODELING TO BUSINESS PROCESS REENGINEERING

1. Data models support both BPR and DoD Data Administration efforts. FDAds designated by the OSD PSAs integrate data models into a data architecture that supports and is consistent with Functional Area Integrated Functional Architectures. This includes key-based data models developed to support process improvement projects, and the fully attributed and normalized models developed from them to support data administration tasks (e.g., data standardization).

2. FAPMs and the FDAd share the responsibility for reconciling the activity models in the functional architecture, and the data models in the data architecture for the functional area.

3. Data models developed to support BPR analysis are approved by the OSD

PSA, together with the activity models that they complement. Extending a key-based data model to a fully attributed and normalized data model to support DoD 8320.1 requirements does not require a second OSD PSA approval. However, if data modeling to support DoD 8320.1 data administration results in revision of the previously approved key-based model, or the creation of a new data model, then OSD PSA approval is required.

4. Differences between the "AS IS" and "TO BE" data models reflect changes in information requirements that shall be implemented in concert with the process changes defined by the "AS IS" and "TO BE" activity models. The estimated costs and benefits of these changes are included in the functional economic analysis that is prepared to evaluate the process changes. A data management plan (DMP) is developed to plan implementation of the data changes required for the process improvement alternatives. The DMP is a source document for finalizing the functional economic analysis.

5. The FDAd validates all data models for conformance to the Functional Area Functional Integrated Architecture and the supporting data architecture before its incorporation in a formal process change proposal. The FDAd is responsible for integrating data models and standard data definitions across functional activities within a functional area. The FDAd is also responsible for working with FDAds in other functional areas, and with CDAds and the DoD DAd, to coordinate and integrate data models and standard data definitions across functional areas, and to incorporate approved data models into the DoD Enterprise Data Model.

6. The DAPMO reviews data models for consistency with the DoD Enterprise Model and coordinates any necessary reconciliation.

7. The DoD DAd annually prepares and maintains DoD DASP from inputs developed by each FDAd and CDAd. The DASP provides comprehensive, long-term direction to improve the planning and management of DoD data resources and to plan and operate data administration activities within DoD. Migration system data management plans for each migration system and active data management plans for each process improvement project are sources for this input.

8. The DASP and the functional area data administration action plan are source documents for supporting execution of the functional area strategic plan.

D. RELATIONSHIP OF DATA MODELING TO INFORMATION SYSTEM LIFE-CYCLE MANAGEMENT

1. The functional management strategy to be followed in streamlining and standardization processes requires that legacy systems be identified to support approved process and data baselines. The selected information systems(s) then evolve in accordance with the DoD Directive 8120.1 *Life-Cycle Management (LCM) of Automated Information Systems (AISs)* (reference (f)) through numerous evolutionary and incremental changes to

provide improved functional and technical capability. These changes address improvements in functionality, incorporation of standard data definitions and structures to promote integration and data sharing, and technical migration toward an open system environment (as defined by the DoD technical architecture).

2. Selection of a baseline system for incremental migration to an open system architecture is a functional decision that shall be supported by an economic analysis of the costs and benefits in comparison to other competitive alternatives.

3. Following preliminary evaluation of candidate systems, detailed implementation plans are prepared for the systems(s) that show significant potential for supporting the baseline requirements. The FDAd assists in preparing a migration system DMP with input from the CDAd and the DoD DAd as necessary. The migration system DMP addresses all data administration actions related to implementing of the migration system, including issues related to transitioning to standard data definitions and structures. The DMP also provides technical guidance, schedules, and exit/completion criteria to be met by the implementors.

4. The logical data models created to support data administration shall be converted to physical data models for definition of actual database structures.

APPENDIX C

PROPOSAL PACKAGE CHECKLIST

This appendix provides a set of checklists for use in preparing a functional area/component-level model for submission to the 8320.1-M-x DoD Enterprise Data Model review, approval, and maintenance process. The following checklists are provided:

A. Basic Proposal Package Information Checklist

B. Entity Information Checklist

C. Attribute Information Checklist

D. Relationship Information Checklist

E. Compliance Checklist

A. BASIC PROPOSAL PACKAGE CHECKLIST

	Req'd	Hardcopy	Softcopy
Proposed Model ERD			
Proposed Model	Y		
Overall Model (if package contains a model subset)	C		
Relative Components of the DoD Enterprise Data Model Included.	C		
Basic Package Information			
Sponsoring Organization	Y		
Model Originator/POC Name	Y		
Model Originator/POC Address	Y		
Model Originator/POC Phone #	Y		
DoD Enterprise Data Model Version Number	Y		
Submitting FDAd/CDAd Name	Y		
Submitting FDAd/CDAd Org.	Y		
Proposal Package Data Steward	N		
Functional Area ID	Y		
Model Entities Count	Y		
Model Attributes Count	Y		
Model Relationships Count	Y		
Tool Used to Generate ERD(s)	Y		
List of Information Systems Supported by the ERD	C		
Schema Type (if IDEF1X not used)	C		
Modeling Technique (if IDEF1X not used)	C		
ERD Notation Summary (if IDEF1X not used)	C		

In the Req'd (required) column, possible values are "Y" for required, "N" for not required, and "C" for conditionally required (required if applicable).

B. ENTITY INFORMATION CHECKLIST (FOR EACH ENTITY)

	Req'd	Hardcopy	Softcopy	DDRS
Entity				
Name	Y			
Definition *	Y			
Data Steward *	N			
Functional Area ID	Y			
DDRS Counter ID	N			
Attributes				
Names	Y			
Key Designations	Y			
Entity Submission Type *	Y			
Prime Word Using Model Name(s)	Y			

* Not required in hardcopy or softcopy if entered into the DDRS.

In Req'd (required) column, possible values are "Y" for required and "N" for not required.

C. ATTRIBUTE INFORMATION CHECKLIST (FOR EACH ATTRIBUTE)

	Req'd	Hardcopy	Softcopy	DDRS
Attribute				
Name	Y			
Definition *	Y			
DDRS Counter Identifier	N			
Attribute Role	N			
Metadata Information *				
Data Value Source List	C			
Decimal Place Count Quantity	C			
Authority Reference Text	Y			
Domain Definition Text	N			
Domain Value Identifiers	C			
Domain Value Identifier Text	C			
High-range Identifier	C			
Low-range Identifier	C			
Maximum Character Count	Y			
Security Class. Code	N			
Proposed Steward Name	N			
Functional Area Id	Y			
Unit Measure Name	C			
Data Type Name	Y			
Derivation Type Name	C			
Formula Definition Text	C			

* Not required in hardcopy or softcopy if entered into the DDRS.

In Req'd (required) column, possible values are "Y" for required, "N" for not required, and "C" for conditionally required (required if applicable).

D. RELATIONSHIP INFORMATION CHECKLIST (FOR EACH RELATIONSHIP)

	Req'd	Hardcopy	Softcopy
Relationships between proposed entities	y		
Business Rule	y		
Cardinality - Degree	y		
Cardinality - Nature	y		
Relationships to the DoD Enterprise Data Model	y		
Business Rule	y		
Cardinality - Degree	y		
Cardinality - Nature	y		

In Req'd (required) column, "Y" indicates required.

E. COMPLIANCE CHECKLIST

	Yes	No
Technical Compliance Checked		
8320.1-M-x Chapter 5		
8320.1-M-x Chapter 7		
FIPS PUB 184		
8320.1-M-1		
Functional Compliance Checked		