DoD Architecture Framework

Version 2.02, Change 1

Volume I: Overview and Concepts

Manager's Guide

31 January 2015

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Change 1 Description

DoDAF has had three incremental updates since the main release of DoDAF 2.0. Release 2.02, Chg 1 is primarily a result of the hard work and efforts of the Components in making refinements to existing content or from adding content provided by the architecture community on experimental techniques for organizing, sharing, and understanding the data in architectural descriptions. The United States Marine Corps (USMC) provided the predominant change through their revisions to the model descriptions in Volume II. Volume IV, from the Defense Chief Management Office (DCMO), provides new techniques and discussions for using DoDAF in conjunction with OWL and semantic web. Content location changes from Version 2.02 now keep information about specific topics in one place.

The DoDAF version 2.02, with its accompanying meta model, the DoDAF Meta Model (DM2), was baselined in October 2010. Improvements and corrections have been collected from the DoD EA community. These were logged and tracked by the DoDAF - DM2 Work Group (WG) secretariats following the processes and procedures documented in DoDAF - DM2 Configuration Management Plan. These were prioritized and adjudicated by the DoDAF - DM2 WG in a consensual manner though weekly DoDAF - DM2 WG meetings. WG actionees implemented the changes as per WG adjudication and reported back to the WG for WG review of the implementation.

There were 69 DoDAF-DM2 Action Items / Change Requests resolved by version 2.02, Chg 1. These are shown in detail in the table in Appendix C. Listed below is a summary of the changes for this release:

- Updated the definition of DoDAF Conformance to four levels – Conceptual, Logical, Physical, and Semantic. v2.02 was tantamount to Physical only. (CR 620
- Technical editing of the DoDAF model (view) descriptions (“TECHEDITS”) in response to, 1) comments submitted by Marine Corps on undefined terms, inconsistencies, and false statements, 2) SPAWAR markup of 100’s of undefined terms in the DoDAF model descriptions. WG concluded after initial batch that a TECHEDIT team needed to re-write the model descriptions using defined terms and to be consistent with DM2. (CR’s 28, 428, 621, 625, 663, 665, 666, 667, 668, 669, 670, 671, 672)
- DM2 diagram per DoDAF model (CR 316)
- Normative parts of document separated from informative parts (CR 636
- Description of Rules and Desired Effect. Their Descriptions are produced by rule and goal-setting authorities. They are consumed by Activities (aka Controls in IDEF0). Distinguished that Guidance influences Activity from Rules that control Activity. Activities that conform to Rules are subtypes of the Rule. (CR 383a/615, 537, 539a, 610, 617)

- Information resource flow and associations were simplified into flatter type structure so it would be logically correct and consistent with other Resource Flows. (CR 642/652)
- Capability made a subtype of Property so that it is the set of Tasks performed under Conditions that meet certain performance standards (Measures). Also refined the Desired Effect of a Capability to be a Resource (state) that is desired by some PerformerCapableOfResponsibility. This makes Capability comparison and dependencies more direct as property intersections and Resource (state) overlaps. (CR 406/604, 453, 538, 598, 603, 605)
- Added SoA Joint Action concept and distinguished business services from enabling services (CR 597)
- Refined rules for superclass association usage (CR 503, 618)
- Continued work on refinement of meaning of Services. (CR 151
- Relationship between Context and Condition clarified. (CR 91)
- Resources in LocationTypes and ResourceTypes in Locations clarified (CR 643)
- Several Data Dictionary and Alias corrections, e.g., Ways. (CR 414, 449/520, 549, 630)
- Several IDEAS Foundation corrections. (CR 295, 408, 439, 464, 484, 494, 497, 517, 541, 544, 548, 573, 595, 600, 606, 607, 609, 612, 619, 647)
- Several minor PES corrections (CR 405, 566a, 622, 641, 649)
- DoDAF website and FAQ improvements (CR 593, 402)

Executive Summary

The Department of Defense Architecture Framework (DoDAF) is the overarching, comprehensive framework and conceptual model for architectural descriptions developed within the DoD. This framework helps Department of Defense (DoD) managers at all levels make effective decisions by ensuring the sharing of consistent and common information across the Department, Joint Capability Areas (JCAs), missions, components, and programs. The DoDAF helps the DoD Chief Information Officer (CIO) develop and maintain architectures required by the Clinger-Cohen Act. It also fulfills guidance from the Office of Management and Budget (OMB) and other Departmental directives and instructions.

The DoDAF supports DoD's core decision-making processes, including the Joint Capabilities Integration and Development System (JCIDS), the Defense Acquisition System (DAS), Systems Engineering (SE), the Planning, Programming, Budgeting, and Execution (PPBE) Process, Capabilities Portfolio Management (CPM), and Operations (OPS).

DoD Components should conform to the DoDAF when they develop architectures within the Department.

The DoDAF allows architectural artifacts to be *fit-for-purpose*, that is, to be defined and described consistently with specific project or mission decision-making needs. Because architectural descriptions are employed at many levels, contexts, and purposes within the DoD, they vary in content, structure, and level of detail. Basing the architectural description development on well-articulated and understood purposes will ensure that the necessary data collection occurs at the appropriate level of detail to support specific decisions.

The DoDAF focuses on architectural data rather than architecture artifacts. It identifies, defines, and specifies the information needed to describe something in architectural terms within DoD. There is a wide range of architecture tools developed by commercial sources that can collect, organize, and store architecture data. The focus on data supports the production of fit-for-purpose models tailored for multiple uses. It also supports analysis and simulation of architectural description content produced across Components to support DoD's core decision making processes. Consequently, tools should use the DoDAF Meta Model (DM2) specifications to exchange architectural data.

Models visualize architecture data. A model, displayed as diagrams, narrative text, matrices, tables, dashboards, or other representations, serves as a template for organizing and displaying data in a format appropriate for a decision-maker. Viewpoints are thematic collections of models. A viewpoint focuses on data within the scope of some concern, such as capabilities, systems, or standards. A set of viewpoints, accompanied by useful definitions of the terms they use, is an architectural description.

The DoDAF specification comprises four volumes.

- Volume I, the manager's volume, provides general information and guidance for development, use, and management of DoD architectures. This volume explains the role of architecture within core DoD processes and key DoD architecture concepts are identified and defined.
- Volume II, the architect's volume: 1) defines architectural viewpoints and models, and 2) specifies the DM2 at a conceptual and logical level, through an elaboration of the key concepts. Models depict a subset of architectural data within a viewpoint. Once populated with data, models associated with the viewpoint can present these data. The DoDAF specifies over 50 standard models within eight viewpoints. The DM2 supports creating additional custom, fit for purpose, models to present architectural data within or across viewpoints for specific stakeholders and their specific needs.
- Volume III, the developer's volume, discusses the ontological foundation for DM2 and specifies the physical level format for the exchange of DoDAF-compliant architectural data. This volume is for developers of architectural description analytics, tools, databases, repositories, and simulations.
- Volume IV, the DoDAF Journal, publishes descriptions of other best practices, lessons learned, and reference documents that supplement the information contained in the three volumes of the DoDAF, including a discussion of the DoDAF OWL exchange specification. This volume provides information only and is not part of DoDAF conformance.

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1 INTRODUCTION

The Department of Defense Architecture Framework (DoDAF) is the overarching, comprehensive framework and conceptual model for architectural descriptions developed within the DoD. The DoDAF is the structure for organizing architecture concepts, principles, assumptions, and terminology about operations and solutions into meaningful and consistent patterns to satisfy specific DoD purposes. The DoDAF offers guidance, principles, and direction on communicating business and mission needs and capabilities to managers, architects, analysts, and developers who are responsible for developing and building the necessary systems, services, applications, and infrastructure to meet stakeholder needs and to manage their expectations.

This framework helps DoD managers at all levels make effective decisions by sharing information across the Department, Joint Capability Areas (JCAs), missions, components, and programs. The DoDAF focuses on the collection, presentation, and sharing of architectural data as information required by DoD decision makers, rather than on developing individual models. Architects may use the standard models described in this Volume I and specified in Volume II to obtain and visualize architecture data. However, the framework also allows architects to build other, fit-for-purpose (FFP) products for an architectural description.

1.1 Vision for the DoDAF

The vision for use of the DoDAF is to:

- Provide architecture concepts to guide development of architectures throughout the Department in support of decision processes for departmental programs, military components, and capability areas. This guidance is consistent with federal enterprise architecture guidance provided by OMB.
- Focus on architectural data as information required for making critical decisions and de-emphasize individual or independent architecture models. Allow architects to visualize architectural information using both standard models and fit-for-purpose models that are consistent with the culture and preferences of an organization while being consistent descriptions for consumption and use by the entire Department.

1.2 Purpose

The purposes of DoDAF are as follows.

a. DoDAF supports the Department of Defense Chief Information Officer (DoD CIO) efforts to develop and maintain architectures as required by the Clinger-Cohen Act. From a compliance perspective, federal law and policy (i.e., Clinger-Cohen Act, OMB Circular A-130) require architectures to support investment decisions. The Office of Management and Budget (OMB) annually evaluates agency efforts to improve the quality and usefulness of information technology investments requested by agencies

through well-organized strategic decisions relating to investments and Portfolio Management. This process evaluates the use of enterprise architectures as the principal means of meeting mission requirements, while achieving savings and cost avoidance goals. Each agency is required to adopt an existing architecture framework or to create one for that purpose. The DoDAF is the designated architecture framework for DoD architecture development.

b. DoDAF supports DoD's core decision-making processes, including the Joint Capabilities Integration and Development System (JCIDS), the Defense Acquisition System (DAS), Systems Engineering (SE), the Planning, Programming, Budgeting, and Execution (PPBE) Process, Capabilities Portfolio Management (CPM), and Operations (OPS). These key processes produce far-reaching change across all Military Departments, Agencies, the Joint Staff, and other Departmental functions.

c. The framework is consistent with, and supports DoD policy directives that require programs and components to (a) ensure that their architectures meet stated objectives and departmental requirements, and, (b) provide the information necessary to support defined decisions at higher tiers. These policies also require consistency across horizontal architecture boundaries within a tier. The guidance and information contained in these volumes also ensures that, when followed, architecture development is consistent with OMB guidance on enterprise architecture.

d. This version of the DoDAF supports the Departmental preference for federated architecture development in a tiered environment. To enable federation and support tiered responsibility and accountability, the framework provides data structures for comparing appropriate touch-points for consistency across architecture boundaries. Use of these data structures ensures that higher tiers have access to data from lower tiers in a form that supports their decision needs.

e. Architecture frameworks support change in organizations through building and using architectures that:

- Enhance decision making processes by leveraging knowledge in existing architectures and opportunities for reusing existing information assets.
- Respond to stakeholder, customer, and client needs for effective and efficient processes, systems, services, and resource allocation.
- Provide mechanisms to manage configuration of the current state of the enterprise and to maintain validity of the expected performance.
- Analyze designs for future states of the enterprise.
- Establish baseline architectures for solutions under development.

f. From a practical perspective, an organization that pursues complex ends with sophisticated people, systems, services, and technologies needs comparably complex architectures to evaluate and compare investments. Such an organization also uses architectures to build new systems, deploy new technologies, offer new services, and guide change to the organization itself.

g. The DoDAF also helps architects develop SOA-based architectural descriptions that define solutions specifically in terms of services for discovery and use in executing departmental or joint functions and requirements.

h. The DoDAF establishes a common vocabulary for architecture development and for the exchange of architecture information.

1.3 Scope

Guidance provided by the DoDAF applies to all architectures developed, maintained, and used within the DoD. The DoDAF is also the basis for tiered architecture federation, shared architecture information, and a federated enterprise architecture describing the Department.

2 DODAF VOLUME ORGANIZATION AND INTENDED AUDIENCE

The DoDAF has four volumes.

2.1 Volume I — Introduction, Overview, and Concepts

Primary audience: executives, project directors, and managers.

Volume I introduces DoD architecture concepts and provides general guidance for development, use, and management of DoD architectures. This volume explains the role of architecture within core DoD processes. Volume I identifies and defines key DoD architecture concepts.

Volume I contains the following resources:

- An overview and vision for DoDAF.
- An overview of the framework.
- Defining fit-for-purpose architectures.
- Introduction to the DoDAF Meta Model and identification and definition of key DoD architecture concepts.

2.2 Volume II — Architectural Data and Models

Primary audience: architects, program managers, portfolio managers, systems engineers, capability analysts and testers, and other technically oriented architecture users

Architects, modelers, and technical designers need to know what sorts of things can be modeled and the sorts of relationships among those things. Volume II describes the DoDAF meta-model, meta-model data groups, DoDAF viewpoints, and standard DoDAF models. The DoDAF meta-model specifies the sorts of things that can be modeled and the relationships among those things. Appendices to Volume II contain the DoDAF Glossary and references.

2.3 Volume III — DoDAF Meta Model Ontology Foundation and Physical Exchange Specification

Primary audience: developers of architectural description analytics, tools, databases, repositories, and simulations

Volume III discusses the ontological foundation for DM2 and specifies the physical level format for the exchange of DoDAF-compliant architectural data. These technical tools provide different ways to exchange architectural information among stakeholders.

2.4 Volume IV — DoDAF Journal

Volume IV is the informative volume of the DoDAF. Volume IV includes descriptions of best practices, lessons learned, reference documents, and other information that supplements the three normative volumes of the DoDAF.

3 WHAT DOD MANAGERS AND EXECUTIVES NEED TO KNOW ABOUT DODAF

Architecture development is a management tool that supports the decision-making process. A process owner, an executive responsible for a specific process or program, has the direct responsibility for ensuring that a particular process or program works efficiently, complies with legal and Departmental requirements, and serves the purpose for its creation. Legislation such as the Clinger-Cohen Act and implementing directives such as OMB Directive A-130 require periodic review and evaluation of the maturity and effectiveness of programs and processes. These requirements call for information architectures to support requests to fund those projects and processes.

A manager or executive may delegate the responsibility for creation of the architecture to a qualified architect working with an architecture development team. However, that delegation of authority does not alter the continuing responsibility of the executive or manager. As described throughout this volume, the decision-maker needs to be actively involved in the architecture development process and support architectural description development. They must also approve the architectural description for use and reference by the Department. Active involvement means that the decision-maker:

- Identifies the purpose and scope for the architecture.
- Transmits to the architect and development team the scope and purpose of the architecture effort, along with those goals and objectives that support the need.
- In conjunction with the architect, identifies the general data categories needed for architecture development, and assists in data collection and validation.
- Determines desired views and presentation methods for the completed architecture.
- Meets frequently with the architect and development team to ensure that the development effort is on target (i.e., is fit-for-purpose) and provides new direction, as required to ensure that the development effort meets established requirements.

Working with the architect and team, the decision-maker has a critical role in ensuring that the architecture not only supports the creation of executable requirements that will achieve the desired outcome, but also that senior executives and managers can view the solution in an understandable and logical manner.

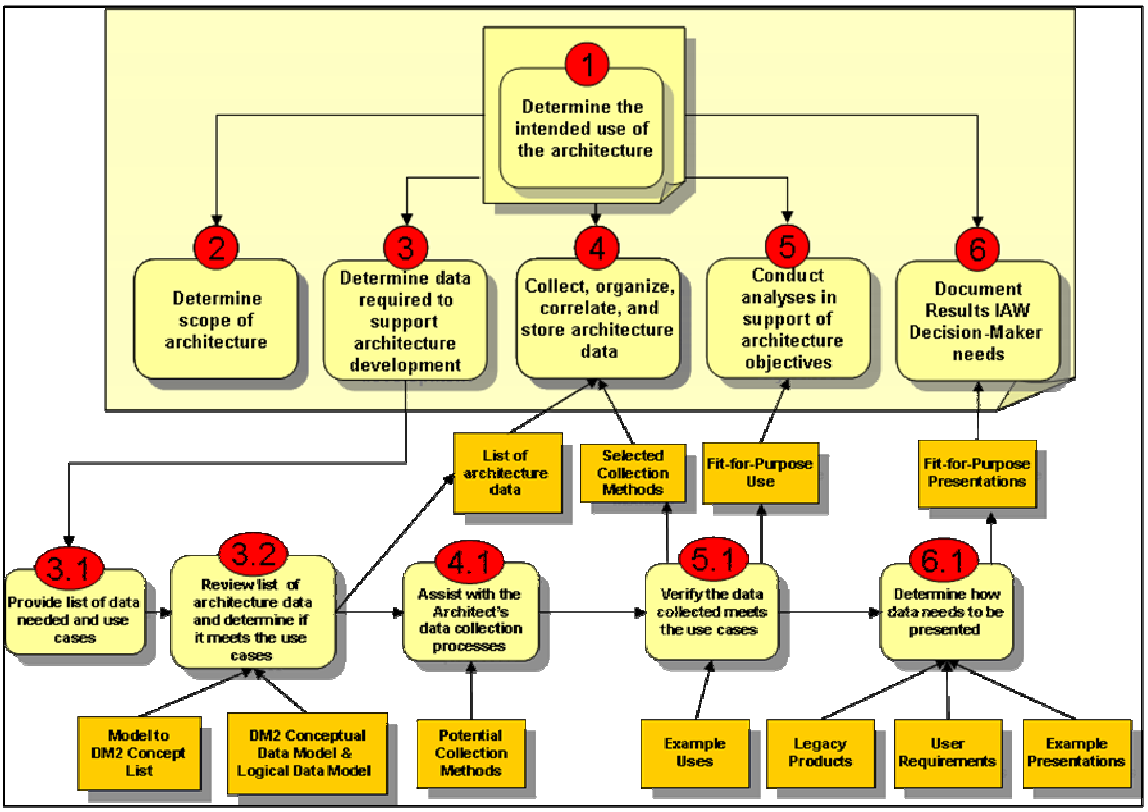

Figure 3-1. Architecture Manager Roles

3.1 Developing Architectures

Careful scoping and organization by managers of the architecture development effort focuses on areas of change indicated by policy or contract in support of the stated goals and objectives. A data-centric, rather than product-centric, architecture framework ensures concordance across architectural models. Concordance means that data in one model is the same as in another model when talking about the same exact thing, such as an activity. This enables the federation of all pertinent architecture information, and provides data describing the same thing being the same in all models in an architectural description (also known as full referential integrity), simplifies and supports a wide variety of analysis tasks. Logical consistency of the data thus becomes a critical 'property' of architectures of all types as described more fully below. The objective of achieving concordance across the architectural view must be included in architecture planning and development actions.

The DoDAF describes three major types of architectures that contribute to the DoD enterprise architecture, Mission Area architectures, enterprise-level reference architectures, and Component enterprise architectures. A fourth type, solution architectures trace back to the other three types but are not included in the DoD enterprise architecture. Each of these architectures serves a specific purpose:

- An enterprise architecture is a strategic information asset of an organization. This asset defines the mission of the organization, the behaviors and information necessary to perform the mission, the resources necessary to perform the mission, and the processes for transforming the organization and its resources to satisfy changing mission needs. An enterprise architecture includes a baseline architecture representing the current organization, a target architecture representing the future organization, and a plan for moving from the present into the future.
    - Enterprise level reference architectures are an authoritative source of information about a specific subject area that guides and constrains the instantiations of multiple architectures and solutions. It has 5 elements:
        - Strategic Purpose – Identifies goals and objectives of the Reference Architecture and describes the specific purpose of and the problem(s) addressed by the Reference Architecture.
        - Principles – Sufficient high-level foundational statements of rules, culture, and values that drive technical positions and patterns.
        - Technical Positions– Technical guidance and standards, based on specified principles to follow and implement as part of the solution.
        - Patterns (Templates) – Generalized architecture representations (viewpoints, graphical/textual models, diagrams, etc.) that show relationships between elements and artifacts specified by the technical positions.
        - Vocabulary – Acronyms, terms, and definitions that are used in the Reference Architecture and relevant to architectures and solutions guided and constrained by the Reference Architecture.
    - Component enterprise architectures are the description of mission-specific services and capabilities within the Component. It portrays relationships among all elements of a DoD Component.
    - Solution architectures describe a system or other asset that an organization uses to carry out its mission. Although not part of the DoD enterprise architecture, solution managers use these architectures to create, update, revise, or remove resources that are called for by the organization's enterprise architecture. Solution architectures are the most common type of architecture developed in the Department.

3.2 Maintaining and Managing Architectures

Embedding architecture development process in routine planning and decision-making institutionalizes the practices of architecture and the maintenance of architectural data, models, and viewpoints. Tiered accountability provides the means to maintain and manage architectures

within the Department. Tiered accountability is the distribution of authority and responsibility for development, maintenance, configuration management, and reporting of architectures, architecture policy, tools, and related architecture artifacts to all three distinct tiers within the DoD. The DoDAF supports three tiers: Department, Mission Area (MA), and Component (i.e., enterprise and program or project-level solutions development). These tiers support the federated approach for architecture development and maintenance.

3.3 Using Architectures

Architecture supports major DoD decision-making processes, including JCIDS, DAS, PPBE, SE, and PfM processes. Architecture also supports business process reengineering, organizational development, research and development, operations support, and service-oriented solutions. Architectural data gives decision makers data they need to make informed decisions in those processes.

3.4 DoDAF Conformance

The Department of Defense expects DoD architectural descriptions to conform to the DoDAF to the maximum extent possible. Conformance ensures that reuse and sharing of information, architecture artifacts, models, and viewpoints is possible through a shared understanding of the underlying data. Both classified and unclassified architectural descriptions are to conform to the DoDAF.

There are four assessment level for DoDAF conformance. Higher levels of conformance build upon lower levels of conformance.

Level 1 — Conceptual conformance

- The architectural description uses normative DoDAF terms as defined in the DoDAF Glossary to identify concepts. The architectural description uses these normative DoDAF terms to describe the architecture. The AV-2 model, which is the glossary of the architectural description, appropriately defines additional terms used to describe the architecture. The AV-2 model complies with the DoDAF Glossary Style Manual guidance for writing definitions.
- DoDAF standard models within the architectural description satisfy the specifications given in Volume II.
- Stakeholders who use DoDAF fit-for-purpose models, validate them within the architectural description.

Level 2 — Logical conformance

- The architectural description demonstrates conceptual conformance.

- The AV-2 model within the architectural description complies with the DoDAF Glossary Style Manual guidance for constructing glossary entries and producing a glossary.
- The architectural description uses types, relationships, and properties defined by the DoDAF meta-model to describe the architecture. The architectural description correctly introduces and defines additional concepts, relationships, and properties used to describe the architecture as subtypes of DoDAF meta-model concepts, relationships, and properties.

Level 3 — Physical conformance

- The architectural description demonstrates logical conformance.
- The architectural data expressed by the architectural description is correctly produced and consumed using a specified format to exchange architectural data. A successful DM2 PES exchange satisfies this requirement; alternatively, architecture efforts within recognized Business Capability Lifecycle (BCL) programs may satisfy this criterion by successful DM2 OWL-DL exchanges.

Level 4 — Semantic conformance.

- The architectural description demonstrates physical conformance.
- The architectural description correctly uses and expresses the ontological semantics of the DoDAF meta-model.

4 DODAF STRUCTURE

The DoDAF's focus is on data, viewpoints, and models. This approach responds to departmental processes, such as business transformation, JCIDS, and other major functions with significant impact throughout the Department that have developed requirements for multiple, custom models. They use information based on authoritative data, beyond the operational, systems, and technical views of previous versions of DoDAF. The standard models are templates for identifying and collecting specific data within the data groups discussed in Volume II. Users define fit-for-purpose models to explain specific data to specific audiences.

4.1 Architectural Data

Architectural data provides efficient and flexible use and reuse of architectural descriptions for decision makers and process owners. The DoDAF metadata model (DM2) specifies a minimal set of architectural data required to support the core DoD decision-making processes. The DM2 has several levels, each of which is important to a particular viewer of departmental processes. The DoDAF conceptual data model (CDM) presents concepts shared by all DoDAF-compliant architectural descriptions. The CDM is defined in this Volume I, in this paragraph and in the Glossary in Appendix B.

The DoDAF logical data model (LDM) adds technical information and, when necessary, clarifies relationships into an unambiguous usage definition. Volume II discusses the LDM in detail.

DoDAF data exchange comes in two forms, the Physical Exchange Specification (PES) and the DM2-OWL specification. Volume III discusses the PES and Volume IV discusses DM2-OWL.

Data, organized as information, is the critical element of architecture development. The DoDAF provides the DM2 CDM, LDM, and the PES and OWL exchange specifications for data managers, tool vendors, and others to help:

- Establish areas of discourse and a shared vocabulary.
- Support data overlap analysis.
- Define and encourage the use of shared information.
- Provide a target for architectural data integration.

The DM2 defines architectural data elements and enables the integration and federation of architectural descriptions. It establishes a basis for semantic (i.e., understanding) consistency within and across architectural descriptions. In this manner, the DM2 supports the exchange and reuse of architectural information among MAs, Components, and federal and coalition partners; this helps the Department understand and build processes and systems that work well together, particularly in the sharing of information (interoperability).

4.1.1 The DoDAF Conceptual Data Model (CDM)

The DoDAF conceptual data model (CDM) presents concepts shared by all DoDAF-compliant architectural descriptions. Key concepts of the CDM are illustrated in Figure 4-1. This diagram may be read in a straightforward way as simple sentences, with the subject and object in the ovals and the predicate on the lines, as follows:

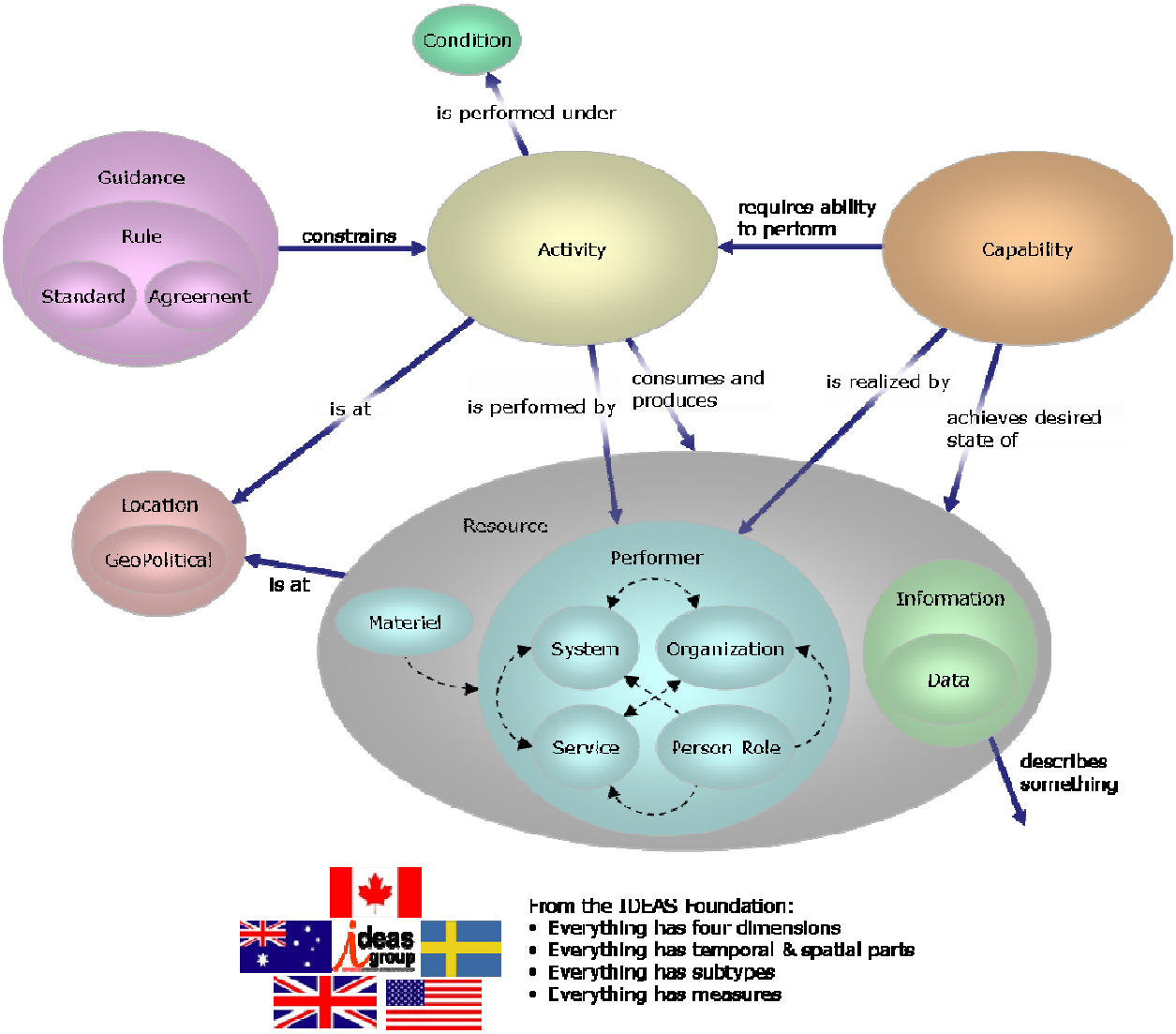

Figure 4-1. DoDAF Meta Model at the Conceptual Level

- An activity consumes and produces resources. An interesting activity always produces an interesting resource. In general, an interesting activity also consumes interesting resources. However, consumed resources are not necessarily architecturally interesting.
- An activity is performed by some performer.
- A performer is a sort of resource that performs an activity.

- An activity can produce a resource that performs another activity. Some activities, such as projects, are interesting just in that they produce performers that can realize capabilities.
- An activity is constrained by some guidance. Guidance forestalls random behavior. Proceeding by trial and error is not a best practice in anything we do.
- A rule is a sort of guidance.
- A standard is a sort of rule, and thus a standard is a sort of guidance.
- An agreement is a sort of rule, and thus an agreement is a sort of guidance.
- An activity is performed under some condition. Conditions affect the way a performer can carry out an activity, and conditions are seldom perfect in the real world.
- An activity is performed at some location. Locations are important for activities because they entail possible conditions.
- A resource exists at some location. Locations are important for resources because we cannot rely upon resources whose locations are unknown or unknowable.
- A geopolitical place is a sort of location.
- Materiel is a sort of resource. The DoDAF notion of materiel encompasses anything a performer uses to get a job done.
- A system is a sort of performer, and thus a system is a sort of resource.
- A service is a sort of performer, and thus a service is a sort of resource.
- An organization is a sort of performer, and thus an organization is a sort of resource.
- A person in a role is a sort of performer, and thus such a person is a resource.
- A performer can be a complex of systems, services, organizations, and persons in roles.
- A person in a role may be a part of a system.
- A person in a role may be a part of a service.
- A person in a role may be a part of an organization.
- Materiel may be a part of a performer.
- Information describes something. Specifically, information describes activities, guidance, conditions, resources, locations, and capabilities.
- Information is a sort of resource.

- Data is a sort of information, and thus data is a sort of resource. Data that is not used to describe activities, guidance, conditions, resources, locations, or capabilities is not architecturally interesting.

Further, the DoDAF conceptual data model inherits from the IDEAS ontology so that:

- Everything of architectural interest has four dimensions, that is, they exist in space and time. All the pieces and parts of a described architecture must be founded upon things that are real in the world.
- Everything of architectural interest has parts. In particular, everything has both temporal parts and spatial parts. This is the basis for asserting the identity of a whole as its parts change over time.
- Everything of architectural interest is a sort of something. Indeed, any given thing can be a sort of many different things at the same time and over time.
- Everything of architectural interest has measures. Something that exists in space and time can be observed. Anything that can be observed can be measured. At a minimum, we can measure the size and the position of any real thing of architectural interest.

Together, these concepts cover the notions needed to discuss all aspects of architectural description in DoD. For example, *capabilities* as defined by Joint doctrine:

> *A capability is the ability to achieve a desired effect under specified standards and conditions through combinations of means and ways to perform a set of tasks.*

A desired effect is a measurable change in the state of resources we see in someplace in the world. Activities consume resources in one state and produce resources in another state. Performers perform activities that change the state of resources. Performers do this under conditions that affect their performance. Performers do this following guidance to perform tasks appropriately under those conditions. All this can be measured, and the performance of an activity can be assessed against standards of performance. In architectural terms: *tasks* are activities, *ways* are guidance, *means* are performers, *conditions* are conditions, *standards* are a particular sort of guidance, and *desired effects* are changes in the states of resources.

In the DM2 these straightforward concepts are founded on a formal ontology that enables architectural descriptions as complex and detailed as required. Figure 4-2 illustrates key concepts of the DM2's foundation.

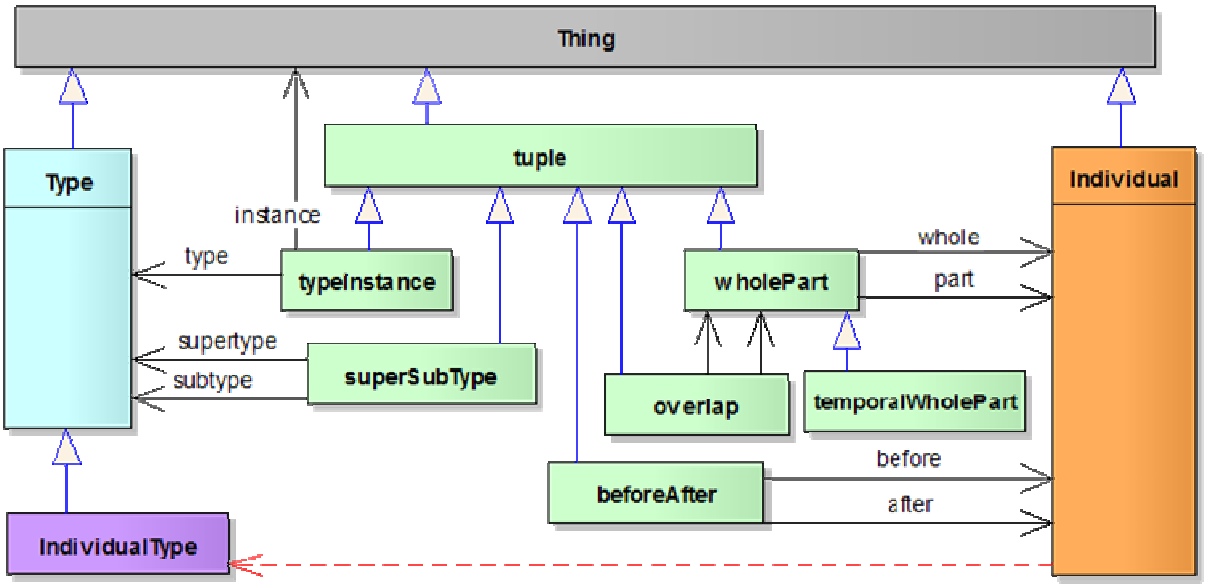

Figure 4-2. Overview of DM2 Ontologic Foundation

The top-level foundation elements are represented by these boxes:

- thing — anything that is an individual or a grouping of individuals.
- individual — a thing that exists in space and time.
- type — a grouping of things. Groups may be themselves grouped.
- tuple — an ordered pair of two things (i.e., a relationship).

The foundation tuples (relationships) are similar to concepts found in many ontologies, conceptual schemes, and data models. These common relationship patterns include:

- whole & part — composition. Everything has parts, and everything is part of something else.
- supertype & subtype — generalization and specialization. Everything is a sort of something.
- before & after — temporal ordering. Everything comes after something and before something else.
- overlap — four-dimensional shared extent. Everything has parts that are shared with other things. In particular, overlap is the relationship that binds a persistent whole to its changing parts.

Composition and specialization apply to all architecture concepts. Temporal ordering is needed to arrange things through time. Overlap is necessary to describe things that interface but are not necessarily contained within each other.

4.2 Architecture Viewpoints and DoDAF-described Models

An architecture viewpoint is a selected set of architectural data organized around some central concept. There are many ways to present an architectural description. A model, regardless of its form, is a representation of some portion of the architectural data, in the sense that a still photograph shows only one view of a subject within a picture. Figure 4-3 provides a graphical representation of the architecture viewpoints in the DoDAF.

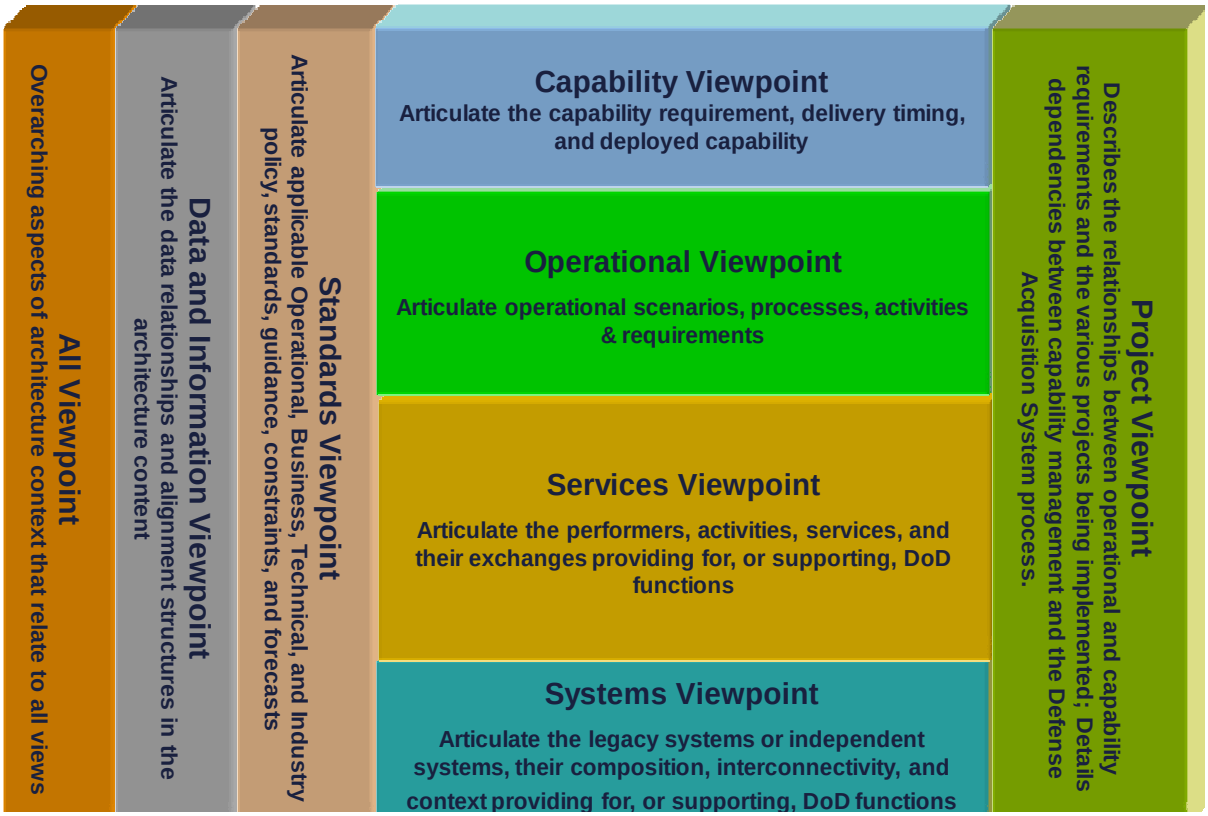

Figure 4-3. Architecture Viewpoints in the DoDAF

4.2.1 All Viewpoint

Some overarching aspects of an architectural description relate to all models. The All Viewpoint (AV) models provide information about the entire architectural description, such as its scope and context. The scope includes the subject area and timeframe of the architectural description. The setting in which the architectural description exists comprises the interrelated conditions that compose the context for the architectural description. These conditions include doctrine; tactics, techniques, and procedures; relevant goals and vision statements; concepts of operations (CONOPS); scenarios; and environmental conditions.

4.2.2 Capability Viewpoint

The Capability Viewpoint (CV) describes a vision for performing specified activities to achieve desired resource states under specified standards and conditions. It applies specified guidance and specified performers to those tasks. This viewpoint provides a strategic rationale for the described architecture.

4.2.3 Data and Information Viewpoint

The Data and Information Viewpoint (DIV) describes information needs, data requirements, and the implementation of data elements within an architectural description. This viewpoint includes information associated with information exchanges in the architectural description, such as the attributes, characteristics, and inter-relationships of exchanged data.

4.2.4 Operational Viewpoint

The Operational Viewpoint (OV) describes organizations, activities they perform, and resources they exchange to fulfill DoD missions. This viewpoint includes the types of information exchanged, the frequency of such exchanges, the activities supported by information exchanges, and the nature of information exchanges.

4.2.5 Project Viewpoint

The Project Viewpoint (PV) describes how programs are grouped in organizational terms as a coherent portfolio of acquisition programs. This viewpoint provides a way of describing the organizational relationships between multiple acquisition programs, each of which is responsible for delivering systems or capabilities.

4.2.6 Services Viewpoint

The Services Viewpoint (SvcV) describes services that provide or support operational activities. This viewpoint traces service activities and resources to the requirements established by the Operational Viewpoint.

4.2.7 Standards Viewpoint

The Standards Viewpoint (StdV) describes the minimal set of rules governing the arrangement, interaction, and interdependence of systems and system parts. The purpose of this viewpoint is to ensure that a system satisfies a specified set of operational requirements. The Standards Viewpoint identifies the technical systems implementation guidelines upon which engineering specifications are based, common building blocks established, and product lines developed. This viewpoint includes a collection of the technical standards, implementation conventions,

standards options, rules, and criteria for organizing them into profiles that govern systems and system or service elements in a given architectural description.

4.2.8 Systems Viewpoint

Systems Viewpoint (SV) describes system activities and resources that support operational activities. This viewpoint traces system activities and resources to the requirements established by the Operational Viewpoint.

4.2.9 Standard Models

The table, DoDAF Standard Models, list the standard models provided by the DoDAF for the eight DoDAF viewpoints.

Table 4-1. DoDAF Standard Models

Model	Describes…
AV-1: Executive Summary	Project visions, goals, objectives, plans, activities, events, conditions, measures, effects (outcomes), and produced objects.
AV-2: Glossary	Definitions of ontic terms used in an architectural description.
CV-1: Capability Effects	The overall vision for transformational endeavors, which provides a strategic context for the capabilities described and a high-level scope.
CV-2: Capability Hierarchies	A hierarchy of capabilities which specifies all the capabilities that are referenced throughout one or more architectural descriptions.
CV-3: Capability Schedules	The planned achievement of capability at different points in time or during specific periods of time. The CV-3 shows the capability phasing in terms of the activities, conditions, desired effects, rules complied with, resource consumption and production, and measures, without regard to the performer and location solutions.
CV-4: Capability Dependencies	The dependencies between planned capabilities and the definition of logical groupings of capabilities.
CV-5: Capability Deployments	The fulfillment of capability requirements shows the planned capability deployment and interconnection for a particular capability phase. The CV-5 shows the planned solution for the phase in terms of performers and locations and their associated concepts.
CV-6: Capability Activities	A mapping between the capabilities required and the operational activities that those capabilities support.
CV-7: Capability & Services	A mapping between the capabilities and the services that these capabilities enable.
DIV-1:Conceptual Information	Information needs.
DIV-2: Data Requirements Model	Data requirements.
DIV-3: Data Implementation	The physical implementation of data elements.
OV-1: Operational Concept	The operational concept.
OV-2: Organizations & Resources	Resource flows exchanged between operational activities.
OV-3: Organizations, Activities, & Resources	Resources exchanged and the relevant attributes of the exchanges.
OV-4: Organizational Relationships	Organizational context, roles, and other relationships among organizations.
OV-5a: Operational Activity Hierarchy	Capabilities and operational activities organized in a hierarchal structure.
OV-5b: Operational Activities	The context of capabilities and operational activities and the relationships among activities, inputs, and outputs.
OV-6a: Operational Rules	Rules that constrain operational activities.
OV-6b: Operational State Transitions	Activity responses to other activities.
OV-6c: Operational Activity Sequences	Activities in a scenario, a specified sequence of activities.
PV-1: Projects & Organizations	The dependency relationships between the organizations and projects and the organizational structures needed to manage a portfolio of projects.
PV-2: Project Schedules	A schedule of activities and their resources with the key milestones and dependencies.
PV-3: Projects & Capabilities	A mapping of programs and projects to capabilities to show how the specific projects and program elements help to achieve a

Model	Describes…
	capability.
SvcV-1 Services	Services, service items, and their interconnections.
SvcV-2 Services Interfaces	Resource flows among services.
SvcV-3a Services & Systems	relationships among or between systems and services in a given architectural description.
SvcV-3b Service Relationships	Relationships among services in a given architectural description.
SvcV-4 Services Functions	Activities performed by services and the service resource flows among service activities.
SvcV-5 Services & Operational Activities	A mapping of service activities to operational activities.
SvcV-6 Services, Activities, & Resources	Service resource flow among between services and the attributes of those resources.
SvcV-7 Service Measures	Measures of services for interesting periods of activity.
SvcV-8 Services Evolution	Planned incremental steps to migrate from current services to future services.
SvcV-9 Service Technologies & Skills	Emerging resources, standards, and skills that planners expect to be available for future service development.
SvcV-10a Services Rules	Rules that constrain service activities.
SvcV-10b Services State Transitions	Service activity responses to other activities.
SvcV-10c Services Activity Sequences	Activities in a scenario, a specified sequence of service activities.
StdV-1 Standards Profile	Current standards constraining activities that produce solution resources.
StdV-2 Standards Forecast	Future standards that will constrain activities that produce solution resources.
SV-1 Systems Composition and Interface Identification	Systems, system parts, and their relationships.
SV-2 System Interface Means	Resource flows among systems.
SV-3 System Relationships	Relationships among systems in an architectural description.
SV-4 Systems Functions	The functions (activities) performed by systems and the system data flows among system functions (activities).
SV-5a Systems & Operational Activities	The relationships of system activities to operational activities.
SV-5b Systems & Capabilities	A mapping of systems back to capabilities or operational activities (activities).
SV-6 Systems, Activities, & Resources	Provides details of system resource flow elements being exchanged between systems and the attributes of that exchange.
SV-7 System Measures	Measures of a system.
SV-8 System Evolution	The plan to upgrade a suite of systems to a more efficient suite or to evolve a current system to a future implementation.
SV-9 System Technologies & Skills	The emerging technologies, software/hardware products, and skills that are expected to be available in a given set of time frames and that will affect future system development.
SV-10a Systems Rules	Constraints on system activities.
SV-10b System State Transitions	How a system responds to events.
SV-10c System Activity Sequences	System-specific refinements of critical sequences of activities described in the Operational Viewpoint.

APPENDIX A ACRONYMS & ABBREVIATIONS

Acronym	Definition
AV	All Viewpoint
BEA	Business Enterprise Architecture
BMA	Business Mission Area
BPMN	Business Process Modeling Notation
C2	Command and Control
CA	Common Approach
CDM	Conceptual Data Model
CI	Configuration Item
CM	Configuration Management
COI	Community Of Interest
COMMPLAN	Communications Plan
CDD	Capability Development Document
CPD	Capability Production Document
CPM	Capability Portfolio Management
CV	Capability Viewpoint
DAS	Defense Acquisition System
DDMS	Department of Defense Discovery Metadata Specification
DISR	DoD Information Standards Registry
DIV	Data and Information Viewpoint
DM2	DoDAF meta-model
DNDAF	Department of National Defense Architecture Framework
DOTMLPF	Doctrine, Organization, Training, Material, Leadership and education, Personnel, and Facilities
E-R	Entity-Relationship
EA	Enterprise Architecture
EEI	Essential Element of Information

Acronym	Definition
FEA	Federal Enterprise Architecture
FFP	Fit For Purpose
FOC	Full Operational Capability
IC	Intelligence Community
IC-ISM	Intelligence Community – Intelligence Standard Markings
ICD	Initial Capabilities Document
IDEAS	International Defence Enterprise Architecture Specification
IEA	Information Environment Architecture
IER	Information Exchange Requirement
IMA	Information Mission Area
IPB	Intelligence Preparation of the Battlefield
IPOE	Intelligence Preparation of the Operational Environment
IOC	Initial Operational Capability
ISO	International Standards Organization
ISP	Interoperability Support Plan
ISR	Intelligence, Surveillance and Reconnaissance
IT	Information Technology
JCA	Joint Capability Areas
JCIDS	Joint Capabilities Integration and Development System
LDM	Logical Data Model
OMB	Office of Management and Budget
OPLAN	Operation Plan
OV	Operational Viewpoint
MODAF	Ministry of Defence Architecture Framework
MOE	Measure Of Effectiveness
MOP	Measure of Performance
NIEM	National Information Exchange Model

Acronym	Definition
NSS	National Security System
PE	Program Element
PES	Physical Exchange Specification
PIR	Priority Intelligence Requirement
POM	Program Objective Memorandum
PPBE	Planning, Programming, Budgeting, and Execution
PV	Project Viewpoint
QoS	Quality of Service
RA	Reference Architecture
RDBMS	Relational Database Management System
SA	Solution Architecture
SCI	Software Configuration Item
SE	Systems Engineering
SETR	System Engineering Technical Review
SOA	Service Oriented Architecture
SoS	System of Systems
SoSE	System of Systems Engineering
SV	Systems Viewpoint
SvcV	Services Viewpoint
StdV	Standards Viewpoint
TADIL	TActial Data and Information Link
TEMP	Test and Evaluation Master Plan
TOGAF	The Open Group Architecture Framework
TTP	Tactics, Techniques, and Procedures
UJTL	Universal Joint Task List
UML	Unified Modeling Language
URL	Universal Resource Locator

Acronym	Definition
WBS	Work Breakdown Structure
WMA	Warfighting Mission Area
XML	Extensible Markup Language
XSD	XML Schema Definition

APPENDIX B GLOSSARY OF CONCEPTUAL LEVEL TERMS

This appendix lists conceptual level terms and their definitions from the DoDAF Glossary[1]. For more information about these terms, including their technical DM2 definitions, consult the complete Glossary. These definitions are generally stated in the singular; however, this grammar assumes that whatever applies to one also applies to many. Consult WordNet for the meaning of terms not defined here. The appropriate senses among those given by WordNet are noted by an index number in entries that specify a specific sense of term for DoDAF use.

activity — a transformation of some resource into another resource.

agreement — a guidance statement that records consent among performers to guidance and conditions for performing an activity.

capability — an ability to achieve a desired resource state under a specified performance standard and a specified condition through some combination of guidance and resources to perform a set of activities. ◇ *translated from*: Joint Publication X.

condition — a state of resources that affects the performance of an activity.

data — an information resource that represents states in a standard way suitable for consumption and production by activities. ● *see*: information.

desired resource state — a state of resources that is envisioned by a performer capable of responsibility. ● *see*: vision, capability, resource. ● *note*: A desired resource state is the DoDAF expression of the desired effect of a capability. In the Joint view of capability, a performer capable of responsibility is exemplified by a combatant commander.

geopolitical extent — a region of the world whose boundaries are asserted by a nation state.

guidance — an information resource that is an authoritative statement that constrains the performance of an activity.

information — a resource that is a representation of the state of rules, conditions, activities, performers, and other resources. ● *note*: Information is often produced by one performer to be consumed by another, decision-making performer. ● example: *Information is a difference that makes a difference.* • Gregory Bateson.

location — a point or extent in space that may be referred to by coordinates or by name. ● *note*: A location is said to be a *geospatial extent*.

[1] The DoDAF 2.02, Chg 1 Glossary is also known as the DoDAF 2.02, Chg 1 Data Dictionary.

materiel — a resource that is some assemblage of equipment, apparatus, and supplies used by a performer to perform an activity.

measure — a quantification of the magnitude of some property of a thing.

organization — a performer that is an assemblage of persons in roles and resources that support those roles.

performer — a resource that performs an activity.

performer capable of responsibility — a person in a role that is accountable for the performance of an activity. ● *see*: person role.

person role — a performer that is a person defined by a role with respect to an activity. ● *note*: In day-to-day language, we speak of a *person in a role*.

resource — any thing that is produced or consumed by an activity. ● *note*: Performers and guidance associated with an activity are themselves products of other activities.

rule — a guidance statement that prescribes the performance of an activity.

service — a performer that enables access to the performance of a set of activities.

standard **—** a guidance statement that specifies criteria for the performance of an activity.

system — a performer that is an assemblage of resources.

vision — an information resource that describes a future state of resources that is to be achieved.

APPENDIX C RECORD OF CHANGES FOR CHANGE 1

#	Title	Description	Source Org	Action
91	Context	Context, esp Operational or Environmental Context, can set condition for interfaces, etc. Same as 453	UPDM	We model as Condition. It looks like Condition is a sub of Property, e.g., UJTL Riverine Current of Stong, Moderate, Gentle -- the rivers whose current is Stong, all the rivers whose current is Gentle, etc. Condition was made a subtype of Property
295	Condition Powertype stereotype	To have a <<Powertype>> stereotype, the class must be at the (arrow) end of a powertypeInstance relationship. In other words, it is formally redundant…but is there as it is useful to be able to identify what is a powertype at a single glance. In the case below, "condition" is not a powertype, as we have not identified the type for which it is the powertype. Suggest it is just stereotyped as <<Type>>	IDEAS	Changed to Type. WG Reviewed.
316	Metamodel diagram per DoDAF Model	Schema has not been provided in the Dictionary for the DoDAF Ver. 2.0 Viewpoints. The only schemas included are for the Meta-model Data Groups. CADM included schemas that showed how each View was characterized and constructed from a data perspective. The Proposed Resolution: Revise the Dictionary to add schemas for each AV, CV, DIV, OV, PV, StdV, SvcV, and SV Viewpoint.	SPAWAR	Create simplified versions of the LDM diagrams
383a	Rules and Contexts	Are there examples of Rules that don't have spatio-temporal extent? For example, does the Constitution exist separate from any printed copy? Should the context of a Performer WRT a rule constraining an Activity be generalized? Rules and superrules? See SBVR WRT rules, operative rules, and enforcement.	Sandia	same pattern as desiredEffect and desiredEffectDescription for WG to review prior to 2.03 technical cutoff Added pattern to Rules diagram. WG reviewed.

#	Title	Description	Source Org	Action
402	External Performer	Is there an official DoDAF 2 definition for an "external performer" and how does the DM2 handle it? My architects believe that the external performer is a performer outside the scope of the architecture and we do not necessarily know/care what they do with the information. For example, we know the we need to get information X to the Army, but don't necessarily know the activity they will be doing if it is outside the scope of the architecture. Our architects capture the Army needline in the OV-2, but I don't think the DM2 doesn't allow us capture it without documenting the activity.	HQMC CD&I	Put out a FAQ on this. Discuss external organizations and how DM2 restricts send and receive to be by Activities only but that this is not a problem -- simply create a Send XXX and Receive XXX. Also update FAQ's on Journal from EA Conference FAQs. Provide FAQ in next readahead FAQ added. FAQ list consolidated and put on Journal site. DM2 site has link to FAQ on Journal site. In DM2 you can categorize as external or internal as needed. But may not be standard across organizations. For Performers you do not need to model, the DM2 doesn't not require documentation of the Activities other than an acknowledgement that a generic or dummy consume or produce activity must have taken place. See UPDM SAR DM2 markup examples. An OV-2 diagram need not show the implied activities but the DM2 PES XML document must, even if they are just placeholders to be completed later, e.g., during OV-5 development. This precision solves the “overspecification” problem of earlier DoDAF OV’s. In MODAF, would be known resource. Private action and public actions in Joint action.
405	Physical and Temporal Measures for SV10b	UPDM example does not have these mandatory elements	DCIO	made optional in PES matrix

#	Title	Description	Source Org	Action
406	Rename/Def change for desiredEffect structure	Capability connects to Resource via desiredEffectOfCapability which is descended from WholePartType. Capability is descended from IndividualType, i.e. it is the set of sets where the instances of each of the sets it contains are entities that have a capability, i.e. some of these can easily contain individuals that are kinds of performers. There is no argument however concerning the need to have something that connects a capability to a desired outcome in the form of a state of a given resource. As an example taken from the SAR it would seem likely that the end desired effect of a Maritime search and rescue would be that the state of the resources that are in need of rescue is changed from "in need of rescue" to "rescued and safe" and that the state of the resource "a place of safety" is changed from having "no rescued" to "all in need rescued". This would however seem to imply a certain multiplicity as regards the resource. Is this assumption relating to multiplicity correct? The naming of the element gives the impression that it has something to do with desiredEffect which however is not the case. This would seem to require some handling to avoid misunderstandings. An associated element is effectMeasure and MeasureOfEffect. The definition of effectMeasure talks about desiredEffect in spite of the fact that there is no relationship to this element. A change of definition would seem to be in order here.	UPDM	DM2 AI rec change desiredEffectOfCapability name to desiredResourceStateOfCapability. Also, fix def of MeausreOfEffect to remove "desired." DM2 AI Capability must have at least one of these. May also for Performer to say it must perform at least one Activity. Etc. Provide list of association name changes. Changed defs of desiredResourceStateOfCapability, desireMeasure, effectMeasure, visionRealizedByDesiredResourceState, desiredResourceStateRealizedByProjectType, descriptionOfDesiredResourceStateDirectsActivity, descriptionOfDesiredResourceState,desiredResourceState DescribedBy Renamed desiredResourceStateOfCapability, visionRealizedByDesiredResourceState, desiredResourceStateRealizedByProjectType, descriptionOfDesiredResourceStateDirectsActivity, descriptionOfDesiredResourceState,desiredResourceState DescribedBy.
408	activitySuperSubtypeOfMeasureType Def	activitySuperSubtypeOfMeasureType is defined as: " activityType is a member of MeasureType". There is no element named activityType and this implies that the definition needs to be changed. Since Activity is the set of all subsets of IndividualActivity and MeasureType is the set of all subsets of a set of sets of Individual Measures, the connection is less than obvious and the author of this report would like to discuss this. Def is incorrect or remove TypeType.	UPDM	Relationship changed to measureTypeApplicableToActivity and is a typeInstance relationship and of proper order. The definition needed to be corrected and was.

#	Title	Description	Source Org	Action
414	Ways	The proposed action is incorrect and leads to ambiguity. Ways are activities (behavior, tactics, etc.), means are systems (materiel facilities, people, etc)	SAF/A6	Take Alex's Joint pub defs in the Capabilities deck and add to aliases. Take a stab at DM2 that corresponds to it. Added Ways as alias. Revisit to finialize def and DM2 aliases. Notify Mark that we went with Joint defs. New source for Ways and def reviewed by WG.
428	Enterprise	CV-3 Capability phasing The text describing the view talks about phases derived from CV-1. What is being referred to here? (since no direct enterprise phase exists in DM2).	UPDM	Capability phasing will not be included in the TECHEDIT
439	activityResourceOverlapSuperSubtypeOfRule	This seems weird to be a supersubtype since the super and sub are different types (Type and tuple type)	DCIO	relationship removed
449	Ind. Person	It has been stated previously that IndividualPerson is to be considered as meta-data. It is however still shown as part of the Performer data group. Does this mean that the use of IndividualPerson has changed?	UPDM	Correct IndividualPerson is not a DoDAF architectural element. Removed IndividualPerson. Created IndividualPersonRole to represent, e.g., billets.
453	capabilityOfPerfomer	Capability is related to Performer via capabilityOfPerformer. This in turn is descended from propertyOfType which is defined as " A superSubtype that asserts an IndividualType is a subtype of a Property - i.e. it asserts all members of the Individual type "have" a property. Examples: All London Buses are red, All Porsche 911 2.2S have a mass between 900 and 960 kg.". In PropertyOfType <<place1Type>> is Property and <<place2Type>> is IndividualType. In capabilityOfPerformer <<place2Type>> is Performer which is a subset of Resource which in turn is a subset of IndividualType. <<place1Type>> is Capability which is a subset of IndividualType i.e. less restricted than the <<place1Type>> that propertyOfType links to since Property is a subset of IndividualType. The following therefore seems to be a valid question: Why is Capability not a subset of Property?	UPDM	Agreed, made Capability a subtype of Property so that a Capability is a set of types that exihibit certain desired effects and performance of activities under certain conditions. (Similarly, changed CapabiltyType to be a PropertyType.) Necessitated changing capabilityOfPerformer to be propertyOfType (a super-subtype relationship). This is a relatively big issue since it high-lights a general problem where the model does not seem to mesh properly. At present the DM2 model contains an error that has to be corrected in some fashion. It is not strictly clear however exactly how this is to be accomplished. There seems to be some misgivings about using the solution that indicates capability as a subtype of Property, the reason for this is at present not known.
464	Disjoint	Disjoint already in the current IDEAS foundation so can be removed form DM2	UPDM	Brought in IDEAS Disjoint for Partitions. Setup one for the partition of real property into sites and facilities.

#	Title	Description	Source Org	Action
471	ServiceDescription desribes ServicePort, not Service	ServiceDescription contains all the information relating to a service but it is linked to a ServicePort not a Service	UPDM	Service Description describes a Service. Still need to figure out what a Service Port is? Deleted from model for now. See 387 for this issue
484	Project and Project Type have a TI and a PTI		UPDM	Removed the TI
494	Info Type and Data Type	Information is indicated as a Type, i.e. it is a set of sets. InformationType is its Powertype, i.e. it is the set of all subsets of a set of sets. Why is associationOfInformation attached to it, would it not be better to make use of Information instead if the intent of the element is to describe the structure of a particular kind of information type (an instance of the Information set). InformationType is not connected anywhere with the exception of the tuple and the powertype association. The same could be stated for DataType.	UPDM	Record DM2 AI for what are currently are called Info Type and Data Type to be the resource types that flow in the resource flow model. This is because it is not the actual Individual Type Information that is modeled in the flow, but the TypeType. This requires a person to understand that the Individual information or data is at the utterance or copy level. At present the DM2 model handling of Information (a set of sets) and InformationType (set of subsets of a set of sets is somewhat strange. The same goes for DataType. The explanation given is that an individual piece of information is a specific utterance as such. As an example let is consider the information "weight =10 kg". The set being referred to by Information are all utterances or copies of this particular piece of information. The instances of InformationType are therefore all subsets of theses sets and one of those subsets is weight information where the actual value is not defined but only given as a valueType. The implication of this is then that DM2 is wrong when it defines Information as a subset of Resource, instead the subset should be InformationType if it is to be usable. The same argument can be made for Data and DataType. Do 2nd order types for everything - done. Information is a subclass of both Representation and Resource. 2nd order of these classes follow the same pattern. Reviewed by WG

#	Title	Description	Source Org	Action
497	Measures	Why have measureOfIndividual been treated differently from MeasureOfType (see 2.6 in the report).	UPDM	Added subtype for MeasureOfIndividual, currently only MeasureOfIndividualPoint.
503	Org/OrgType WP(T) Performer	Relationship missing - Org/OrgType Part Of Performer	DCIO	Lars' rules should state that WholePart(Types) should be limited to the same DM2 leaf classes only. Make sure Lars' rules are formally in 2.03 The following relationships were added: systemPartOfService servicePartOfSystem organizationTypePartOfService servicePartOfOrganizationType organizationTypePartOfSystem systemPartOfOrganizationType removed: portPartOfPerformer change rule to add above and send to Alex
517	Powertype Definition	The definition for “Powertype” seems a bit garbled (“A Type that is the is the set (i.e., Type) of all subsets (i.e., subTypes) that can be taken over the some Type.”	IDA	Changed to IDEAS def.
520	Individual Person	If needed only for metadata, does not need to be structured so remove. If intended only for AV-1, how would you restrict?	MITRE	dupe of #449
537	desiredEffectDirectsActivity	How does a desired effect guide/direct Activities?	UPDM	Added DescriptionOfDesiredEffect and showed it as the Resource consumed by an Activity so that it would be guided by it.
538	Not all Performers can desired an effect	Probably limit to Oganizations, Organization Types, and Person Types	UPDM	Try PerformerCapableOfResponsibility on for size and WG review. OrgType and PersonRole made sub of PerformerCapableOfResponsibility. WG reviewed.
539a	Guidance and Rule	Guidance serves no purpose in DM2. It should either be deleted or linked to something.	UPDM	Made a new relationship between Guidance and Activity-guidanceShapesActivity Made Guidance dfo and new relationship as o in PES matrix

#	Title	Description	Source Org	Action
541	PersonType part of Individual Performer	Need Individual Person part of Individual Performer to do correctly. Related to 503	UPDM	Use personRolePartOfPerformer with singleton typeInstance relationship between IndividualPersonRole and IndividualPerformer
542	Information Type is a Representation Type	Information Type is a Resource Type but forgot to show Representation Type relationship	UPDM	Restitched InformationType To RepresentationType
544	Pedigree activities	Pedigree Activities are Individual Activities	UPDM	Made Pedigree activities Individual Activities. Combined InformationPedigree and Pedigree diagram
548	Name def doesn't match model		IDA	changed to IDEAS def
549	Action	Should be in data dictionary	IDA	Get definitions for Action, e.g., JC3IEDM, Dale, …
566a	Monster Matrix review - part 1	especially: 1. desiredEffect the tuple is required in many products, but we tend to use the resource state instead. 2. ov5a has no optional elements. that really limits things. 3. most SvcV products require port even though we alway use serviceport instead.	SBSI/DCIO	1. made desiredEffect optional. ResourceState is dfo. 2. no change needed. Activity and ActivityType are available along with all IFO and DFO classes. 3 is OBE.
573	Representation Type / Resource	RepresentationType cannot be an IndividualTypeType and a Resource (IndividualType). This occurs because InformationType is needed in ResourceFlow	SBSI/DCIO	Changed Info and Data flow resources to be first order.
593	SBSI Website: DM2 Action Item	The DoDAF website should have a process to submit change requests. Also, there should be a way to see the submitted change requests in a log on the public site (whether it is DoDAF or DoDAF Journal). It needs to collect the appropriate status and change information.		added to website
595	IDEAS plugin model tweaks	In order for the IDEAS plugin to work properly with the model, Ian will run a script to tweak it. Also, double-clicking on diagram items causes issues.		work with Ian to fix plugin new plugin available
597	Need ARO to prevent ambiguity			added joint action as a couple that relates activityConsumesResource and activityProducesResource
598	Capability	Is Capability really a subset of IndividualType. This results in strange connections for other elements.		Make Capability a sub of Property. Dupe of 453

#	Title	Description	Source Org	Action
600	Measure of Type and Measure of Ind are df	This means you can't put a Measure on any individual other than a point and for types only the specifically defined subclasses of Measure of Type.		measureOfType and measureOfIndividual made dfo verify done for 2.03
603	Def of activityPerformableUnderCondition and activityMapsToCapabilityType	1. They're identical. 2. Theydon't make any sense: "Represents that an activity was / is / can-be/ must-be conducted under certain conditions with a spatiotemporal overlap of the activity with the condition." 3. Why is the mapping an overlap rather than a wholePart like activityPartOfCapability?		Changed to: activityPerformableUnderCondition-Represents that an activity was / is / can-be/ must-be conducted under certain conditions. activityMapsToCapabilityType-Represents that an activity is part of a CapabiltyType. The mapping may go away depending on resolution of the higher order types.
604	desiredEffect association names	They're actually pointing to a resourceState. Dupe of 406		desiredFutureResourceState s/b desiredResourceState, others s/b desiredResourceState not desiredEffect. The following were renamed as such: descriptionOfDesiredResourceStateDirectsActivity desiredResourceStateRealizedByProjectType desiredResourceStateOfCapability desiredResourceStateDescribedBy visionRealizedByDesiredResourceState DescriptionOfDesiredResourceState
605	effect and desire measures can be subtyped under resource measure	Since both places are subtypes		classes made subtypes of measureOfResource
606	explcitness of representation places	places 1 should be renamed to thingRepresented, thingNamed, thingDescribed		renamed as described
607	measure of individual place renaming	places mixed up measureOfIndividualPoint -- should be place 2 that points to the thing measured. Don't need to redefine place 1 since measureOfIndividual already points to Measure. Don't need to rename place 1 for most of the subs.		Changed place2 to point to class Point. Also put descriptive name on place2.

#	Title	Description	Source Org	Action
609	resources overlap locations, not necessarily contained within	e.g., a facility's lat long point		Change to overlap type
610	type for rule and guidance constraints	since they are both information, they are consumed like other information		Change to overlap type and before after type for both the rule constraining and guidance shaping. Like in 383
612	measures of temporal boundaries	should use IDEAS duration and period naming instead		Dupe of 647
615	rules and guidance separate actual from document			like 383 Pattern done for Rule but not Guidance - 539b.
617	desired effect directs activity	place positions are reversed; the activities happen before the objective. But the description of the desired effect happens before the activities.		these are the beforeAfterType relationships in the model and the relationship they describe: ruleConstrainsActivity - rule before activity desiredResourceStateRealizedByProjectType - projecttype before resource *descriptionOfDesiredResourceStateDirectsActivity - descriptionOfDesiredResourceState before activity *activityConsumesResource - resource before activity activityProducesResource - activity before resource *descriptionOfRuleDirectsActivity - descriptionOfRule before activity guidanceShapesActivity - guidance before activity enablingServiceStandardConstrainsEnablingServiceActivity - EnablingServiceStandard before EnablingServiceActivity businessServiceStandardConstrainsBusinessServiceActivity - BusinessServiceStandard before BusinessServiceActivity The starred items were backwards and changed to described above.
618	performer part of performer	Some combinations don't make sense; usage for system part of service, org part of system, etc. violates Lars Superclass Association Usage Rules; and LDM is inconsistent with CDM.		Looks like all combinations are OK except OT WPT PRT. Dupe of 503

#	Title	Description	Source Org	Action
619	temporal boundaries at the type level unnecessary			removed from model and data dictionary
620	DoDAF conformance	Update text to WG levels		develop text based on FAC brief
621	Systems transitioning to Services	DoDAF says: "The Systems DoDAF-described Models are available for support of legacy systems. As architectures are updated, they should transition from Systems to Services and utilize the models within the Services Viewpoint". Not all systems transition to services and architectures may need both SV and SvcV's. See the discussion thread on LinkedIn for more details, http://www.linkedin.com/groups?mostPopular=&gid=2585550. Part of Service concept (CR's 516, 518, 523, 560, 387, 398, 621)		Change to: "The Systems DoDAF-described Models are available for support of systems. This includes legacy systems and systems that will not become services. If an architecture transitions to services, they can transition from Systems to Services and utilize the models within the Services Viewpoint. An architecture can also have models in the Systems Viewpoint and the Services Viewpoint.' Discussed Services CRs. WG to review. McDaniel to work on defs. Section being aligned with glossary and DM2.
622	Release Date	Add release date to PES file	DCIO	changed in new PES

#	Title	Description	Source Org	Action
625	Model convention update	change to: «Individual» an instance of an Individual: something with spatiotemporal extent [gray (80%): R40 G40 B40] «Type» a specification of a Type [pale blue: R153 G204 B255] «IndividualType» a specification of a Type whose members are Individuals [light orange: R255 G173 B91] «TupleType» a specification of a Type whose members are tuples [light green: R204 G255 B204] «Powertype» a specification of a Type that is the set of all subsets of a given Type [lavender: R204 G153 B255] «Name» a specification of a Name, with the exemplar text provided as a tagged value [tan: R255 G254 B153] «NamingScheme» a specification of a Type whose members are Names [yellow: R255 G255 B0] The model uses these stereotyped relationships: «typeInstance» a relationship between a Type and one of its instances (UML: dependency) [red: R255 G0 B0] «powertypeInstance» a relationship between a Type and its powerset (UML: dependency) [red: R255 G0 B0] «nameTypeInstance» a relationship between a Name and its NameType (UML: dependency) [red: R255 G0 B0] «superSubtype» a relationship between a Type and one of its subtypes (UML: generalization) [blue: R0 G0 B255] «wholePart» a relationship between an Individual and one of its parts (UML: aggregation) [green: R0 G147 B0] «namedBy» a relationship between a Name and the thing it names (UML: association) [black: R0 G0 B0] «tuple»/«couple» a relationship among/between things (UML: n-ary relationship diamond) [gray (80%): R40 G40 B40]	UPDM	changed
630	PersonType residual terminology	The potential aliases for "Mission" still mentions PersonType.	N2/N631	Renamed as IndividualPersonRole, PersonRole, PersonRoleType
636	DoDAF Website PDFs	PDF from website is not a document, but simply a print job from web content	DCIO	Will provide formal document exactly same as web page for 2.03

#	Title	Description	Source Org	Action
641	Foundation category for exporter	The following types in DM2 (v2.02) do not get the correct foundation class using the specified rules. - activityProducesResource - activityConsumesResource - desiredEffectDirectsActivity - desiredEffectIsRealizedByProjectType All of the above classes are subtypes of both WholePartType and BeforeAfterType. DM2_PES_v2.02.xsd specifies that they must have the foundation category WholePartType. But the rules indicate that the foundation category should be CoupleType (the super type of BeforeAfterType) because it is more generic.	EE	change in new PES
642	associationOfInformation	It is the last triple in the model. Is this correct?		Removed the association. It is not necessary. Can be treated as any other Resource and use the other generic DM2 relationships like superSubType, WholePartType, BeforeAfterType instead.
643	resourceInLocationType	Wanted to make sure we needed both individualResourceInLocation and resourceInLocationType. The only set of relationships in the model that are duplicated for Individual and Type.		Put operationally, in architectures do we need to sometimes say: Some type of Resource is (or will be) in an actual location (e.g., Afghanistan) Some type of Resource will need to be in a location type (e.g., the desert) Use a consistent pattern Example, documentation on use of singletons Review convention on “Individual” prefixes and “Type” suffixes and make consistent. Removed individualResourceInLocation.

#	Title	Description	Source Org	Action
647	Remove temporalBoundary classes	now using HappensIn	DCIO	harmonize with IDEAS deleted: EndBoundaryType measureOfIndividualEndBoundary measureOfIndividualStartBoundary measureOfTypeEndBoundaryType measureOfTypeStartBoundaryType StartBoundaryType TemporalBoundaryType kept: endBoundary startBoundary temporalBoundary added: Period Instant PeriodOrInstant happensIn Duration PeriodType timeSuperTypeDurationSubtype MeasurePoint
649	Versioning	make sure version information is embedded in PES XSD and LDM	DCIO	add to new PES
652	associationOfInformation	associationOfInformation has the names of its relationships reversed "associateOne" is stereotyped as "place2" and "associateTwo" is stereotyped as "place1".	DCIO	relationship deleted. See 642.
663	Whole Document: Legacy System Statement	Incorrect statement concerning 'Legacy' – "The Systems Viewpoint, for Legacy support, is the design for solutions articulating the systems, their composition, interconnectivity, and context providing for or supporting operational and capability functions." http://cio-nii.defense.gov/sites/dodaf20/ viewpoints.html	USMC	3 d-Deleted. Find other instances of legacy and change. System views will not go away for Service views. Cross ref with 621. Section being aligned with glossary and DM2.

#	Title	Description	Source Org	Action
665	OV-2: Incorrect use of 'Connections"	Incorrect statement and use of 'connections' "In addition to Needlines, Resource Flow Connectors can be used to overlay contextual information about how the Operational Activities and Locations interact via physical flows" http://cio-nii.defense.gov/sites/dodaf20/OV-2.html Suggest using 'Flow' when referring to an information or resource exchange.	USMC	3.1.4.2.2 p - Removed term. Must define Resource Flow. Rename Resource Flow diagram in DM2 . Section being aligned with glossary and DM2.
666	OV-2: Incorrect description and overly dependant upon 'Activities'	OV-2 description relies heavily upon activities and it should focus on the "performers". http://cio-nii.defense.gov/sites/dodaf20/OV-2.html	USMC	changed 3.1.4.2.2 e and g. Section being aligned with glossary and DM2.
667	OV-2: "Incorrect use of supply chain analysis"	Incorrect statement - "Supply chain analysis" and "Allocation of activities to resources". It should not be used because it skews the intended purpose of the OV-2. This analysis would require much more information than is captured on an OV-2 and it will lead to confusion on the part of the developer of the OV-2.	USMC	3.1.4.2.2 c - removed both terms. Ensure allocation of activites to resource in OV5b. Section being aligned with glossary and DM2.
668	OV-5b: Incorrect statement and use of 'Intelligence Community"	Incorrect statement, delete all references to only 'Intel Community' – "The OV-5b describes the operational, business, and defense portion of the intelligence community activities associated with the Architectural Description," http://cio-nii.defense.gov/sites/dodaf20/OV-5ab.html	USMC	fixed 3.1.4.2.5 c. Section being aligned with glossary and DM2.
669	OV-5b: Incorrect OV-5b description	Incorrect statement, does not accurately describe OV-5, sounds more like OV-6c – "The OV-5a and OV-5b describes the operational activities that are being conducted within the mission or scenario." http://cio-nii.defense.gov/sites/dodaf20/OV-5ab.html	USMC	fixed 3.1.4.2.5 b - deleted: that are being conducted within the mission or scenario, added: and, optionally, the allocated performers. Section being aligned with glossary and DM2.
670	OV-5b: Incorrect description of focus	Incorrect statement, should not focus on Business Activities only - "External interchanges (from/to business activities that are outside the scope of the model)." http://cio-nii.defense.gov/sites/dodaf20/OV-5ab.html	USMC	3.1.4.2.5 c - deleted: The OV-5b also describes Input/Output flows between activities, and to/from activities that are outside the scope of the Architectural Description. Section being aligned with glossary and DM2.

#	Title	Description	Source Org	Action
671	OV-5b: Incorrect terminology used	Incorrect statement, should not use not standardized or defined term - “External interchanges.” http://cio-nii.defense.gov/sites/dodaf20/OV-5ab.html	USMC	3.1.4.2.5 c - deleted: External interchanges (from/to business activities that are outside the scope of the model). Section being aligned with glossary and DM2.
672	OV-5b: Incorrect definition	Incorrect definition and should be rewritten, it does not add any clarity to the correlation between the OV-2 and OV-5b - “To maintain this independence from implementation, logical activities and locations in OV-2 Operational Resource Flow Description are used…” http://cio-nii.defense.gov/sites/dodaf20/OV-5ab.html	USMC	3.1.4.2.5 d - deleted: To maintain this independence from implementation, logical activities and locations in OV-2 Operational Resource Flow Description are used to represent the structure which carries out the Operational Activities. Section being aligned with glossary and DM2.