

The Open Group Architecture Framework (TOGAF™ 9) and the US Department of Defense Architecture Framework 2.0 (DoDAF 2.0)

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**The Open Group Architecture Framework (TOGAF™ 9) and the
US Department of Defense Architecture Framework 2.0 (DoDAF 2.0)¹**

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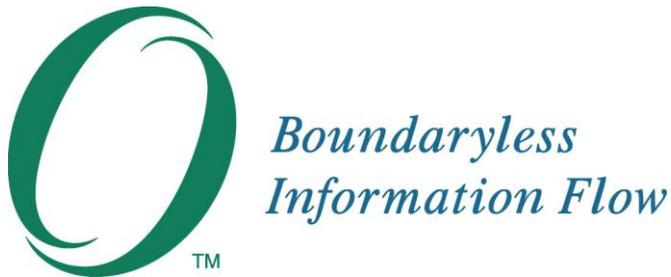
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Executive Summary

Numerous architecture framework standards have been developed and matured over the past decade and the focus of these frameworks is diverse. Many engineers believe there is an “either or” decision to be made regarding these frameworks; however, this is not always the case. Some of these standards address completely different elements of the architecture development process, thus there may be a natural synergy that can be identified and leveraged between architecture frameworks. The central part of TOGAF is the Architecture Development Method (ADM), a prescriptive, step-by-step instruction guide for “how to” architect, while the US Department of Defense Architecture Framework (DoDAF) has a primary focus on architecture description via a set of viewpoints. A MITRE working group was formed to analyze and document the relationships between these two frameworks and identify complementary areas. This core group of representatives from MITRE was also supported by members of The Open Group Architecture Forum during this effort. The baseline versions of the documents used were TOGAF 9 and DoDAF 2.0.

Previous analysis between TOGAF 8.1 and DoDAF 1.0 concluded that TOGAF and DoDAF were synergistic and complementary frameworks. This also holds true for the TOGAF 9 and DoDAF 2.0 releases. TOGAF continues to add depth to its method, while DoDAF has added depth and integrity to the types of data and viewpoints used to describe architectures. With all the improvements, it still remains beneficial to any DoDAF architect development effort to use the TOGAF ADM. Developing DoDAF models in conjunction with the ADM allows an architect to produce an architecture description within a well-defined and repeatable process.

A final note, given the synergy between these two frameworks it would appear that collaboration between the communities should be explored.

Introduction

This White Paper provides a comparative analysis of the two frameworks that describes where DoDAF products can be employed throughout the TOGAF ADM phases to develop a visual, integrated model of an architecture.

The intended audience is the DoD architect who can benefit from a formal methodology to guide architecture efforts and result in a quality architecture description in a DoD-compliant format, and the TOGAF architect who can benefit by a formal set of defined models to capture output for each of the ADM phases. This document provides the architect with a map of the specific DoDAF 2.0 model that should be produced or consumed in a specific phase of TOGAF 9 with enough context to understand the fundamental concepts of both DoDAF and TOGAF.

Overview of Analysis Results

Previous analysis between TOGAF 8.1 and DoDAF 1.0 concluded that TOGAF and DoDAF were synergistic and complementary frameworks. This also holds true for the TOGAF 9 and DoDAF 2.0 releases. TOGAF continues to add depth to its method, while DoDAF has added depth and integrity to the types of data and viewpoints used to describe architectures. With all the improvements, it still remains beneficial to any DoDAF architect development effort to use the TOGAF ADM.

The following tables and graphics provide a summary of the results of this comparative analysis of TOGAF 9 and DoDAF 2.0. Detailed information between these standards is contained in the sections following.

Notes to the reader:

- Some textual content from both TOGAF 9 and DoDAF 2.0 has been intentionally extracted and embedded in this White Paper to provide better insight to the reader on both standards. Some minor edits of this text were made to clarify DoDAF 2.0/TOGAF 9 relationships.
- There are numerous detailed method steps in some TOGAF 9 phases. In these instances a subset of the complete TOGAF 9 step listing is presented, focusing on the steps that apply to DoDAF 2.0 tailoring comments.

Table 1 provides a summary of DoDAF 2.0 architecture models mapped to specific sections within the TOGAF 9 structure.

Table 1: Summary Mapping of DoDAF 2.0 Models to TOGAF 9 Structure

Viewpoint	DoDAF Model	DoDAF Model Name	TOGAF 9 Structure Reference
All Viewpoint	AV-1	Overview and Summary Information	Part II: Ch. 6 through 16, All Phases
All Viewpoint	AV-2	Integrated Dictionary	Part II: Ch. 6 through 16, All Phases
Capability Viewpoint	CV-1	Vision	Part II: Ch. 7, 8, Phases A, B
Capability Viewpoint	CV-2	Capability Taxonomy	Part II: Ch. 7, 8, Phases A, B
Capability Viewpoint	CV-3	Capability Phasing	Part II: Ch. 7, 14, 16, Phases A, F, H
Capability Viewpoint	CV-4	Capability Dependencies	Part II: Ch. 7, 8, Phases A, B
Capability Viewpoint	CV-5	Capability to Organizational Development Mapping	Part II: Ch. 13, Phase E
Capability Viewpoint	CV-6	Capability to Operational Activities Mapping	Part II: Ch. 13, Phase E

Viewpoint	DoDAF Model	DoDAF Model Name	TOGAF 9 Structure Reference
Capability Viewpoint	CV-7	Capability to Services Mapping	Part II: Ch. 13, Phase E
Data and Information Viewpoint	DIV-1	Conceptual Data Model	Part II: Ch. 7, Phase A
Data and Information Viewpoint	DIV-2	Logical Data Model	Part II: Ch. 8, Phases B, C
Data and Information Viewpoint	DIV-3	Physical Data Model	Part II: Ch. 10, Phases C
Operational Viewpoint	OV-1	High-Level Operational Concept Graphic	Part II: 6, 7, Phases Prelim, A
Operational Viewpoint	OV-2	Operational Resource Flow Description	Part II: Ch. 8, Phase B
Operational Viewpoint	OV-3	Operational Resource Flow Matrix	Part II: Ch. 8, Phase B
Operational Viewpoint	OV-4	Organizational Relationships Chart	Part II: Ch. 8, Phase B
Operational Viewpoint	OV-5a	Operational Activity Decomposition Tree	Part II: Ch. 8, Phase B
Operational Viewpoint	OV-5b	Operational Activity Model	Part II: Ch. 8, 13, Phases B, E
Operational Viewpoint	OV-6a	Operational Rules Model	Part II: Ch. 8, Phase B
Operational Viewpoint	OV-6b	State Transition Description	Part II: Ch. 8, Phase B
Operational Viewpoint	OV-6c	Event-Trace Description	Part II: Ch. 8, Phase B
Project Viewpoint	PV-1	Project Portfolio Relationships	Part II: Ch. 7, 13, 14, 16, Phases A, E, F, H
Project Viewpoint	PV-2	Project Timelines	Part II: Ch. 7, 8, 13, 14, 16, Phases A, B, E, F, H
Project Viewpoint	PV-3	Project to Capability Mapping	Part II: Ch. 7, 8, 14, 16, Phases A, B, F, H
Services Viewpoint	SvcV-1	Services Context Description	Part II: Ch. 11, Phase C
Services Viewpoint	SvcV-2	Services Resource Flow Description	Part II: Ch. 11, Phase C
Services Viewpoint	SvcV-3a	Systems-Services Matrix	Part II: Ch. 12, Phase D
Services Viewpoint	SvcV-3b	Services-Services Matrix	Part II: Ch. 11, Phase C
Services Viewpoint	SvcV-4	Services Functionality Description	Part II: Ch. 11, Phase C
Services Viewpoint	SvcV-5	Operational Activity to Services Traceability Matrix	Part II: Ch. 11, Phase C
Services Viewpoint	SvcV-6	Services Resource Flow Matrix	Part II: Ch. 11, Phase C
Services Viewpoint	SvcV-7	Services Measures Matrix	Part II: Ch. 11, Phase C
Services Viewpoint	SvcV-8	Services Evolution Description	Part II: Ch. 13, Phase E
Services Viewpoint	SvcV-9	Services Technology & Skills Forecast	Part II: Ch. 13, 16, Phases E, H
Services Viewpoint	SvcV-10a	Services Rules Model	Part II: Ch. 11, Phase C
Services Viewpoint	SvcV-10b	Services State Transition Description	Part II: Ch. 11, Phase C
Services Viewpoint	SvcV-10c	Services Event-Trace Description	Part II: Ch. 11, Phase C
Systems Viewpoint	SV-1	Systems Interface Description	Part II: Ch. 12, Phase D
Systems Viewpoint	SV-2	Systems Resource Flow Description	Part II: Ch. 12, Phase D
Systems Viewpoint	SV-3	Systems-Systems Matrix	Part II: Ch. 12, Phase D
Systems Viewpoint	SV-4	Systems Functionality Description	Part II: Ch. 12, Phase D
Systems Viewpoint	SV-5a	Operational Activity to Systems Function Traceability Matrix	Part II: Ch. 12, Phase D

Viewpoint	DoDAF Model	DoDAF Model Name	TOGAF 9 Structure Reference
Systems Viewpoint	SV-5b	Operational Activity to Systems Traceability Matrix	Part II: Ch. 12, Phase D
Systems Viewpoint	SV-6	Systems Resource Flow Matrix	Part II: Ch. 12, Phase D
Systems Viewpoint	SV-7	Systems Measures Matrix	Part II: Ch. 12, Phase D
Systems Viewpoint	SV-8	Systems Evolution Description	Part II: Ch. 13, Phase E
Systems Viewpoint	SV-9	Systems Technology & Skills Forecast	Part II: Ch. 13, 16, Phases E, H
Systems Viewpoint	SV-10a	Systems Rules Model	Part II: Ch. 12, Phase D
Systems Viewpoint	SV-10b	Systems State Transition Description	Part II: Ch. 12, Phase D
Systems Viewpoint	SV-10c	Systems Event-Trace	Part II: Ch. 12, Phase D
Standards Viewpoint	StdV-1	Standards Profile	Part II: Ch. 12, Phase D
Standards Viewpoint	StdV-2	Standards Forecast	Part II: Ch. 13, 16, Phases E, H

Figure 1 is a visualization of the relationship between these frameworks from a TOGAF 9 to DoDAF 2.0 perspective using the TOGAF 9 ADM Cycle diagram.

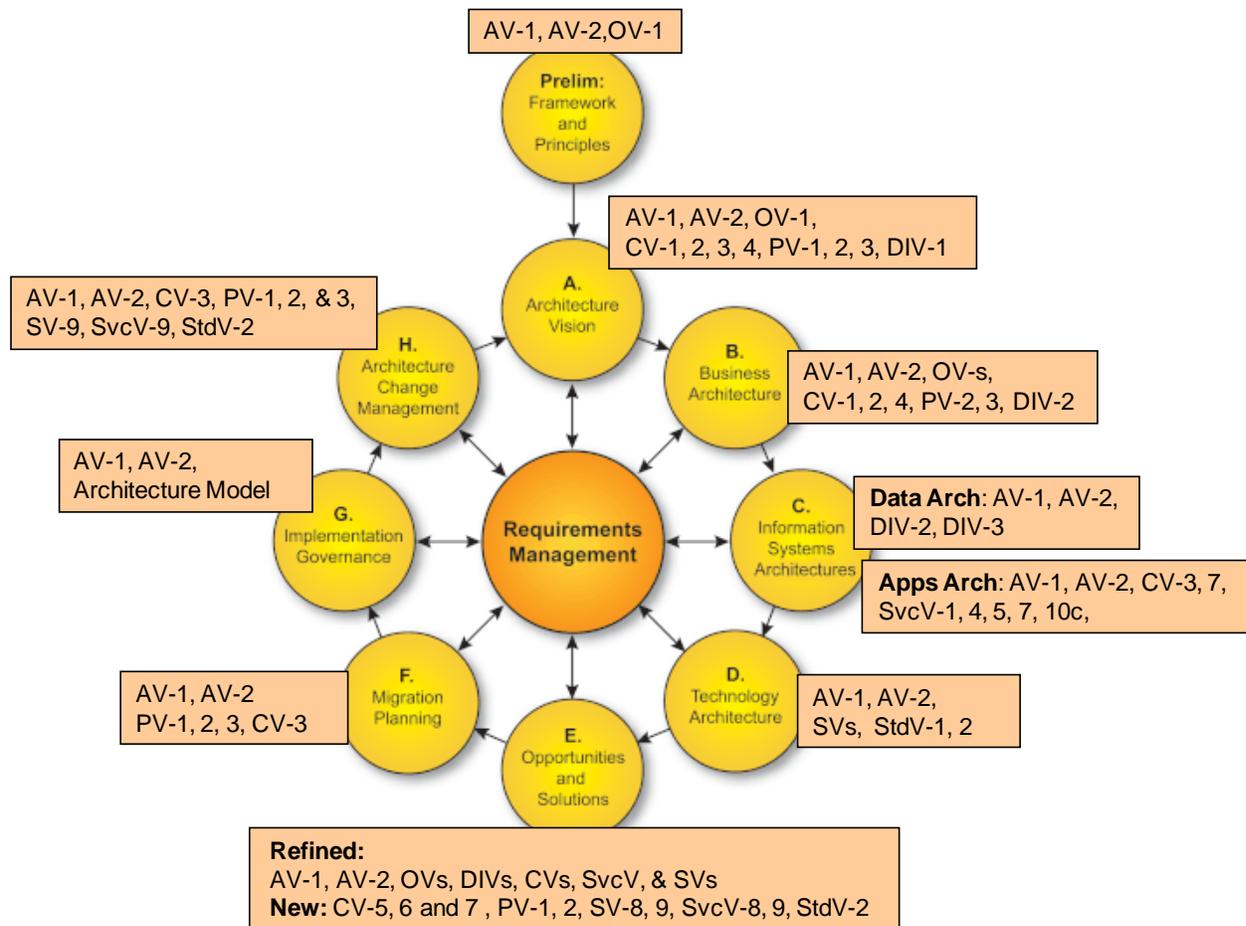


Figure 1: Summary of TOGAF 9 ADM with DoDAF 2.0 Models as the Architecture Description

The Open Group Architecture Framework Version 9 (TOGAF 9)

TOGAF is a “...detailed method and set of supporting tools—for developing enterprise architecture.” [TOGAF 9-2009] In the early 1990s, the US Department of Defense (DoD) developed a series of architecture guidance documents known as the Technical Architecture Framework for Information Management (TAFIM). The purpose of these eight volumes was to provide: “...the services, standards, design concepts, components, and configurations that can be used to guide the development of technical architectures that meet specific mission requirements” to evolve the DoD technical infrastructure [TAFIM-1996]. TAFIM was matured to Version 3.0 and then provided to The Open Group for its ongoing maturation and promulgation across the US Government and industry. TAFIM served as the baseline for the development of TOGAF in 1995 and was subsequently retired.

The US Defense Information Systems Agency (DISA) contributed heavily to the development of TOGAF 1.0, which primarily leveraged TAFIM Volume 2: Technical Reference Model for the TOGAF Technical Reference Model and TAFIM Volume 3: Architecture Concepts and Design Guidance for the TOGAF Architecture Development Method (ADM). The ADM is a prescriptive, step-by-step instruction guide for “how to” architect. It is presented in a series of phases that guide the architect or architecture team through the architecting lifecycle of system development. The first seven releases of the TOGAF ADM (1995-2001) focused on providing technical architecture guidance. The 2002 release of TOGAF 8.0 extended the earlier technical focus with elements of Business, Data, and Application Architectures. This “collection” of architectures is commonly known as “enterprise architecture”.

Table 2 below is an overview of the nine phases that guide the architect through the ADM.

Table 2: TOGAF ADM Phase Descriptions

Phase	Name	Description
Preliminary	Framework & Principles	Identify additional framework(s) to use; define architecture principles to guide the architecture work
A	Architecture Vision	Define scope; create vision; identify relevant stakeholders; define business/mission requirements and constraints; obtain approvals
B	Business Architecture	Develop Baseline and Target Business Architectures, describing product and/or service strategy and organizational, functional, process, information, and geographic aspects of the business/mission environment, based on business/mission principles, business/mission goals, and strategic drivers
C	Information Systems Architecture: Data Architecture	Develop Target Architecture(s) covering either the data domain
	Information Systems Architecture: Application Architecture	Develop Target Architecture(s) covering either the application or systems domains
D	Technology Architecture	Develop Technology Architecture to form the basis of the following implementation work
E	Opportunities and Solutions	Evaluate and select among the implementation options identified in candidate Target Architectures; identify strategic parameters for change and top-level work packages or projects required to move from current state to target state
F	Migration Planning	Assess dependencies, costs, and benefits of the various migration projects; prioritize list of projects to form basis of detailed Implementation and Migration Plan

Phase	Name	Description
G	Implementation Governance	Make recommendations for each implementation project; construct architecture contract to govern overall implementation and deployment process; perform governance functions while system is implemented and deployed; ensure conformance with defined architecture
H	Change Management	Provide for the continual monitoring of new developments in technology and changes in the business environment, and for determining whether to formally initiate a new architecture evolution cycle

With TOGAF 9 the reader is introduced to a new modular structure comprised of seven main parts:

- Part I: Introduction
- Part II: Architecture Development Method (ADM)
- Part III: ADM Guidelines and Techniques
- Part IV: Architecture Content Framework (ACF)
- Part V: Enterprise Continuum and Tools
- Part VI: TOGAF Reference Models
- Part VII: Architecture Capability Framework

The focus of this White Paper will remain on the use of DoDAF 2.0 models in conjunction with the TOGAF 9 ADM; however, the TOGAF 9 ACF can serve as useful reference in the development of DoDAF 2.0 models.

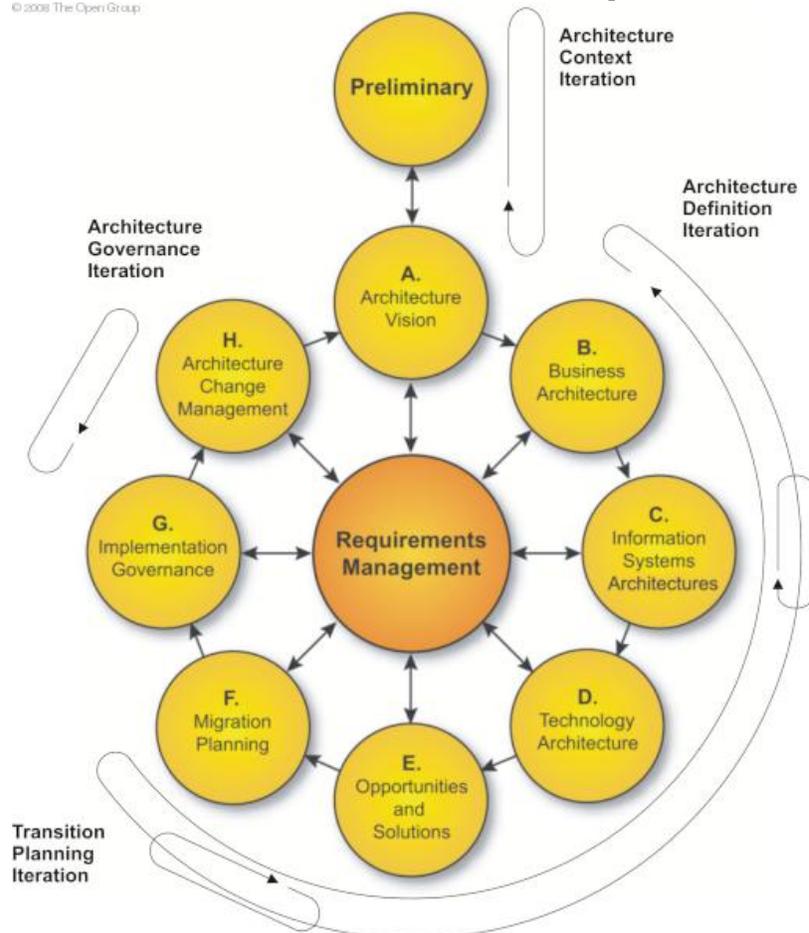


Figure 2: TOGAF 9 ADM

Note: Although TOGAF 9 phases have alphabetic identifiers, there is an understanding that iteration within and between phases is required.

US Department of Defense Architecture Framework 2.0 (DoDAF 2.0)

In 1995, the US Deputy Secretary of Defense directed that work begin: "...to define and develop better means and processes for ensuring that C4I capabilities meet the needs of warfighters". [CAF-1996] This initiative led to the development of the Command, Control, Communications, Computers, Intelligence, Reconnaissance, and Surveillance (C4ISR) Architecture Framework (CAF). CAF 1.0 was published in 1996 and was matured through deployment analyses and lessons learned. CAF 2.0 was released in December 1997. The US Department of Defense broadened the scope of the CAF by its next release in February 2004, renaming it the Department of Defense Architecture Framework (DoDAF) to clarify its scope within the US Government. Additionally, its version number was reset to 1.0. DoDAF 2.0 was released in May 2009 with several significant changes.

Version 2.0 focuses on architectural data (rather than individual products as described in previous versions), changes the terminology for major concepts, adds new viewpoints (formerly known as views), and describes models (formerly known as products) for each viewpoint. DoDAF 2.0 also discusses "fit-for-purpose" descriptions as user-defined presentations of a subset of architectural data created for some specific purpose.

DoDAF 2.0 consists of three volumes:

- Volume 1: Introduction, Overview, and Concepts – Manager's Guide
- Volume 2: Architectural Data and Models – Architect's Guide
- Volume 3: DoDAF Meta-model: Physical Exchange Specification – Developer's Guide

The DoDAF Journal² is an electronic interface for DoDAF support. The DoDAF Journal provides a place for submitting future change requests to DoDAF, gives examples referenced in the various DoDAF volumes, and includes descriptions of other best practices, lessons learned, and reference documents that supplement the information contained in the three volumes of DoDAF 2.0.

The primary focus of DoDAF is architecture description – the architecture depiction consisting of several models (called products in [DoDAF-2004]) and reflecting the architecture from multiple viewpoints. Figure 3, extracted from DoDAF 2.0 Volume 1, Section 3.4.2, shows the All, Operational, Systems, and Standards viewpoints and the newly defined Capability, Services, Data and Information, and Project viewpoints. [DoDAF-2009] Initially the primary objective of DoDAF was to facilitate establishing interoperability between DoD systems, but that objective has been broadened to facilitate decision-making by DoD managers at all levels on issues relating to DOTMLPF (Doctrine, Organization, Training, Material, Leadership and Education, Personnel, and Facilities) as well as DoD IT systems.

² Refer to http://cio-nii.defense.gov/sites/dodaf20/journal_exp3.html.

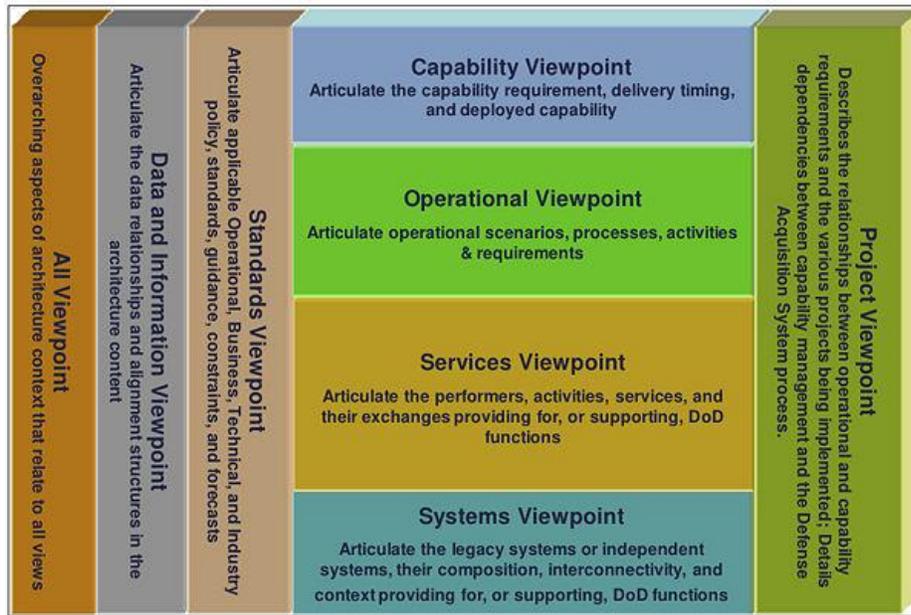


Figure 3: Architecture Viewpoints in DoDAF 2.0

Model descriptions in DoDAF 2.0 are provided as “predefined examples”. DoDAF does not prescribe any particular models. Instead it concentrates on the data required for architecture development. However, other regulations and instructions from both the DoD and Chairman, Joint Chiefs of Staff (CJCS) have specific presentation requirements. These models are supported by DoDAF 2.0, and should be consulted for specific model requirements.

A review of the DoDAF 2.0 models and descriptions in Table 3 reflects that these models are not unique to DoD architectures – many are traditional systems engineering modeling artifacts that have been in use for many years. Most are intrinsically useful beyond the DoD community. DoDAF 2.0 can be leveraged by many domains outside of the DoD community, providing a baseline for which architecture models the architect (or architecture team) considers when identifying which viewpoints will be addressed by their overall architecture description.

Table 3: DoDAF 2.0 Listing of Architecture Models

Viewpoint	Model	Name	General Description
All Viewpoint	AV-1	Overview and Summary Information	Describes a project's visions, goals, objectives, plans, activities, events, conditions, measures, effects (outcomes), and produced objects.
All Viewpoint	AV-2	Integrated Dictionary	An architectural data repository with definitions of all terms used throughout the architectural data and presentations.
Capability Viewpoint	CV-1	Vision	The overall vision for transformational endeavors, which provides a strategic context for the capabilities described and a high-level scope.
Capability Viewpoint	CV-2	Capability Taxonomy	A hierarchy of capabilities which specifies all the capabilities that are referenced throughout one or more architectural descriptions.
Capability Viewpoint	CV-3	Capability Phasing	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.

Viewpoint	Model	Name	General Description
Capability Viewpoint	CV-4	Capability Dependencies	The dependencies between planned capabilities and the definition of logical groupings of capabilities.
Capability Viewpoint	CV-5	Capability to Organizational Development Mapping	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.
Capability Viewpoint	CV-6	Capability to Operational Activities Mapping	A mapping between the capabilities required and the operational activities that those capabilities support.
Capability Viewpoint	CV-7	Capability to Services Mapping	A mapping between the capabilities and the services that these capabilities enable.
Data and Information Viewpoint	DIV-1	Conceptual Data Model	The required high-level data concepts and their relationships.
Data and Information Viewpoint	DIV-2	Logical Data Model	The documentation of the data requirements and structural business process (activity) rules. In DoDAF V1.5, this was OV-7.
Data and Information Viewpoint	DIV-3	Physical Data Model	The physical implementation format of the Logical Data Model entities; e.g., message formats, file structures, physical schema. In DoDAF V1.5, this was SV-11.
Operational Viewpoint	OV-1	High-Level Operational Concept Graphic	The high-level graphical/textual description of the operational concept.
Operational Viewpoint	OV-2	Operational Resource Flow Description	A description of the resource flows exchanged between operational activities.
Operational Viewpoint	OV-3	Operational Resource Flow Matrix	A description of the resources exchanged and the relevant attributes of the exchanges.
Operational Viewpoint	OV-4	Organizational Relationships Chart	The organizational context, role, or other relationships among organizations.
Operational Viewpoint	OV-5a	Operational Activity Decomposition Tree	The capabilities and activities (operational activities) organized in a hierarchal structure.
Operational Viewpoint	OV-5b	Operational Activity Model	The context of capabilities and activities (operational activities) and their relationships among activities, inputs, and outputs; Additional data can show cost, performers, or other pertinent information.
Operational Viewpoint	OV-6a	Operational Rules Model	One of three models used to describe activity (operational activity). It identifies business rules that constrain operations.
Operational Viewpoint	OV-6b	State Transition Description	One of three models used to describe operational activity (activity). It identifies business process (activity) responses to events (usually, very short activities).
Operational Viewpoint	OV-6c	Event-Trace Description	One of three models used to describe operational activity (activity). It traces actions in a scenario or sequence of events.
Project Viewpoint	PV-1	Project Portfolio Relationships	Describes the dependency relationships between the organizations and projects and the organizational structures needed to manage a portfolio of projects.

Viewpoint	Model	Name	General Description
Project Viewpoint	PV-2	Project Timelines	A timeline perspective on programs or projects, with the key milestones and inter-dependencies.
Project Viewpoint	PV-3	Project to Capability Mapping	A mapping of programs and projects to capabilities to show how the specific projects and program elements help to achieve a capability.
Services Viewpoint	SvcV-1	Services Context Description	The identification of services, service items, and their interconnections.
Services Viewpoint	SvcV-2	Services Resource Flow Description	A description of resource flows exchanged between services.
Services Viewpoint	SvcV-3a	Systems-Services Matrix	The relationships among or between systems and services in a given architectural description.
Services Viewpoint	SvcV-3b	Services-Services Matrix	The relationships among services in a given architectural description. It can be designed to show relationships of interest, (e.g., service-type interfaces, planned <i>versus</i> existing interfaces).
Services Viewpoint	SvcV-4	Services Functionality Description	The functions performed by services and the service data flows among service functions (activities).
Services Viewpoint	SvcV-5	Operational Activity to Services Traceability Matrix	A mapping of services (activities) back to operational activities (activities).
Services Viewpoint	SvcV-6	Services Resource Flow Matrix	Provides details of service resource flow elements being exchanged between services and the attributes of that exchange.
Services Viewpoint	SvcV-7	Services Measures Matrix	The measures (metrics) of services model elements for the appropriate timeframe(s).
Services Viewpoint	SvcV-8	Services Evolution Description	The planned incremental steps toward migrating a suite of services to a more efficient suite or toward evolving current services to a future implementation.
Services Viewpoint	SvcV-9	Services Technology & Skills Forecast	The emerging technologies, software/hardware products, and skills that are expected to be available in a given set of timeframes and that will affect future service development.
Services Viewpoint	SvcV-10a	Services Rules Model	One of three models used to describe service functionality. It identifies constraints that are imposed on systems functionality due to some aspect of system design or implementation.
Services Viewpoint	SvcV-10b	Services State Transition Description	One of three models used to describe service functionality. It identifies responses of services to events.
Services Viewpoint	SvcV-10c	Services Event-Trace Description	One of three models used to describe service functionality. It identifies service-specific refinements of critical sequences of events described in the Operational Viewpoint.
Systems Viewpoint	SV-1	Systems Interface Description	The identification of systems, system items, and their interconnections.
Systems Viewpoint	SV-2	Systems Resource Flow Description	A description of resource flows exchanged between systems.
Systems Viewpoint	SV-3	Systems-Systems Matrix	The relationships among systems in a given architectural description. It can be designed to show relationships of interest (e.g., system-type interfaces, planned <i>versus</i> existing interfaces).

Viewpoint	Model	Name	General Description
Systems Viewpoint	SV-4	Systems Functionality Description	The functions (activities) performed by systems and the system data flows among system functions (activities).
Systems Viewpoint	SV-5a	Operational Activity to Systems Function Traceability Matrix	A mapping of system functions (activities) back to operational activities (activities).
Systems Viewpoint	SV-5b	Operational Activity to Systems Traceability Matrix	A mapping of systems back to capabilities or operational activities (activities).
Systems Viewpoint	SV-6	Systems Resource Flow Matrix	Provides details of system resource flow elements being exchanged between systems and the attributes of that exchange.
Systems Viewpoint	SV-7	Systems Measures Matrix	The measures (metrics) of systems model elements for the appropriate timeframe(s).
Systems Viewpoint	SV-8	Systems Evolution Description	The planned incremental steps toward migrating a suite of systems to a more efficient suite, or toward evolving a current system to a future implementation.
Systems Viewpoint	SV-9	Systems Technology & Skills Forecast	The emerging technologies, software/hardware products, and skills that are expected to be available in a given set of timeframes and that will affect future system development.
Systems Viewpoint	SV-10a	Systems Rules Model	One of three models used to describe system functionality. It identifies constraints that are imposed on systems functionality due to some aspect of system design or implementation.
Systems Viewpoint	SV-10b	Systems State Transition Description	One of three models used to describe system functionality. It identifies responses of systems to events.
Systems Viewpoint	SV-10c	Systems Event-Trace	One of three models used to describe system functionality. It identifies system-specific refinements of critical sequences of events described in the Operational Viewpoint.
Standards Viewpoint	StdV-1	Standards Profile	The listing of standards that apply to solution elements.
Standards Viewpoint	StdV-2	Standards Forecast	The description of emerging standards and potential impact on current solution elements, within a set of timeframes.

TOGAF 9 ADM with DoDAF 2.0 Models

TOGAF 9 ACF Content Metamodel

TOGAF 9 provides a process lifecycle to create and manage architectures within an enterprise. At each phase within the ADM, a discussion of inputs, outputs, and steps describes a number of architectural work products or artifacts, such as process and application. The TOGAF Architecture Content Framework (ACF) Content Metamodel defines a formal structure for these terms to ensure consistency within the architecture description and also to provide guidance for organizations that wish to implement their architecture within an architecture tool.

DoDAF MetaModel (DM2)

The DM2 provides a high-level view of the data normally collected, organized, and maintained in an architectural description effort. It also serves as a roadmap for the re-use of data under the federated approach to architecture development and management. Re-use of data among communities of interest provides a way for managers in any level or area of the DoD to understand what has been done by others and also what information is already available for use in their architectural description and management decision-making efforts.

ACF and DM2 Core Metamodel Entities

The ACF Content Metamodel uses the terminology discussed within the TOGAF ADM as the basis for a formal metamodel. The following core terms in Table 4 are used:

Table 4: TOGAF 9 ACF Content Model and DoDAF 2.0 DM2 Core Terms

TOGAF 9 ACF Content Metamodel	DoDAF DM2
Actor: A person, organization, or system that is outside the consideration of the architecture model, but interacts with it.	Performer: Any entity – human, automated, or any aggregation of human and/or automated – that performs an activity and provides a capability.
Application Component: An encapsulation of application functionality that is aligned to implementation structuring.	System: A functionally, physically, and/or behaviorally-related group of regularly interacting or inter-dependent elements. Subtype of Performer: Any entity – human, automated, or any aggregation of human and/or automated – that performs an activity and provides a capability.
Business Service: Supports business capabilities through an explicitly defined interface and is explicitly governed by an organization.	Service: A mechanism to enable access to a set of one or more capabilities, where the access is provided using a prescribed interface and is exercised consistent with constraints and policies as specified by the service description. The mechanism is a Performer. The “capabilities” accessed are Resources: Information, Data, Material, Performers, and Geo-political Extents. Subtype of Performer: Any entity – human, automated, or any aggregation of human and/or automated – that performs an activity and provides a capability.

TOGAF 9 ACF Content Metamodel	DoDAF DM2
<p>Data Entity: An encapsulation of data that is recognized by a business domain expert as a discrete concept. Data entities can be tied to applications, repositories, and services and may be structured according to implementation considerations.</p>	<p>Data: Representation of information in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means. Examples could be whole models, packages, entities, attributes, classes, domain values, enumeration values, records, tables, rows, columns, and fields.</p> <p>Subtype of Resource: Data, Information, Performers, Material, or Personnel Types that are produced or consumed.</p>
<p>Function: Delivers business capabilities closely aligned to an organization, but not explicitly governed by the organization.</p>	<p>Activity: Work, not specific to a single organization, weapon system or individual that transforms inputs (Resources) into outputs (Resources) or changes their state.</p>
<p>Organization: A self-contained unit of resources with line management responsibility, goals, objectives, and measures. Organizations may include external parties and business partner organizations.</p>	<p>Organization: A specific real-world assembly of people and other resources organized for an ongoing purpose.</p> <p>Subtype of Performer: Any entity – human, automated, or any aggregation of human and/or automated – that performs an activity and provides a capability.</p>
<p>Platform Service: A technical capability required to provide enabling infrastructure that supports the delivery of applications.</p>	<p>Service: A mechanism to enable access to a set of one or more capabilities, where the access is provided using a prescribed interface and is exercised consistent with constraints and policies as specified by the service description. The mechanism is a Performer. The “capabilities” accessed are Resources: Information, Data, Material, Performers, and Geo-political Extents.</p> <p>Subtype of Performer: Any entity – human, automated, or any aggregation of human and/or automated – that performs an activity and provides a capability.</p>
<p>Role: An actor assumes a role to perform a task.</p>	<p>PersonType: A category of persons defined by the role or roles they share that are relevant to an architecture.</p> <p>Subtype of Performer: Any entity – human, automated, or any aggregation of human and/or automated – that performs an activity and provides a capability.</p>
<p>Technology Component: An encapsulation of technology infrastructure that represents a class of technology product or specific technology product.</p>	<p>System: A functionally, physically, and/or behaviorally-related group of regularly interacting or inter-dependent elements.</p> <p>Subtype of Performer: Any entity – human, automated, or any aggregation of human and/or automated – that performs an activity and provides a capability.</p>

A quick analysis of the ACF Content Metamodel entities shows that its emphasis is on three of the six interrogatives used to describe an item of interest (e.g., the architecture of an enterprise, a system, etc.). These are:

- *What* – data or resources
- *How* – function or activity
- *Who* – sub-typed in the ACF to several elements including Actor or Performer

The DoDAF 2.0 conceptual data model includes elements covering the remaining three interrogatives:

Table 5: DODAF DM2 Remainder of Core Terms

Interrogative	DoDAF DM2
Where	Location: A point or extent in space that may be referred to physically or logically.
When	Measure: The magnitude of some attribute of an individual.

Interrogative	DoDAF DM2
Why	Rule: A principle or condition that governs behavior; a prescribed guide for conduct or action.

Tailoring TOGAF ADM Considerations

The TOGAF 9 ADM is a generic method, intended to be used by enterprises in a wide variety of industry types and geographies including defense. DoDAF 2.0 is a defense-specific architecture framework that defines a set of elements and relationships, organized into viewpoints and models, that allow an architect to develop a description of the architecture of a current or postulated real-world configuration of resources, rules, and their relationships. Developing DoDAF models in conjunction with the TOGAF 9 ADM allows a DoD architect to produce an architecture description within a well-defined and repeatable process.

Each of the phases of the TOGAF 9 ADM is described below, highlighting potential adaption to TOGAF 9 to define a DoD organization-specific framework producing DoDAF 2.0 deliverables.

Preliminary Phase: Framework and Principles

Objective

The objectives of this phase are:

- To review the organizational context for conducting enterprise architecture
- To identify the sponsor stakeholder(s) and other major stakeholders impacted by the business directive to create an enterprise architecture and determine their requirements and priorities from the enterprise, their relationships with the enterprise, and required working behaviors with each other
- To ensure that everyone who will be involved in, or benefit from, this approach is committed to the success of the architectural process
- To enable the architecture sponsor to create requirements for work across the affected business areas
- To identify and scope the elements of the enterprise organizations affected by the business directive and define the constraints and assumptions (particularly in a federated architecture environment)
- To define the “architecture footprint” for the organization – the people responsible for performing architecture work, where they are located, and their responsibilities
- To define the frameworks and detailed methodologies that are going to be used to develop enterprise architectures in the organization concerned (typically, an adaptation of the generic ADM)
- To confirm a governance and support framework that will provide business process and resources for architecture governance through the ADM cycle; these will confirm the fitness-for-purpose of the Target Architecture and measure its ongoing effectiveness (normally includes a pilot project)
- To select and implement supporting tools and other infrastructure to support the architecture activity
- To define the architecture principles that will impart constraints on any architecture work

Inputs

Inputs to this phase are:

- TOGAF 9 ADM
- DoDAF 2.0

- Pre-existing models for operating an enterprise architecture capability can be used as a baseline for the Preliminary Phase. Inputs would include:
 - Organizational Model for Enterprise Architecture, including:
 - Scope of organizations impacted
 - Maturity assessment, gaps, and resolution approach
 - Roles and responsibilities for architecture team(s)
 - Budget requirements
 - Governance and support strategy
 - Existing Architecture Framework, if any, including:
 - Architecture method
 - Architecture content (deliverables and artifacts)
 - Configured and deployed tools
 - Existing architecture principles, if any
- Existing Architecture Repository, if any (framework description, architectural descriptions, existing target descriptions, etc.)

Tailored Steps with DoDAF 2.0

The key steps in this phase are:

- Tailor TOGAF and DoDAF Architecture Framework:
 - The TOGAF ADM may be used as the architecture development methodology when developing architecture artifacts that are conformant with DoDAF.
 - The choice of architecture tools is framed by choosing DoDAF as the modeling framework.
- In completing the Preliminary Phase, initial versions of AV-1 and OV-1 may be developed to capture the outputs of the Preliminary Phase.

Outputs

DoDAF 2.0 models AV-1, AV-2, OV-1 are used to document the outputs of the Preliminary Phase:

- OV-1, showing: Organizational Model for Enterprise Architecture, including:
 - Scope of organizations impacted
 - Maturity assessment, gaps, and resolution approach
 - Roles and responsibilities for architecture team(s)
 - Constraints on architecture work
 - Re-use requirements
 - Budget requirements
 - Requests for change
 - Governance and support strategy
- AV-1, describing a Tailored Architecture Framework, including:
 - Tailored architecture method
 - Tailored architecture content (deliverables and artifacts): Specify which architecture data is required for the intended architecture use/analysis needs and list DoDAF models that present this data in an integrated model.
 - Configured and deployed tools, including evaluation report if conducted
- Architecture principles

- Restatement of, or reference to, business principles, business goals, and business drivers
- Request for Architecture Work
- Governance Framework
- AV-2: Initial Architecture Repository, populated with framework content:
 - Employ integrated modeling tool to automatically create and populate an Architecture Repository with architecture data and relationships.
 - An Architecture Repository contains all knowledge content pertaining to the architecture and may extend beyond an AV-2 which is a repository of terms and their definitions used throughout the architectural presentations including relationships among the architectural data elements.

Phase A: Architecture Vision

Objective

The objectives of this phase are:

- To ensure that this evolution of the architecture development cycle has proper recognition and endorsement from the corporate management of the enterprise, and the support and commitment of the necessary line management
- To define and organize an architecture development cycle within the overall context of the architecture framework, as established in the Preliminary Phase
- To validate the business principles, business goals, and strategic business drivers of the organization and the enterprise architecture Key Performance Indicators (KPIs)
- To define the scope of, and to identify and prioritize the components of, the Baseline Architecture effort
- To define the relevant stakeholders, and their concerns and objectives
- To define the key business requirements to be addressed in this architecture effort, and the constraints that must be dealt with
- To articulate an Architecture Vision and formalize the value proposition that demonstrates a response to those requirements and constraints
- To create a comprehensive plan that addresses scheduling, resourcing, financing, communication, risks, constraints, assumptions, and dependencies, in line with the project management frameworks adopted by the enterprise (such as PRINCE2 or PMBOK)
- To secure formal approval to proceed
- To understand the impact on, and of, other enterprise architecture development cycles ongoing in parallel

Inputs

Inputs to this phase are:

- Organizational Model for Enterprise Architecture, including:
- Tailored Architecture Framework, including:
- Architecture principles, including business principles, when pre-existing
- Populated architecture – existing architectural documentation (framework description, architectural descriptions, baseline descriptions, ABBs, etc.)

Tailored Steps with DoDAF 2.0

The key steps in this phase are:

- Establish the architecture project
- Develop an AV-1 to:
 - Identify stakeholders, concerns, and business requirements
 - Confirm and elaborate architecture principles, including business principles
- Develop a CV-1-Vision model to:
 - Confirm and elaborate business goals, business drivers, and constraints
 - Evaluate business capabilities
 - Assess readiness for business transformation
 - Define scope
 - Develop Architecture Vision
- Develop initial (vision) AS-IS and TO-BE OV-1 that describe the High-Level Operational Concept
- Develop initial (vision) AS-IS and TO-BE DIV-1 to describe data entities at a conceptual level
- Develop PV-1: Project Portfolio Relationships, PV-2: Project Timelines, PV-3: Project to Capability Mapping, and CV-3: Capability Phasing Model to:
 - Define the Target Architecture value propositions and capabilities; desired capability effects can be used to document Key Performance Indicators (KPIs)
 - Identify business transformation risks and mitigation activities
 - Develop enterprise architecture plans
- Develop a Statement of Architecture Work; secure approval and document within refined AV-1

Outputs

The outputs of this phase include:

- Approved Statement of Architecture Work
- Refined statements of business principles, business goals, and business drivers (AV-1)
- Architecture principles (AV-1)
- Capability Assessment to include CV-2: Capability Taxonomy and CV-4: Capability Dependency Models
- Tailored Architecture Framework
- Architecture Vision, modeled using:
 - PV-1: Project Portfolio Relationships
 - CV-1: Vision
 - CV-3: Capability Phasing that describes the planned achievement of capability at different points in time or during specific periods of time:
 - Link the phases to project timelines by specifying the timelines in PV-2 and linking to capabilities in PV-3
- Refined key high-level stakeholder requirements
- AS-IS OV-1 to describe:
 - Baseline Business Architecture (vision)
 - Baseline Data Architecture (vision)

- Baseline Application Architecture (vision)
- Baseline Technology Architecture (vision)
- TO-BE OV-1 to describe:
 - Target Business Architecture (vision)
 - Target Data Architecture (vision)
 - Target Application Architecture (vision)
 - Target Technology Architecture (vision)
- Communications Plan
- Architecture Repository (AV-2)

Phase B: Business Architecture

Objective

The objectives of this phase are:

- To describe the Baseline Business Architecture
- To develop a target Business Architecture, describing the product and/or service strategy, and the organizational, functional, process, information, and geographic aspects of the business environment, based on the business principles, business goals, and strategic drivers
- To analyze the gaps between the Baseline and Target Business Architectures
- To select the relevant architecture viewpoints that will enable the architect to demonstrate how the stakeholder concerns are addressed in the Business Architecture
- To select the relevant tools and techniques to be used in association with the selected viewpoints

Inputs

Inputs to this phase are:

- AV-1: Organizational Model for Enterprise Architecture, including:
- AV-1: Tailored Architecture Framework
- Approved Statement of Architecture Work
- AV-1: Architecture principles, including business principles, when pre-existing
- Enterprise Continuum
- AV-2: Architecture Repository, including:
 - Re-usable building blocks
 - Publicly available reference models
 - Organization-specific reference models
 - StdV-1 – organization standards
- AV-1: Architecture Vision, including:
 - Refined key high-level stakeholder requirements
 - Baseline Business Architecture, Version 0.1
 - Baseline Technology Architecture, Version 0.1
 - Baseline Data Architecture, Version 0.1

- Baseline Application Architecture, Version 0.1
- Target Business Architecture, Version 0.1
- Target Technology Architecture, Version 0.1
- Target Data Architecture, Version 0.1
- Target Application Architecture, Version 0.1

Tailored Steps with DoDAF 2.0

A variety of modeling tools and techniques may be employed, if deemed appropriate to carry out these steps:

- Select reference models, such as any applicable community of interest's ontology, link to FEA reference models, where applicable
- Select viewpoints, and tools:
 - Specify viewpoints to be developed for the business architecture by updating AV-1
 - Use an integrated architecture modeling tool such as those that offer the Unified Profile for DoDAF/MODAF (UPDM) to develop the viewpoints
- Develop both the Baseline Business Architecture Description and Target Business Architecture Description:
 - Develop PV-2: Project Timelines and PV-3: Project to Capability Mapping to document project timelines and milestones (as-is and to-be timelines) and to specify capability to be met at each
- Develop CV-2: Capability Taxonomy and CV-4: Capability Dependency Models to further detail the capabilities breakdown and their inter-dependencies
- Develop high-level OV-2, OV-5, and OV-6; utilize DIV-2 entities to document inputs and outputs to business/operational activities
- Develop OV-4 to describe business performers/organizations' internal structures; organizations described in OV-4 must correspond one-to-one to performers/organizations described in OV-2, OV-5, and OV-6
- Generate OV-3 matrix model to show mapping of business organizations to business processes (note that many architecture tools can auto-generate this Operational Resource Flow Matrix model)
- Use information modeled in OV-2 through OV-6, and DIV-2 and Draft Architecture Requirements Specification including content updates to perform gap analysis
- Define roadmap components
- Resolve impacts across the Architecture Landscape
- Conduct formal stakeholder review
- Finalize the Data Architecture by refining DIV-2: Logical Data Model after ensuring data entities correspond to business process inputs and outputs
- Generate Architecture Definition Document by using report features of modeling tool

Outputs

The outputs of this phase include:

- Refined and updated versions of the Architecture Vision phase deliverables, where applicable, including:
 - AV-1: Statement of Architecture Work, updated if necessary
 - AV-1: Validated business principles, business goals, and business drivers updated if necessary
 - AV-1: Architecture principles
- Draft Architecture Definition Document generated from architecture modeling tool and architecture model content that contains:

- Content updates, addressing key stakeholder concerns
- PV-2 and PV-3 to document project timelines and milestones
- AS-IS OV-2 through OV-6, DIV-2: Baseline Business Architecture
- TO-BE CV-1, CV-2, CV-4, OV-2 through OV-6, DIV-2: Target Business Architecture, Version 1.0 (detailed), including:
 - o Organization structure – identifying business locations and relating them to organizational units
 - o Business goals and objectives – for the enterprise and each organizational unit
 - o Business functions – a detailed, recursive step involving successive decomposition of major functional areas into sub-functions
 - o Business services – the services that the enterprise and each enterprise unit provides to its customers, both internally and externally
 - o Business processes, including measures and deliverables
 - o Capability Taxonomy
 - o Capability Dependency Models further detailing the capabilities breakdown and their inter-dependencies
- Gap analysis results
- Data interoperability requirements
- Relevant technical requirements that will apply to this evolution of the architecture development cycle
- Constraints on the Technology Architecture
- Updated business requirements
- Updated application requirements
- Business Architecture components of an Architecture Roadmap

Phase C: Information Systems Architectures

In TOGAF, Phase C: Information Systems Architectures consists of two parts, the Data and the Application Architectures. Each part is detailed below.

Phase C: Information Systems Architectures – Data Architecture

Objective

The objective here is to define the major types and sources of data necessary to support the business, in a way that is:

- Understandable by stakeholders
- Complete and consistent
- Stable

It is important to note that this effort is *not* concerned with database design. The goal is to define the data entities relevant to the enterprise, not to design logical or physical storage systems. (However, linkages to existing files and databases may be developed, and may demonstrate significant areas for improvement.)

Inputs

Inputs to this phase are:

- AV-1: Organizational Model for Enterprise Architecture, including:

- AV-1: Tailored Architecture Framework
- AV-1: Data principles, if existing
- AV-1: Statement of Architecture Work
- AV-1: Architecture Vision
- AV-2: Architecture Repository, includes data and relationships developed in previous phase
- Draft Architecture Definition Document, generated from architecture modeling tool and architecture model content that contains:
 - PV-2 and PV-3 to document project timelines and milestones
 - AS-IS OV-2 through OV-6: Business Architecture, Version 1.0 (detailed)
 - TO-BE OV-2 through OV-6: Target Business Architecture Version 1.0 (detailed)
 - AS-IS DIV-2: Baseline Data Architecture, Version 0.1
 - TO-BE DIV-2: Target Data Architecture, Version 0.1
 - Baseline Application Architecture, Version 0.1
 - Target Application Architecture, Version 0.1
- Draft Architecture Requirements Specification, including:
 - Gap analysis results (from Business Architecture)
 - Relevant technical requirements that will apply to Phase C
- Business Architecture components of an Architecture Roadmap

Tailored Steps with DoDAF 2.0

The key steps in this phase are:

- Select reference models, viewpoints, and tools
- Use an integrated architecture modeling tool, such as those that offer the Unified Profile for DoDAF/MODAF (UPDM), to develop the Information and Data View Models:
 - Refine Data Model (DIV-2) to model the Baseline Data Architecture Description, generate data schema from logical model
 - Refine Data Model (DIV-2) to model the Target Data Architecture Description, generate data schema from logical model
- Perform gap analysis
- Define roadmap components
- Resolve impacts across the Architecture Landscape
- Conduct formal stakeholder review
- Finalize the Data Architecture
- Generate Architecture Definition Document by using report features of modeling tool

Outputs

The outputs of this phase include:

- Refined and updated versions of the Architecture Vision phase deliverables, where applicable:
 - AV-1: Statement of Architecture Work, updated if necessary
 - AV-1: Validated data principles, or new data principles (if generated here)

- Draft Architecture Definition Document, generated from architecture modeling tool and architecture model content that contains:
 - DIV-2, generated DIV-3: Baseline Data Architecture, Version 1.0, if appropriate
 - DIV-2, generated DIV-3: Target Data Architecture, Version 1.0, including:
 - Business data model
 - Logical data model
 - Data management process models
 - Data Entity/Business Function matrix
 - Draft Architecture Requirements Specification, including such Data Architecture requirements as:
 - Gap analysis results
 - Data interoperability requirements
 - Relevant technical requirements that will apply to this evolution of the architecture development cycle
 - Constraints on the Technology Architecture about to be designed
 - Updated business requirements, if appropriate
 - Updated application requirements, if appropriate
 - Data Architecture components of an Architecture Roadmap

Phase C: Information Systems Architectures – Application Architecture

Objective

The objective of Phase C is to define the kinds of application systems necessary to process the data and support the business. The Services viewpoint in DoDAF can be used to describe the kinds of human and automated services that a system (or enterprise) provides or needs. In the case of an automated system, the Application Architecture phase can be used to develop service descriptions that describe the functionality to be performed by automated services to be detailed in the Technology Architecture phase.

Inputs

Inputs to this phase are:

- AV-1: Organizational Model for Enterprise Architecture, including:
 - AV-1: Tailored Architecture Framework
 - AV-1: Application principles, if existing
 - AV-1: Statement of Architecture Work
 - AV-1: Architecture Vision
- AV-2: Architecture Repository includes architecture data and relationships developed in previous phase
- Draft Architecture Definition Document, generated from architecture modeling tool and architecture model content that contains:
 - AS-IS OV-2 through OV-6: Baseline Business Architecture, Version 1.0 (detailed), if appropriate
 - TO-BE OV-2 through OV-6: Target Business Architecture Version 1.0 (detailed)
 - AS-IS DIV-2: Baseline Data Architecture, Version 1.0 (detailed), or Version 0.1 (vision)
 - TO-BE DIV-2: Target Data Architecture, Version 1.0 (detailed), or Version 0.1 (vision)
 - Baseline Application Architecture, Version 0.1, if appropriate and if available

- Target Application Architecture, Version 0.1, if available
- Baseline Technology Architecture, Version 0.1 (vision)
- Target Technology Architecture, Version 0.1 (vision)
- Draft Architecture Requirements Specification, including:
 - Gap analysis results (from Business and Data Architecture, if available)
 - Relevant technical requirements that will apply to this phase
- Business and Data Architecture components of an Architecture Roadmap, if available

Tailored Steps with DoDAF 2.0

The key steps in this phase are:

- Select reference models, viewpoints, and tools
- Use an integrated architecture modeling tool such as those that offer the Unified Profile for DoDAF/MODAF (UPDM), to develop the Services View models:
 - Develop AS-IS service models to describe the Baseline Application Architecture Description:
 - SvcV-1: Services Context Description: the identification of services, service items, and their interconnections
 - SvcV-4: Service Taxonomy: specifies a hierarchy of services
 - SvcV-5: Operational Activity to Services Traceability Matrix: a mapping of services (activities) back to operational activities (activities)
 - SvcV-7: Services Measures Matrix: the measures (metrics) of Services Model elements for the appropriate timeframe(s)
 - SvcV-10c: Services Event-Trace Description: specifies how a service interacts with external agents, and the sequence and dependencies of those interactions
 - Develop TO-BE service models (SvcV-1, 4, 5, 7, and 10c) to model the Target Application Architecture Description; use OV-3 from Business Architecture to identify information exchange requirements; these requirements can form the basis for identifying target data services
- Develop CV-7: Capability to Services Mapping to document how capabilities are planned to be delivered through the set of services provided by the system
- Refine CV-3: Capability Phasing to document how capabilities will be delivered through the set of services provided by the system
- Use CV-3 and CV-7: Capability to Services Mapping to perform gap analysis
- Define roadmap components
- Resolve impacts across the Architecture Landscape
- Conduct formal stakeholder review
- Finalize the Application Architecture
- Generate Architecture Definition Document by using report features of modeling tool

Outputs

The outputs of this phase include:

- Refined and updated versions of the Architecture Vision phase deliverables, where applicable:
 - AV-1: Statement of Architecture Work, updated if necessary
 - AV-1: Validated application principles, or new application principles (if generated here)

- Draft Architecture Definition Document, including:
 - AS-IS SvcV-1, 4, 5, 7, and 10c: Baseline Application Architecture, Version 1.0, if appropriate
 - TO-BE SvcV-1, 4, 5, 7, and 10c: Target Application Architecture, Version 1.0, including:
 - Process systems model
 - Place systems model
 - Time systems model
 - People systems model
 - Draft Architecture Requirements Specification, including such Application Architecture requirements as:
 - CV-3, CV-7: Gap analysis results
 - Applications interoperability requirements
 - Relevant technical requirements that will apply to this evolution of the architecture development cycle
 - Constraints on the Technology Architecture about to be designed
 - Updated business requirements, if appropriate
 - Updated data requirements, if appropriate
 - Application Architecture components of an Architecture Roadmap

Phase D: Technology Architecture

Objective

The Technology Architecture phase seeks to map application components defined in the Application Architecture phase into a set of technology components, which represent software and hardware components, available from the market or configured within the organization into technology platforms.

Inputs

Inputs to this phase are:

- AV-1: Organizational Model for Enterprise Architecture, including:
- AV-1: Tailored Architecture Framework
- AV-1: Technology principles, if existing
- AV-1: Statement of Architecture Work
- AV-1: Architecture Vision
- AV-2: Architecture Repository
- Draft Architecture Definition Document, including:
 - Baseline Business Architecture, Version 1.0 (detailed)
 - Target Business Architecture Version 1.0 (detailed)
 - Baseline Data Architecture, Version 1.0 (detailed)
 - Target Data Architecture, Version 1.0 (detailed)
 - Baseline Application Architecture, Version 1.0 (detailed)
 - Target Application Architecture, Version 1.0 (detailed)
 - Baseline Technology Architecture, Version 0.1 (vision)
 - Target Technology Architecture, Version 0.1 (vision)
- Draft Architecture Requirements Specification, including:

- Gap analysis results (from Business, Data, and Application Architectures)
- Relevant technical requirements from previous phases
- Business, Data, and Application Architecture components of an Architecture Roadmap

Tailored Steps with DoDAF 2.0

As part of Phase D, the architecture team will need to consider what relevant Technology Architecture resources are available in the Architecture Repository. In particular:

- DoD IT standards registry (DISR)
- Domain-specific Technical Reference Model (TRM)
- Domain vocabularies, etc.

During Phase D, SV models that document the distribution of application and information systems across the systems environment and the dependencies of legacy systems on the IT infrastructure and services can be developed using the following:

- Select reference models, viewpoints, and tools
- Develop Baseline Technology Architecture Description
- AS-IS SV-1, SV-2, SV-4, and SV-10c, generate SV-6
- Document technology constraints in SV-7 and StdV-1:
 - Generate SV-5 reports to ensure the Technology Architecture meets business objectives
 - Generate SV-3 report
 - Document validated technology principles by refining SV-7 and StdV-1 (if appropriate)
- Develop Target Technology Architecture Description:
 - To-BE SV-1, SV-2, SV-4, and SV-10c, generate SV-6
 - Document technology constraints in SV-7 and StdV-2
 - Generate SV-5 reports to ensure the Technology Architecture meets business objectives
 - Generate SV-3 report
 - Document validated technology principles by refining SV-7 and StdV-2 (if appropriate)
- Perform gap analysis
- Define roadmap components
- Resolve impacts across the Architecture Landscape
- Conduct formal stakeholder review
- Finalize the Technology Architecture
- Generate Architecture Definition Document by using report features of modeling tool

Outputs

The outputs of this phase include:

- Refined and updated versions of the Architecture Vision phase deliverables, where applicable:
 - AV-1: Statement of Architecture Work, updated if necessary
 - AV-1: Validated technology principles, or new technology principles (if generated here)
 - AV-2: Architecture Repository includes architecture data and relationships from all DoDAF models developed in previous phase

- SV-1, through SV-10, StdV-1, Draft Architecture Definition Document that documents the Target Technology Architecture, Version 1.0 (detailed), including:
 - Technology components and their relationships to information systems
 - Technology platforms and their decomposition, showing the combinations of technology required to realize a particular technology “stack”
 - Environments and locations – a grouping of the required technology into computing environments (e.g., development, production)
 - Expected processing load and distribution of load across technology components
 - Physical (network) communications
 - Hardware and network specifications
 - Baseline Technology Architecture, Version 1.0 (detailed), if appropriate
 - Views corresponding to the selected viewpoints addressing key stakeholder concerns
- Draft Architecture Requirements Specification, including Technology Architecture requirements such as:
 - Gap analysis results
 - Requirements output from Phases B and C
 - Updated technology requirements
- Technology Architecture components of an Architecture Roadmap

Phase E: Opportunities and Solutions

Objective

The objectives of this phase are:

- To review the target business objectives and capabilities, consolidate the gaps from Phases B to D, and then organize groups of building blocks to address these capabilities
- To review and confirm the enterprise’s current parameters for and ability to absorb change
- To derive a series of Transition Architectures that deliver continuous business value (e.g., capability increments) through the exploitation of opportunities to realize the building blocks
- To generate and gain consensus on an outline Implementation and Migration Strategy

Inputs

Inputs to this phase are:

- AV-1: Organizational Model for Enterprise Architecture
- AV-1: Tailored Architecture Framework
- AV-1: Application principles, if existing
- AV-1: Statement of Architecture Work
- AV-1: Architecture Vision
- AV-2: Architecture Repository
- Draft Architecture Definition Document, including:
 - Baseline Business Architecture, Version 1.0 (detailed), if appropriate
 - Target Business Architecture, Version 1.0 (detailed)
 - Baseline Data Architecture, Version 1.0 (detailed), or Version 0.1 (vision)
 - Target Data Architecture, Version 1.0 (detailed), or Version 0.1 (vision)

- Baseline Application Architecture, Version 0.1, if appropriate and if available
- Target Application Architecture, Version 0.1, if available
- Baseline Technology Architecture, Version 0.1 (vision)
- Target Technology Architecture, Version 0.1 (vision)
- Draft Architecture Requirements Specification, including:
 - Gap analysis results (from Business Architecture and Data Architecture, if available)
 - Relevant technical requirements that will apply to this phase
- Business and Data Architecture components of an Architecture Roadmap, if available

Tailored Steps with DoDAF 2.0

During Phase E, system models that describe the long-term migration plans and forecasts of technology and technology applications can be developed using the following:

- Determine/confirm key corporate change attributes
- Determine business constraints for implementation
- Refine AV-1, OVs, DIVs, SvcVs, and SVs: review and consolidate gap analysis results from Phases B to D
- Review IT requirements from a functional perspective
- Consolidate and reconcile interoperability requirements
- Refine CVs: refine and validate dependencies
- Confirm readiness and risk for business transformation
- Formulate high-level Implementation and Migration Strategy
- Identify and group major work packages:
 - Develop system-level PV-1 and PV-2
 - Develop an SV-8 and an SvcV-8 to document technology forecasts and their possible application in future technology investments
- Develop SV-9, SvcV-9, and StdV-2 to identify Transition Architectures
- Create portfolio and project charters and update the architectures

Outputs

The outputs of this phase include:

- AV-1, OVs, DIVs, SvcVs, and SVs: refined and updated versions of the Architecture Vision, Business Architecture, Information Systems Architecture, and Technology Architecture phase deliverables, where applicable:
 - Statement of Architecture Work
 - OVs: Architecture Vision, including definition of types and degrees of interoperability
 - Draft Architecture Definition Document, including:
 - Identification of increments
 - Interoperability and co-existence requirements
 - Inclusion of project list and project charters
 - Draft Architecture Requirements Specification
- Consolidated and validated Architecture Roadmap
- CV-5, CV-6, CV-7: Capability Assessment, including:

- Enterprise Architecture Maturity Profile
- Transformation Readiness Report
- SV-8, 9, SvcV-8, 9, and StdV-2: Transition Architecture, Version 1.0, including:
 - Consolidated Gaps, Solutions, and Dependencies Assessment
 - Risk Register, Version 1.0
 - Impact analysis – project list
 - Dependency Analysis Report
 - Implementation Factor Assessment and Deduction Matrix
- PV-1, PV-2: Implementation and Migration Plan, Version 0.1 including the high-level Implementation and Migration Strategy

Phase F: Migration Planning

Objective

The objective of this phase is to sort the various implementation projects into priority order. Activities include assessing the dependencies, costs, and benefits of the various migration projects. The prioritized list of projects will go on to form the basis of the detailed Implementation and Migration Plan.

Inputs

Inputs to this phase are:

- AV-1: Organizational Model for Enterprise Architecture
- Governance models and frameworks:
 - Enterprise Architecture Management Framework
 - Capability Management Framework
 - Portfolio Management Framework
 - Project Management Framework
 - Operations Management Framework
- AV-1: Tailored Architecture Framework
- AV-1: Statement of Architecture Work
- AV-1: Architecture Vision
- AV-2: Architecture Repository
- Draft Architecture Definition Document, including:
 - Strategic Migration Plan
 - Baseline Business Architecture, Version 1.0 (detailed)
 - Target Business Architecture, Version 1.0 (detailed)
 - Baseline Data Architecture, Version 1.0 (detailed)
 - Target Data Architecture, Version 1.0 (detailed)
 - Baseline Application Architecture, Version 1.0 (detailed)
 - Target Application Architecture, Version 1.0 (detailed)
 - Baseline Technology Architecture, Version 1.0 (detailed)
 - Target Technology Architecture, Version 1.0 (detailed)

- Impact analysis – project list and charters
- Draft Architecture Requirements Specification, including:
 - Architectural requirements
 - Gap analysis results (from Business, Data, Application, and Technology Architecture)
 - IT service management integration requirements
- Change Requests for existing business programs and projects
- Consolidated and validated Architecture Roadmap
- Capability Assessment, including:
 - Enterprise Architecture Maturity Profile
 - Transformation Readiness Report
- Transition Architecture, Version 1.0, including:
 - Consolidated Gaps, Solutions, and Dependencies Assessment
 - Risk Register, Version 1.0
 - Impact analysis – project list
 - Dependency Analysis Report
 - Implementation Factor Assessment and Deduction Matrix
- Implementation and Migration Plan, Version 0.1, including the high-level Implementation and Migration Strategy

Tailored Steps with DoDAF 2.0

The main focus of Phase F is the creation of a viable Implementation and Migration Plan in cooperation with the portfolio and project managers.

Develop PV-1 to describe the dependency relationships between the organizations and projects; a PV-2 to describe the timeline perspective on programs or projects, indicating key milestones and inter-dependencies; CV-3 which shows planned achievement of capability at different points in time or during specific periods of time; and PV-3 which provides a mapping of programs and projects to capabilities to show how the specific projects and program elements help to achieve a capability. Refine/tie CV-3 and PV-2 together, where CV-3's different points in time for planned achievement of capability correspond to PV-2's project and program timelines and key milestones.

The key steps in this phase are:

- CV-3, PV-2: Confirm management framework interactions for Implementation and Migration Plan
- Assign a business value to each project
- Estimate resource requirements, project timings, and availability/delivery vehicle
- Prioritize the migration projects through the conduct of a cost/benefit assessment and risk validation
- Confirm Transition Architecture increments/phases and update Architecture Definition Document
- PV-1, 2, 3, & CV-3: Generate the Architecture Implementation Roadmap (Time-lined) and Migration Plan
- Establish the architecture evolution cycle and document lessons learned

Outputs

The outputs of this phase include:

- CV-3, PV-1, 2, & 3: Implementation and Migration Plan, Version 1.0
- Finalized Architecture Definition Document

- Finalized Architecture Requirements Specification
- Finalized Architecture Roadmap
- Finalized Transition Architecture
- Re-usable Architecture Building Blocks
- Requests for Architecture Work for the architecture aspects of implementation projects, if any
- AV-1: Architecture Contracts (standard) for implementation projects
- Implementation Governance Model
- Change Requests arising from lessons learned

Phase G: Implementation Governance

Objective

The objectives of this phase are:

- To formulate recommendations for each implementation project
- To govern and manage an Architecture Contract covering the overall implementation and deployment process
- To perform appropriate governance functions while the solution is being implemented and deployed
- To ensure conformance with the defined architecture by implementation projects and other projects
- To ensure that the program of solutions is deployed successfully, as a planned program of work
- To ensure conformance of the deployed solution with the Target Architecture
- To mobilize supporting operations that will underpin the future working lifetime of the deployed solution

Inputs

Inputs to this phase are:

- Request for Architecture Work
- AV-1: Statement of Architecture Work
- Re-usable Solution Building Blocks (from organization's Solutions Continuum, if available)
- Impact Analysis – detailed Implementation and Migration Plan (including Architecture Implementation Contract, if appropriate)

Tailored Steps with DoDAF 2.0

During Phase G, the architecture description created as a set of integrated models during the previous phases may be utilized to produce implementation recommendations. The SV, SvcV, and StdV models can be utilized by system integrators as a high-level system of systems architecture model that describes information systems interoperability needs and a possible technology solution. AV-1 and OV-1 are additional resources to ensure that the architecture's implementation complies with key information captured in this model (assumptions, constraints, principles, drivers, etc.).

The key steps in this phase are:

- [Refined] AV-1: Confirm scope and priorities for deployment with development management
- Identify deployment resources and skills
- Guide development of solutions deployment

- Perform enterprise architecture compliance reviews
- Implement business and IT operations
- Perform post-implementation review and close the implementation

Outputs

The outputs of this phase include:

- AV-1: Architecture Contract (signed), as recommended in the architecture-compliant implemented architectures
- Compliance Assessments
- Change Requests
- Architecture integrated model, consisting of all architecture views developed: architecture-compliant solutions deployed including:
 - The architecture-compliant implemented system
 - Populated AV-2: Architecture Repository includes architecture data and relationships from all DoDAF models developed in previous phase
 - Architecture compliance recommendations and dispensations
 - Recommendations on service delivery requirements
 - Recommendations on performance metrics
 - Service Level Agreements (SLAs)
 - AV-1: Architecture Vision, updated post-implementation
 - Architecture Definition Document, updated post-implementation
 - Transition Architecture, updated post-implementation
 - Business and IT operating models for the implemented solution

Phase H: Architecture Change Management

Objective

The objectives of this phase are:

- To ensure that Baseline Architectures continue to be fit-for-purpose
- To assess the performance of the architecture and make recommendations for change
- To assess changes to the framework and principles set up in previous phases
- To establish an architecture change management process for the new enterprise architecture baseline that is achieved with completion of Phase G
- To maximize the business value from the architecture and ongoing operations
- To operate the Governance Framework

Inputs

Inputs to this phase are:

- AV-1: Organizational Model for Enterprise Architecture
- AV-1: Tailored Architecture Framework
- AV-1: Statement of Architecture Work
- AV-1: Architecture Vision

- AV-2: Architecture Repository
- Architecture Definition Document
- Architecture Requirements Specification, including:
 - Gap analysis results (from Business, Data, Application, and Technology Architectures)
 - Architectural requirements
- Architecture Roadmap
- Change Request – technology changes:
 - New technology reports
 - Asset management cost reduction initiatives
 - Technology withdrawal reports
 - Standards initiatives
- Change Request – business changes:
 - Business developments
 - Business exceptions
 - Business innovations
 - Business technology innovations
 - Strategic change developments
- Change Request – from lessons learned
- Transition Architecture
- Implementation Governance Model
- AV-1: Architecture Contract (signed)
- Compliance Assessments
- Implementation and Migration Plan

Tailored Steps with DoDAF 2.0

The goal of an architecture change management process is to ensure that the architecture achieves its original target business value. This includes managing changes to the architecture in a cohesive and architected way.

During Phase H, the DoDAF architecture models that were created as a set of integrated models during the previous phases are placed under a change management process, where all modifications made in the model are documented and communicated to the various stakeholders. Further, CV-3, PV-1, 2, & 3, SV-9, SvcV-9, and StdV-2 may be specifically used to describe and document future plans for the systems modeled in the architecture.

The key steps in this phase are:

- Establish value realization process
- Deploy monitoring tools
- Manage risks
- Use CV-3, PV-1, 2, & 3, SV-9, SvcV-9, and StdV-2 to:
 - Provide analysis for architecture change management
 - Develop change requirements to meet performance targets
- Manage governance process

- Activate the process to implement change

Outputs

The outputs of Phase H are an architecture integrated model, consisting of all architecture views developed that describes:

- Architecture updates (for maintenance changes)
- AV-1: Changes to architecture framework and principles (for maintenance changes)
- New Request for Architecture Work, to move to another cycle (for major changes)
- AV-1: Statement of Architecture Work, updated if necessary
- AV-1: Architecture Contract, updated if necessary
- Compliance Assessments, updated if necessary

DoDAF 2.0 within the TOGAF 9 ADM

The following subsections document our ADM relationship observations associated with each DoDAF architecture model. It is important to note that there are cases where no DoDAF descriptive model was identified for a certain ADM construct. This should not be considered a problem. The goal of this White Paper is to outline which parts of the TOGAF ADM relate to the intended content of each DoDAF architectural model. DoDAF can thus be leveraged to develop a visual model of the architecture and to use this model in facilitating and documenting decisions made during the ADM steps.

All Viewpoint (AV)

There are some overarching aspects of an architectural description that are captured in the All Viewpoint (AV) DoDAF-described models. The AV models provide information pertinent to the entire architectural description rather than representing a distinct viewpoint.

DoDAF AV models provide an overview of the architectural effort including such things as the scope, context, rules, constraints, assumptions, and the derived vocabulary that pertains to the architectural description. It captures the intent of the architectural description to help ensure its continuity in the face of leadership, organizational, and other changes that can occur over a long development effort. AV models are initially populated during the ADM's Preliminary Phase and Phase A: Architecture Vision, and are updated at each phase. AV-1 is finalized during ADM Phase G: Implementation Governance to reflect architecture analysis results. AV-2 evolves across all phases of the TOGAF ADM and includes architecture data and relationships from all DoDAF models developed in previous phases.

Capability Viewpoint (CV)

DoDAF's Capability Viewpoint (CV) is based on the program and capability information used by portfolio managers to capture the increasingly complex relationships between inter-dependent projects and capabilities. Capability Viewpoint elements document the enterprise's vision for transformational endeavors and thus define the strategic context for a group of capabilities. Capability Viewpoint elements also reflect planned achievement of capability at different points in time, and show dependencies to other capabilities, services, operational activities, and organizational dependencies.

DoDAF's Capability Viewpoint primarily aligns with ADM Phases A, B, C, F, and H.

Project Viewpoint (PV)

Project Viewpoint (PV) model elements describe how programs, projects, portfolios, or initiatives deliver capabilities, the organizations contributing to them, and dependencies between them. Different levels of cost data can be captured in the architecture, based on the process owners' requirements. An example PV model is a Work Breakdown Structure.

DoDAF's Project Viewpoint primarily aligns with ADM Phases, A, B, F, and H. Project models are refined during Phase E: Opportunities and Solutions.

Operational Viewpoint (OV)

The Operational Viewpoint (OV) model elements describe the tasks and activities, operational elements, and resource flow exchanges required to conduct operations. A pure operational model is material-independent.

DoDAF's Operational Viewpoint primarily aligns with ADM Phase B: Business Architecture. OV models are refined during Phase E: Opportunities and Solutions.

Data and Information Viewpoint (DIV)

DoDAF's Data and Information Viewpoint (DIV) provides a means of portraying the operational and business information requirements and rules that are managed within, and used as constraints on, the organization's business activities.

DoDAF's Data and Information Viewpoint (DIV) primarily aligns with ADM Phase C: Information Systems Architecture: Data Architecture. DIV models are refined during Phase E: Opportunities and Solutions.

Services Viewpoint (SvcV)

The Services Viewpoint (SvcV) describes services, and their interconnections, providing or supporting DoD functions. DoD functions include both warfighting and business functions. The service models associate service resources to the operational and capability requirements. These resources support the operational activities and facilitate the exchange of information. The relationship between architectural data elements across the Services Viewpoint to the Operational Viewpoint and Capability Viewpoint can be exemplified as services are procured and fielded to support the operations and capabilities of organizations. The structural and behavioral models in the OVs and SvcVs allow architects and stakeholders to quickly ascertain which functions are carried out by humans and which by services for each alternative specification and so carry out trade analysis based on risk, cost, reliability, etc. Services are not limited to internal system functions and can include Human Computer Interface (HCI) and Graphical User Interface (GUI) functions or functions that consume or produce service data to or from service functions. The external service data providers and consumers can be used to represent the human that interacts with the service.

DoDAF's Services Viewpoint primarily aligns with ADM Phase C: Information Systems Architecture: Application Architecture. SvcV models are refined during Phase E: Opportunities and Solutions.

Systems Viewpoint (SV)

The Systems Viewpoint (SV) describes systems, and their interconnections, providing for or supporting DoD functions. DoD functions include both warfighting and business functions. The systems models associate systems resources to the operational and capability requirements. These systems resources support the operational activities and facilitate the exchange of information.

DoDAF's Systems Viewpoint primarily aligns with ADM Phase D: Technology Architecture. SV models are refined during Phase E: Opportunities and Solutions.

Standards Viewpoint (StdV)

The Standards Viewpoint (StdV) is the set of rules governing the arrangement, interaction, and inter-dependence of parts or elements of the architectural description. These sets of rules can be captured at the enterprise level and applied to each solution, while each solution's architectural description depicts only those rules pertinent to the architecture described. Its purpose is to ensure that a solution satisfies a specified set of operational or capability requirements. The standards models capture the doctrinal, operational, business, technical, or industry implementation guidelines upon which engineering specifications are based, common building blocks are established, and solutions are developed. It includes a collection of the doctrinal, operational, business, technical, or industry standards, implementation conventions, standards options, rules, and criteria that can be organized into profiles that govern solution elements for a given architecture. Current DoD guidance requires the Technical

Standards portions of models be produced from DISR to determine the minimum set of standards and guidelines for the acquisition of all DoD systems that produce, use, or exchange information.

DoDAF’s Standards Viewpoint aligns with ADM Phase D: Technology Architecture. Technology forecasts are documented during Phase E: Opportunities and Solutions.

DoDAF 2.0 to TOGAF 9 ADM Summary

Table 7 provides the authors’ assessment of correlation strength (high, low, or none) between each DoDAF model and TOGAF ADM phase, along with references into specific parts of the ADM chapters for each DoDAF architectural model. This table can help an architect to prioritize their efforts to tailor TOGAF 9 with DoDAF 2.0. It also demonstrates the synergy between the frameworks as there are 38 high correlations compared to 14 low correlations.

Table 6: Correlation between DoDAF 2.0 Models and TOGAF 9 ADM Phases

DoDAF Model	DoDAF Model Name	TOGAF ADM Phase	TOGAF 9 Paragraph Number(s)	Correlation (High, Low)
AV-1	Overview and Summary Information	All Phases	Part II: Ch. 6.4, 7.2.2, 7.4.8,13,15	High
AV-2	Integrated Dictionary	All Phases	Part II	High
CV-1	Vision	A, B, E	Part II: Ch. 7.2.2, 7.4.8, 13.4.11.4	High
CV-2	Capability Taxonomy	A, B, E	Part II: Ch. 7.2.2, 7.2.3, 7.4.8, 13.4.10	Low
CV-3	Capability Phasing	C, E, F, H	Part II: Ch. 7.2.1, 7.4.10, 7.4.11, 13.4.10, 14.4.4	High
CV-4	Capability Dependencies	B, E	Part II: Ch.8, 13.4.11, 13.4.3	High
CV-5	Capability to Organizational Development Mapping	B, E	Part II: Ch. 7.4.5, 13.4.3	Low
CV-6	Capability to Operational Activities Mapping	B, E	Part II: Ch. 7.2, 7.4, 8.4.1, 13.4.3	Low
CV-7	Capability to Services Mapping	C, E	Part II: Ch. 7.2, 7.4, 11.4, 13.4.3	Low
DIV-1	Conceptual Data Model	A, E	Part II: Ch. 7.2.3, 7.4.8, 13	Low
DIV-2	Logical Data Model	B, C, E	Part II: Ch.7, 8.2.3, 10, 10.4.1.1, 13.4.3	High
DIV-3	Physical Data Model	C, E	Part II: Ch. 10, 10.4.1.4, 13	Low
OV-1	High-Level Operational Concept Graphic	Preliminary, A, B, E	Part II: Ch. 5, 6.4.1, 7.2.2, 7.4.8.8, 13	Low
OV-2	Operational Resource Flow Description	B, E	Part II: Ch. 8.2.3, 8.4.1, 13	High
OV-3	Operational Resource Flow Matrix	B, E	Part II: Ch. 8.2.3, 13	Low
OV-4	Organizational Relationships Chart	B, E	Part II: Ch. 8.4.1.3, 13	Low

DoDAF Model	DoDAF Model Name	TOGAF ADM Phase	TOGAF 9 Paragraph Number(s)	Correlation (High, Low)
OV-5a	Operational Activity Decomposition Tree	B, E	Part II: Ch. 8.2.3, 8.4.1.3, 13	High
OV-5b	Operational Activity Model	B, E	Part II: Ch. 8.2.3, 13	High
OV-6a	Operational Rules Model	B, E	Part II: Ch. 8.2.3, 13	Low
OV-6b	State Transition Description	B, E	Part II: Ch. 8.2.3, 13	Low
OV-6c	Event-Trace Description	B, E	Part II: Ch. 8.2.3, 13	High
PV-1	Project Portfolio Relationships	A, E, F	Part II: Ch. 7.4.1, 7.4.11, 13.4.9, 13.4.11, 14.4.2	Low
PV-2	Project Timelines	A, B, E, F	Part II: Ch. 7.4.1, 7.4.11, 8, 13.4.10, 14.4.6, 14.4.7, 14.4.10	High
PV-3	Project to Capability Mapping	A, B, E, F	Part II: Ch. 7.4.9, 8, 13.4.3, 14.4.1	Low
SvcV-1	Services Context Description	C, E	Part II: Ch. 11.4.1, 13	High
SvcV-2	Services Resource Flow Description	C, E	Part II: Ch. 11.4.1, 13	High
SvcV-3a	Systems-Services Matrix	C, E	Part II: Ch. 11.4.1, 13.4.3	High
SvcV-3b	Services-Services Matrix	C, E	Part II: Ch. 11.4.1, 13.4.3	High
SvcV-4	Services Functionality Description	C, E	Part II: Ch. 11.4.1, 13	High
SvcV-5	Operational Activity to Services Traceability Matrix	B, C, E	Part II: Ch. 7, 8.23, 11.4.1, 13.4	High
SvcV-6	Services Resource Flow Matrix	C, E	Part II: Ch. 11.4.1, 13	High
SvcV-7	Services Measures Matrix	C, E	Part II: Ch. 11.4.1, 13	High
SvcV-8	Services Evolution Description	C, E	Part II: Ch. 11.4.1, 13	High
SvcV-9	Services Technology & Skills Forecast	C, E, H	Part II: Ch. 11.4.1, 13, 16	High
SvcV-10a	Services Rules Model	C, E	Part II: Ch. 11.4.1, 13	High
SvcV-10b	Services State Transition Description	C, E	Part II: Ch. 11.4.1, 13	High
SvcV-10c	Services Event-Trace Description	C, E	Part II: Ch. 11.4.1, 13	High
SV-1	Systems Interface Description	C, E	Part II: Ch. 11.4.1, 13	High
SV-2	Systems Resource Flow Description	C, E	Part II: Ch. 11.4.1, 13	High
SV-3	Systems-Systems Matrix	C, E	Part II: Ch. 11.4.1, 13.4	High
SV-4	Systems Functionality Description	C, E	Part II: Ch. 11.4.1, 13	High
SV-5a	Operational Activity to Systems Function Traceability Matrix	B, C, E	Part II: Ch. 8.23, 11.4.1, 13.4	High

DoDAF Model	DoDAF Model Name	TOGAF ADM Phase	TOGAF 9 Paragraph Number(s)	Correlation (High, Low)
SV-5b	Operational Activity to Systems Traceability Matrix	B, C, E	Part II: Ch. 8.23, 11.4.1, 13.4	High
SV-6	Systems Resource Flow Matrix	C, E	Part II: Ch. 11.4.1, 13	High
SV-7	Systems Measures Matrix	C, E	Part II: Ch. 11.4.1, 13	High
SV-8	Systems Evolution Description	C, E	Part II: Ch. 11.4.1, 13	High
SV-9	Systems Technology & Skills Forecast	C, E, H	Part II: Ch. 11.4.1, 13, 16	High
SV-10a	Systems Rules Model	C, E	Part II: Ch. 11.4.1, 13	High
SV-10b	Systems State Transition Description	C, E	Part II: Ch. 11.4.1, 13	High
SV-10c	Systems Event-Trace	C, E	Part II: Ch. 11.4.1, 13	High
StdV-1	Standards Profile	A, B, C, D, E, F, G, H	Part II: Ch. 12.4.1.1	High
StdV-2	Standards Forecast	E, H	Part II: Ch. 12.4.1.1, 13, 16	Low

Summary

Previous analysis between TOGAF 8.1 and DoDAF 1.0 concluded that TOGAF and DoDAF were synergistic and complementary frameworks. This holds true for TOGAF 9 and DoDAF 2.0 releases. TOGAF continues to add depth to its method and DoDAF continues to add depth and integrity to the type of architecture data and viewpoints of the architecture data. There is synergy across a number of areas between these two frameworks; fundamentally DoDAF 2.0 viewpoints and models can be produced throughout TOGAF 9 ADM phases to develop an integrated model of the architecture of concern. A DoDAF 2.0 architecting effort can still benefit by using the TOGAF 9 ADM.

Iteration and evolution should occur through architecture model development and across the lifecycle of system development, but there are general relationships between the DoDAF 2.0 viewpoints and TOGAF 9 ADM phases.

Each complex architecting endeavor requires several key elements in order to reach a successful conclusion: repeatable methodology, standardized output models, formal validation, governance, collaboration guidelines, configuration management, tools, and patterns. The architect is able to address many of these needs through the application of the TOGAF 9 ADM as a disciplined process in developing the DoDAF 2.0 set of viewpoints and models to describe the architecture.

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Acronyms

ADM	Architecture Development Method [from TOGAF]
AV	All Viewpoint [from DoDAF]
C4ISR	Command, Control, Communications, Computers, Intelligence, Reconnaissance, Surveillance
CADM	Core Architecture Data Model
CAF	C4ISR Architecture Framework
CJCS	Chairman, Joint Chiefs of Staff
CV	Capabilities Viewpoint [from DoDAF]
DISR	DoD IT Standards Registry
DITIL	Defense Information Technology Infrastructure Library
DIV	Data and Information Viewpoint [from DoDAF]
DMZ	De-Militarized Zone
DoD	Department of Defense
DoDAF	Department of Defense Architecture Framework
DOTMLPF	Doctrine, Organization, Training, Material, Leadership, Personnel, Facilities
KPI	Key Performance Indicator
MODAF	Ministry of Defence Architecture Framework
OV	Operational Viewpoint [from DoDAF]
PV	Project Viewpoint [from DoDAF]
SLA	Service-Level Agreement
SV	Systems Viewpoint [from DoDAF]
SvcV	Service Viewpoint [from DoDAF]
StdV	Standards Viewpoint [from DoDAF]
TAFIM	Technical Architecture Framework for Information Management
TOGAF	The Open Group Architecture Framework
TRM	Technical Reference Model
TV	Technical Standards View [from DoDAF]
UML	Unified Modeling Language
UPDM	UML Profile for DoDAF and MODAF

URR	Universal Reference Resource
US	United States

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Terry has been involved with the architecture discipline since the 1980s when he was at the NCR Corporation as Director of Strategic Architecture. He has been involved with evolving this discipline since 1996 when he first was introduced to The Open Group Architecture Forum. He was co-chair of the Architecture Forum and frequent contributor of content to TOGAF, including the Business Scenario Method.

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