The USNORTHCOM Integrated Architecture:
Developing and managing a capabilities-based architecture as a program to enhance the Homeland Defense and Military Assistance to Civil Authorities Mission Areas

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Abstract

The United States Northern Command (USNORTHCOM) Integrated Architecture is a capabilities-based methodology, grounded in the two missions of the command: Homeland Defense and Military Assistance to Civil Authorities. USNORTHCOM has identified 17 critical warfighting capabilities and 20 FY04 Joint Mission Essential Tasks that enable the Command to accomplish its missions. The command architecture is a formal methodology that provides a means of describing and assessing/analyzing the infrastructure, personnel, and organization to perform these missions. This approach requires a collaborative process using an integrated, capabilities-based architecture analysis to examine prioritized capability requirements, gaps, shortfalls, redundancies, and duplications to derive potential integrated doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) solutions. Gaps in command capabilities, operational requirements, and associated risks are identified via analysis between the "As-Is" and "To-Be" architectures. Time-phased capabilities are illustrated in the transition and sequencing plans.

The architecture process has several key '*touchpoints*' for information exchange to other USNORTHCOM processes and functions, namely, the Information Technology investment management, resource allocation, and capabilities-based acquisition processes.   The USNORTHCOM Chief Architect's Office manages the development and maintenance of the command's architecture as a program, structuring the office as a program management office. Lastly, the paper delineates the triad of capabilities-based architecture, investment management decision support, and implementation.

1.0   Introduction

Due to the nature of its mission, the Department of Defense (DoD) possesses some of the most structured processes and mature practices in the Federal Government. The DoD was one of the first Federal agencies to embrace the use of architectural principles and practices in the management of information technology and its return on investment. Consequently, the DoD is recognized as the source of many processes that can be applied throughout the public and private sector.

Traditionally, organizations have scrutinized their information technology investments more for cost than benefits or enhanced capability. With decreased budgets for information technology, organizations are now questioning the benefits of these investments more closely. The clear trend, at present and for the future, is that benefits and derived capabilities will be the major concern for information technology investments. In this environment, Enterprise Architecture (EA) becomes a vital candidate for this scrutiny and planning.

Enterprise Architecture, as a discipline and practice, addresses the linkage between an organization's strategic plan and its implementation of both information technology (new material solutions) and non-materiel solutions such as organizational or doctrinal changes. Thus an architecture is more than simply a plan that optimizes existing information technology and ensures its alignment with strategic goals. EA adds a crucial element of control, ensuring the proper integration of changes in corporate practices and non-materiel solutions as well as new or advanced technologies into an agency's architecture. Properly designed, the EA provides a coherent presentation of all the policies, standards, and procedures, as well as evaluation and oversight tools, necessary to enforce the mandates of the Clinger-Cohen Act of 1996 and Federal Enterprise Architecture.

As a newly established organization, USNORTHCOM embraces the concepts and precepts of the Federal and DoD Enterprise Architecture discipline. The command is using both mature, time tested and new, innovative methodologies to develop, maintain, and integrate the EA with the command's pressing needs for efficient and cost-saving investment management, capital planning and control, and capabilities-based acquisitions. The precepts of enterprise architecture are one and the same as those of the USNORTHCOM Integrated Architecture. This article addresses USNORTHCOM's generation and use of its EA, the identification of key interfaces or '*touchpoints*' between the Chief Architect's Office and the functions of operations, investment management, and acquisition.

An important reference point is that the EA discipline and capability applied to the USNORTHCOM processes are also implemented for the bi-national North American Aerospace Defense Command (NORAD).   The Commander, USNORTHCOM and the Director, USNORTHCOM Architectures and Integration are dual-hatted as Commander, NORAD and Director, NORAD Command Control Systems. As such, the staffs, functionality and tools discussed serve both Commands. This paper, however, is focused on enterprise architecture, and its relationship to USNORTHCOM and its mission areas.

2.0   USNORTHCOM Background

USNORTHCOM was established during the summer of 2002, obtaining Initial Operational Capability on 1 October 2002 and Full Operational Capability on 11 September 2003. The USNORTHCOM Integrated Architecture is a capabilities-based product, grounded in the two missions of the command: Homeland Defense and Military Assistance to Civil Authorities.

USNORTHCOM has identified 17 critical warfighting capabilities and 20 FY04 Joint Mission Essential Tasks that allow the Commander to accomplish his assigned missions. The command architecture provides a means of describing and assessing/analyzing the infrastructure, personnel, and organization to perform those missions' tasks.

A capability, as defined by Joint doctrine, is the ability to execute a specific course of action (missions and tasks). Courses of Action are simply sequences of operations that can be executed to support or accomplish a mission. The capabilities-based architecture functions as a blueprint or roadmap for systems development. The blueprint can and should be a critical tool in creating a new process for conducting systems development and acquisition that focuses on delivering the interoperability needed to support concepts such as network centric warfare.

3.0   Managing the Architecture as a Program

The USNORTHCOM Enterprise Architecture is a corporate asset that must be managed as a program. Successful execution of the Enterprise Architecture process is an enterprise-wide endeavor requiring management, allocation of resources, continuity, and coordination. Creating an EA Program and managing the architecture as a program relies on involved leadership and strong commitment.

The EA effort at USNORTHCOM is managed as a program with full sponsorship- through a Capital Planning and Investment Control or investment management process. The Chief Architect's Office (USNORTHCOM/Architectures Branch) has been established as a program management office to manage, monitor, and control the development and maintenance of the EA and associated products. The Architectures Branch identifies and performs DoD and alternate approaches for EA generation, managing both in-house and outsourced contractor EA development work. The Architectures Branch, as the Chief Architect' Office, is also charged with identifying architecture requirements, determining needed resources, and securing architecture funding.

In the role of Architecture Program Manager, the USNORTHCOM Chief Architect's Office has management responsibility for the overall EA program, with the authority, responsibility, and accountability for the development, maintenance, and eventual employment and use of the architecture. The Program Manager is responsible for planning, staffing, and ultimate success of the program, including acquisition of sustaining funds, negotiating schedules, timely and accurate delivery of EA products, and the establishment of an appropriate support environment that ensures proper application of architecture assets.

USNORTHCOM is currently generating a formal plan for EA program management. The Chief Architect's Office is creating a program management plan that includes a roadmap to accomplish its architecture goals. The Program Management Plan details the plans and set of actions to develop, use, and maintain the EA, including its management, control, and oversight. The precepts of the Program Management Plan will be delineated in a USNORTHCOM Command Instruction. This Command Instruction, when published, establishes the architecture processes and procedures as USNORTHCOM directed activities.

The Chief Architect's Office is working closely with USNORTHCOM's Information Technology (IT) investment management staff. As one of the many architecture "*touchpoints*," this interface between the architecture and IT investment management function allows improved information sharing, enhanced IT investments, coordinated resource allocation, and improved budget generation. The architecture is an investment management tool and an integral part of the Command's infrastructure change process.

4.0   Enterprise Architecture Maturity Model Framework Guidance

By describing the elements of an effective EA management program, the General Accounting Office's Enterprise Architecture Management Maturity Framework (EAMMF) provides a benchmarking tool for judging an enterprise's efforts to manage architecture development and its subsequent use [IT-EAMMF, 2003]. With the core elements of the EAMMF grounded in the Federal Chief Information Officer's Council's "*Practical Guide*," many agencies, including USNORTHCOM, adopted the EAMMF as a *de facto* standard for measuring EA management maturity.

Using the contents of the EAMMF as success criteria, both internal and external stakeholders can assess and illustrate an enterprise's EA management strengths and weaknesses at a given point in time or over a period of time. The progressive stages of the EAMMF provide a roadmap for incremental improvement of architecture management. Lower maturity stages form a foundation for higher ones, serving as prerequisites for greater maturity.

Being simply a framework describing *what* needs to be accomplished, the EAMMF does not indicate *how* these functions are to be done. USNORTHCOM augmented the framework with detailed criteria for each core element and assigned an element owner *who* is responsible for directing the maturing of that functionality.

In using the EAMMF for architecture improvement planning and assessment, USNORTHCOM recognized the need for a completed and approved architecture that is maintained and used to leverage organizational change through support to the investment management decision makers. This realization implements and matures the Command's IT management processes, controls, and structures, and provides a guide and set of constraints for using the approved architecture in making information technology investment decisions.

Figure 1 illustrates the EAMMF set of core elements for the five-stage maturity model. USNORTHCOM assesses its maturity based upon a three level red/yellow/green "stop light"

grading scale for each element of the matrix. As of the writing of this paper, USNORTHCOM is achieving stage two.

STAGE 1: Creating EA awareness	STAGE 2: Building the EA Management Foundation	STAGE 3: Developing EA Products	STAGE 4: Completing EA Products	STAGE 5: Leveraging the EA to manage change
By default not satisfying Stage 2 core element classifies an organization in Stage 1. This process continues through each stage.	1. Adequate resources exist	10. Written and approved organization policy exists for EA development.	16. Written and approved organization policy exists for EA maintenance.	24. Written and approved organization policy exists for IT investment compliance with EA.
	2. Committee or group representing the enterprise is responsible for directing, overseeing, or approving EA.	11. EA products are under configuration management	17. EA products and management processes undergo independent verification and validation.	25. Process exists to formally manage EA change.
	3. Program office responsible for EA development and maintenance exists.	12. EA products describe or will describe both the "as-is" and the "to-be" environments of the enterprise, as well as a sequencing plan for transitioning from the "as-is" to the "to-be."	18. EA products describe both the "as-is" and the "to-be" environments of the enterprise, as well as a sequencing plan for transitioning from the "as-is" to the "to-be."	26. EA is integral component of IT investment management process.
	4. Chief Architect exists.	13. Both the "as-is" and the "to-be" environments are described or will be described in terms of business, performance, information/data, application/service, and technology.	19. Both the "as-is" and the "to-be" environments are described in terms of business, performance, information/data, application/service, and technology.	27. EA products are periodically updated.
	5. EA is being developed using a framework, methodology, and automated tool.	14. Business, performance, information/data, application/service, and technology descriptions address or will address security.	20. Business, performance, information/data, application/service, and technology descriptions address security.	28. IT investments comply with EA.
	6. EA plans call for describing both the "as-is" and the "to-be" environments of the enterprise, as well as a sequencing plan for transitioning from the "as-is" to the "to-be."	15. Progress against EA plans is measured and reported.	21. Organization CIO has approved current version of EA.	29. Organization head has approved current version of EA.
	7. EA plans call for describing both the "as-is" and the "to-be" environments in terms of business, performance, information/data, application/service, and technology.		22. Committee or group representing the enterprise or the investment review board has approved current version of EA.	30. Return on EA investment is measured and reported.
	8. EA plans call for business, performance, information/data, application/service, and technology descriptions to address security.		23. Quality of EA products is measured and reported.	31. Compliance with EA is measured and reported.
	9. EA plans call for developing metrics for measuring EA progress, quality, compliance, and return on investment			

Figure 1. Enterprise Architecture Management Maturity Framework (EAMMF)

Not only is USNORTHCOM using the EAMMF as a measurement tool, but it also employs the framework as a roadmap in planning future activities. The framework is the keystone of the Command's plans to manage EA development as a program and in directing that development as part of its Program Management Plan. The EAMMF is, therefore, very effective for measuring, reporting, and overseeing progress in implementing the plan.

5.0   USNORTHCOM Architecture Methodology

The USNORTHCOM Chief Architect's Office employs a number of approaches and architecture development methodologies. Of course, while following the guidance of the Federal Enterprise Architecture framework, key among the approaches are the concepts and precepts of the Department of Defense Architecture Framework (DoDAF). The Command also uses a method of operational task identification and resource allocation as part of its architecture simply called the USNORTHCOM Enterprise Architecture Process.

5.1 *Department of Defense Architecture Framework*

Many current and evolving DoD efforts focus on the common goals of interoperability, integration, and cost-effective investments. Various reference models and information standards provide source documentation for guidelines and attributes, and must be consulted in building architecture products. The Department of Defense Architecture Framework cites several of these reference models.

The most essential aspect of the Framework guidance is that the purpose for building the architecture description should be clearly understood and articulated at the outset. The purpose will influence the choice of what information to gather, what products to build, and what types of analysis to apply. USNORTHCOM's purpose for building its architecture description is to support investment decisions.

Development of command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR) architectures is a distributed process. Because there has been no uniform guidance governing architecture development, DoD organizations describe their respective architectures using disparate perspectives, formats, and terminology. It is virtually impossible to interrelate or compare one architecture with another. Therefore, the architect and program management must conduct an integration process in order to identify interoperability issues and to find opportunities for technology leveraging and sharing. By using the DoDAF over time, system architects can dovetail architectures and develop opportunities to identify and enhance interoperability, integration, and cost-effectiveness.

The DoD Architecture Framework defines the operational, systems, and technical views of any given architecture. Figure 2 illustrates these three views and their relationships.
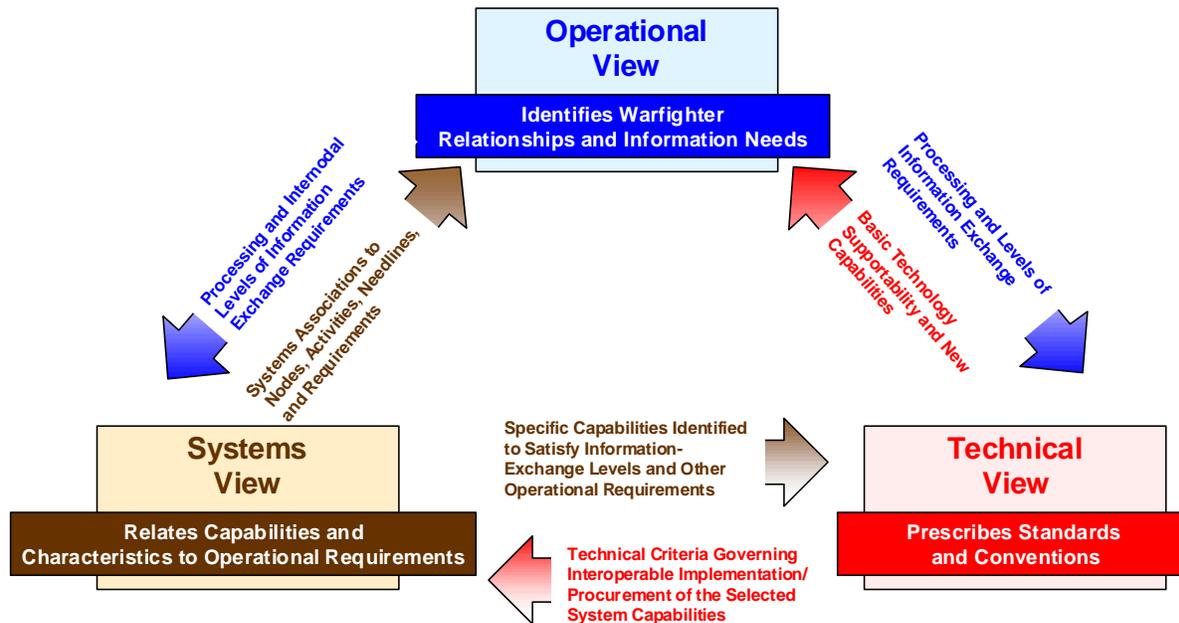

Figure 2. DoDAF: One Architecture, Three Views

The *operational view* describes the tasks and activities, operational elements, and information flows required to accomplish or support an operation. It specifies the nature of each needline's information exchange in sufficient detail to determine what specific degree of interoperability is required. The *systems view* identifies which systems support the requirement. It translates the required degree of interoperability into a set of needed system capabilities, and compares current/postulated implementations with the needed capabilities. The *technical view* articulates the criteria that govern the implementation of each required system capability. To be consistent and integrated, an architecture description must provide explicit linkages among its various views.

5.2   *Enterprise Architecture Process*

The Enterprise Architecture Process (EAP) is an integrated capabilities-based approach to describe the USNORTHCOM Enterprise Architecture operational environment, employing a mission-centric, functional assessment methodology. EAP provides a repeatable process that examines gaps, shortfalls, redundancies, and duplications to recognize efficiencies and effectiveness throughout the Command's mission areas, ensuring quality information remains accurate, timely, valid, useful, concise, and linked to strategic guidance. EAP results should be used to influence doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) solutions through enhanced IT investment management practices. Additionally, this assessment tool can be employed recursively to hone USNORTHCOM command and control requirements in order to provide feedback to the resource allocation community.

The Enterprise Architecture Process follows the practices and procedures, adheres to the conditions and guidance, and follows the precepts as framed by the Department of Defense Architecture Framework. The EAP applies a simple structured four-step methodology to generate objective results.

Step 1 is a mission assessment in which tasks are associated with each of the Command's Joint Mission Essential Tasks. In Step 2, the tasks are linked together by the mission essential information exchanges or information needlines. Step 3 maps the flow of tasks to the specific organizational unit performing the tasks. And lastly, in Step 4, the analysis identifies DOTMLPF resources needed to complete the tasks. DOTMLPF Needs Diagrams delineate the various gaps, shortfalls, and duplications. The architect translates these architecture gaps into mission requirements or need statements in order to affect an eventual funded project.

Centered on the common warfighting construct of Joint Mission Essential Tasks, and a baseline of supporting tasks, the EAP identifies a series of detailed tasks to achieve mission and vision success. All tasks identified by the EAP support the Joint Mission Essential Tasks, Strategic Vision Key Result Areas, Command Capabilities, and other command-level processes delineated and approved by the Commander, USNORTHCOM. The process also identifies resources aligned to integrated DOTMLPF solutions to fulfill and complete each task. See Figure 3 for an example EAP DOTMLPF Resource Diagram.

Information exchanges or needlines between the EAP defined tasks are identified and characterized. The information and work flow needed to accomplish a mission thread is determined. Resources, such as C4ISR IT systems and personnel, are associated with each task. Organizations performing the individual tasks are illustrated in the EAP products. The end result of this process captures the commands' C4ISR systems, personnel, and processes that are directly linked to the operational requirements that will enable strategic mission success. All products are reviewed and verified by a cadre of informal user groups.
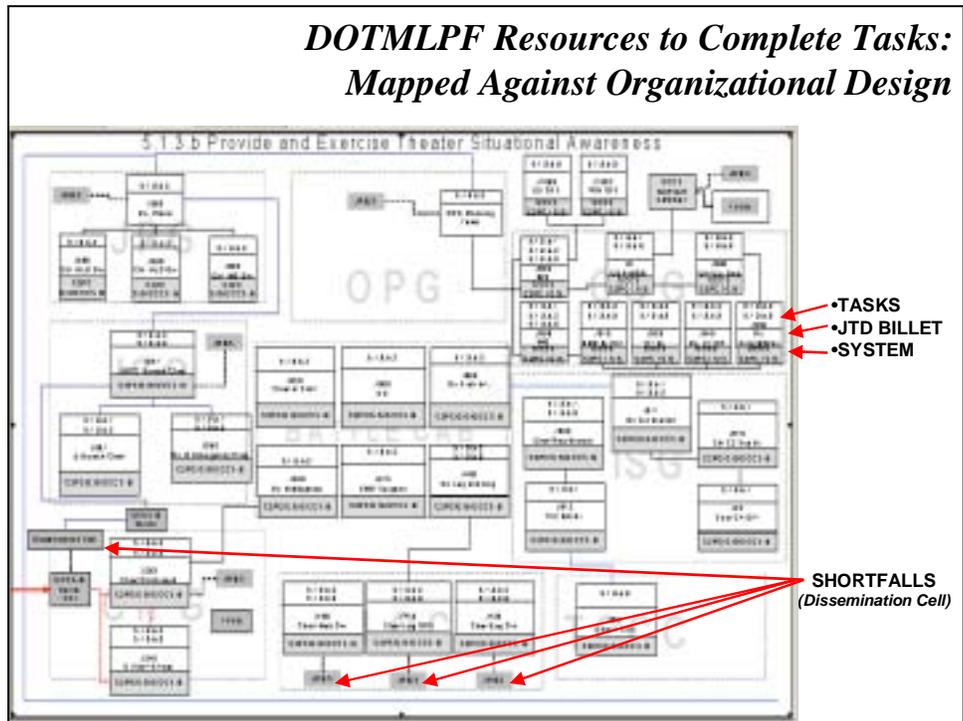

Figure 3. EAP DOTMLPF Resource Diagram

5.3   *Commands Architecture Repository and Decision Support Source*

The Commands Architecture Repository and Decision Support Source (CARDSS) is a "prototype" software application tool that serves as a repository for operational, systems, technical, and program information, providing a decision support mechanism through automated queries, searches, sorts, and report generation. CARDSS supports critical USNORTHCOM functions, such as information technology investment management, systems gap analyses, and mission system integration opportunities. In short, the CARDSS database provides USNORTHCOM with the ability to understand and respond to the state of the enterprise.

The USNORTHCOM Chief Architect's Office uses the CARDSS application to enable the command to leverage mission analysis data, collected through the Enterprise Architecture Process, into an integrated decision making process regarding DOTMLPF gaps, shortfalls, redundancies, and duplications. As the USNORTHCOM architecture repository, CARDSS is the warehouse for the operational, systems, and technical elements and components of the enterprise

architecture supporting standardization, modernization, and interoperability across the Command and the multitude of interfaces with both DoD and civil agencies.

Once fully populated, CARDSS becomes a data 'source' for making fully informed investment management decisions. Leveraging accurate and current architecture data relating to the "As-Is" architecture, "To-Be" architecture, and transition between them; improved, enhanced budget and resource questions can better be made by the acquisition community stakeholders with the support of the architecture team.

The top five functionalities of the CARDSS database, in support of both the architecture team and the acquisition community, will relate to making informed DOTMLPF decisions. As the architectural tool for USNORTHCOM, CARDSS not only provides the below listed functionality, but numerous other roles for the architect and the other command directorates:

1. Allows examination of the DOTMLPF gaps, shortfalls, redundancies, and duplications
2. Provides the maintenance of a set of prioritized solutions for the Command's DOTMLPF gaps, shortfalls, redundancies, and duplications
3. Supports analysis to determine the funding profiles for the DOTMLPF solutions, followed by the generation of timelines for implementing the DOTMLPF solutions
4. Identifies the technical standards for the enterprise and the enforcement of compliance are key to successful investment management.

6.0   DOTMLPF Needs and Solutions

The Joint Capabilities Integration and Development System, as delineated in Chairman of the Joint Chiefs of Staff Instruction 3170.01D, dated 12 March 2004, outlines the concepts and practices associated with DOTMLPF analyses. Joint Capabilities Integration and Development System implements a capabilities-based approach that better leverages staff expertise to identify improvements to existing mission capabilities and to develop new warfighting capabilities. This approach requires a collaborative process that utilizes joint concepts and integrated architectures to identify prioritized capability gaps, shortfalls, and duplications to arrive at integrated DOTMLPF solutions (both materiel and non-materiel) to resolve those gaps, shortfalls, and duplications.

USNORTHCOM will employ its Enterprise Architecture to better define the relationship between materiel considerations and those of doctrine, organization, training and the rest of the DOTMLPF aspects. This permits top-down capabilities identification, using the command's architecture to derive emerging needs from top-level strategic guidance and vision documentation. This analysis process would determine capability gaps, identify the attributes of a capability or combination of capabilities that would resolve the gaps, identify DOTMLPF materiel and non-materiel solutions for implementation and roughly assess the cost and operational effectiveness of the mission given each of the potential solutions.

The USNORTHCOM Enterprise Architecture Process, as an integrated capabilities-based architecture approach, describes the USNORTHCOM operational environment, delineating

mission essential tasks and information exchanges, locating operational nodes, and describing associated DOTMLPF resources. The Enterprise Architecture Process will identify:

1. DOTMLPF resource requirements and mission needs linked to strategic documentation such as vision and mission statements
2. Where DOTMLPF gaps, shortfalls, redundancies, and duplications exist, and
3. Potential solutions for DOTMLPF gaps, shortfalls, redundancies, and duplications.

The EAP results influence DOTMLPF solutions through enhanced investment management practices.

7.0 Investment Management Support

The central tenet of the federal approach to Information Technology Investment Management has been the Select/Control/Evaluate model. This model was initially identified in the General Accounting Office's Strategic Information Management Executive Guide, dated May 1994, and expanded in the Office of Management and Budget IT Investment Guidance, published November 1995. It is the Select/Control/Evaluate process that the USNORTHCOM Enterprise Architecture directly supports via a number of '*touchpoints*.' Architecture '*touchpoints*' are those opportunities to interface and exchange data between the architecture products and the data needs of the investment management process.

Architecture data, maintained in the CARDSS database, are integral to all three phases of the investment management process. In the Select phase, the architecture helps select those projects that will best support/enhance the command's mission needs. In the Control phase, as projects develop and expenditures continue, the architecture assists decision makers and project/portfolio managers to ensure that the project continues to meet mission needs at the expected levels of cost and risk. While in the Evaluate phase, actual versus expected results are compared. Does the project deliver the expected mission capability? In this phase, the architecture helps to identify any changes or modifications required to obtain the desired end-state result or target architecture. In this role, the Chief Architect's Office is acting as the command's "*change agent*."

Key architectural support comes in the form of CARDSS data. As an architecture repository and aid to investment decision makers, the CARDSS database is the source of most capabilities-based acquisition information. CARDSS provides a data querying, sorting, and searching capability that allows stakeholders to obtain the data necessary to make informed investment decisions. Such investment questions include, but are not limited to:

- Does an existing system already fulfill this capability?
- Does the proposed system adhere to the current standards?
- What current manual information exchanges need to be automated?
- Which staff will perform the tasks supported by the proposed system?
- Which is the USNORTHCOM priority for the proposed system?
- Is funding available for the system or is it considered an unfunded requirement?

Capabilities-based architectures are generated in support of the Joint Capabilities Integration and Development System process as established by the Chairman of the Joint Chiefs of Staff. This process implements an integrated, collaborative approach to guide development of new capabilities through architecture *touchpoints*. As documented in Chairman of the Joint Chiefs of Staff Instruction 3170.01D, it is mandatory to ensure that DOTMLPF aspects of new capabilities are being appropriately considered in all phases of the process. Change recommendations are developed, evaluated, and prioritized based on their contribution to future joint concepts and operations. Change, in the form of transitional increments between the "As-Is" and "To-Be" architectures, is the concern of the USNORTHCOM Chief Architect's Office, working in concert with the command's acquisition community. This approach requires a collaborative process that utilizes an integrated architecture to identify prioritized capability requirements, gaps, shortfalls, and duplications and integrated doctrine, organization, training, materiel, leadership and education, personnel, and facilities solutions.

The Joint Capabilities Integration and Development System provides a common coordination and integration process for DoD units working with other agencies and departments. The potential exists for DoD capabilities to satisfy needs of these other government agencies and, conversely, a capability provided by another agency or department may satisfy a DoD need. Thus, the capabilities-based architecture methodology is ideal for USNORTHCOM in its role of military support to civilian agencies and authorities, especially in linking support capabilities with the Department of Homeland Security.

8.0   Implementing the Architecture

Implementing the architecture is the key to Enterprise Architecture success. In many cases, the EA, in hardcopy format simply is relegated to a life on the shelf of history and the softcopy fares no better. Using the architecture to do something meaningful and beneficial is a must. There are many uses and benefits to the Enterprise Architecture, least of which are the following:

- Support to the investment management process
- Training aids
- Communications and Marketing Tool
- Staff orientation
- Systems Inventory
- Shared Vocabulary
- Manages Complexity and Change
- Visualizes Stakeholder Requirements
- Improved Risk Assessment and Reduction
- Provides a Blueprint or Roadmap of organization's direction

In its early stages, USNORTHCOM is embracing the architecture's ability to support both materiel and nonmaterial investment management. In this role, the EA is used as a tool to make better investment decisions. Thus, the Chief Architect's Office is deeply embedded in the USNORTHCOM budgeting and acquisition processes. They fulfill this role as the owner and maintainer of the Command's Transition and Sequencing Plan. At USNORTHCOM the transition plan is called the Information Sharing Block and Spiral Process.

The Block and Spiral Database provides an inventory of USNORTHCOM approved, funded, and planned investment projects. The database maintains a schedule of all key project milestones, such as start and end dates (initial operational capability and final operational capability), critical design reviews, select/control/evaluate dates, and other related data important to the project and portfolio managers, the architect, and USNORTHCOM commanders. The newly formed USNORTHCOM/J6 Portfolio Management Teams will make ranking and funding decisions from command IT projects and recommend projects for inclusion in the Block and Spiral database. The Portfolio Management Teams will be comprised of Project Managers from the same domain areas. The Program Managers monitor and control their projects using a spiral acquisition approach.

Using the Block and Spiral process as the transition plan, in conjunction with the Command's Technical Reference Model, the Chief Architect's Office is able to play a major role in the annual budgeting and resource allocation processes of the Command. Consequently, the command's EA is employed at several points in the acquisition process, providing change management for infrastructure changes and insertion of emerging technologies into the Command's physical architecture.

9.0   Summary

Across the Federal landscape, enterprise architecture frameworks ensure uniformity and standardization in migrating and integrating information systems. The potential for a global constancy, the ability to compare architectures, however, is accomplished only when the frameworks are applied consistently across the multitude of departments, bureaus, and agencies that make up the Federal Government. Consequently, compliance with one or more accepted frameworks is a paramount requirement.

USNORTHCOM is employing both the DoDAF and an internally developed methodology called the Enterprise Architecture Process. DoDAF and EAP concepts and products are thoroughly compliant with all of the fundamentals of enterprise architecting now found in the Federal Enterprise Architecture documentation. The Command expands these concepts to the identification of DOTMLPF solutions to operational, mission, and architecture needs by identifying several "*touchpoints*" between the architecture and acquisition processes. The capabilities-based architecture is used to relate potential solutions to capability needs and enhancements while the capabilities-based acquisition process attempts to efficiently acquire solutions to operational mission needs. Together, the two disciplines collaborate to either enhance or provide new capabilities to the Command.

In an attempt to better service the entire breath of USNORTHCOM, the Chief Architect's Office is in the preliminary stages of developing an architecture repository and a tool that will support the effective and efficient making of investment management decisions. The Commands Architecture Repository Decision Support Source database is this dual-purpose tool, supporting both the architecture and the acquisition directorates of USNORTHCOM.

Striving to achieve not only materiel solutions to the Command's needs, the architect is using the CARDSS database as a source of information to also identify non-materiel solutions. These non-materiel solutions to mission gaps, shortfalls, and duplications include, but are not limited to, organization changes and business process reengineering, enhanced training and continuation education, improved facilities (operations centers, command posts, and watch centers), and policy documentation.

In conclusion, USNORTHCOM is leveraging the best architecture practices and procedures of those Federal agencies (both military and civilian) that have been identified as successes. These include US Transportation Command, headquartered at Scott AFB, the former US Customs Service, and the US Coast Guard. The Command is doing this by following the direction and guidance established by the General Accounting Office and the Office of Management and Budget Federal Enterprise Architecture Program Management Office. In particular, the Chief Architect's Office is measuring its successes and progress against the architecture maturity model developed by the General Accounting Office.

Acronyms

C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
CARDSS	Command Architecture Repository Decision Support Source
DoD	Department of Defense
DoDAF	Department of Defense Architecture Framework
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and education, Personnel, and Facilities
EA	Enterprise Architecture
EAP	Enterprise Architecture Process
EAMMF	Enterprise Architecture Management Maturity Framework
IT	Information Technology
NORAD	North American Aerospace Defense Command
USNORTHCOM	United States Northern Command

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