# DISCUSSION TOPIC:
# Achieving Business Situational Awareness – Developing and Defining an Effective Enterprise Architecture Strategy

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## Executive Summary

By establishing a comprehensive transformation governance structure and an effective outcome based enterprise architecture strategy which includes developing a common operating picture that leverages common business processes, business rules, data and system functions, situational awareness can improve operational performance and reporting of logistics, finance, human resource utilization and other decision support information. Achieving situational awareness generally requires the transformation of business processes and modernization of enabling information technology investments. Once achieved, situational awareness can facilitate the effective, efficient planning and execution of the warfighting mission.

The fundamental factors that enable total situational awareness include developing a comprehensive business enterprise strategy that includes a vision, mission, objectives, governance structure, governance policy, guiding principles, and key milestones to enable integrated and agile business situational awareness across value chains and domains, fostering flexibility to meet evolving business needs.

The key activities that lead to the development of a high-level outcome based enterprise architecture (EA) strategy in support a sustainable situational awareness include

1) Creating an enterprise architecture governance team and define the enterprise
2) Defining the business priority to be addressed by the enterprise architecture
3) Defining the enterprise architecture tools, products, implementation or transition plan and key performance metrics required to implement the outcome based enterprise architecture strategy.

Situational awareness can be achieved by developing, implementing and managing a common operating framework that leverages common business processes, business rules, and data and system functions from a business transformation priority perspective, directed by a well developed enterprise architecture strategy and governed by a well defined disciplined accountable and empowered architecture or business transformation governance board.

## Background

An effective outcome based enterprise architecture strategy is a key enabler to achieving increased business situational awareness.[1] Without an overarching capability framework and governance structure to help develop and define interoperable and integrated processes, data elements, business rules and system functions; total visibility, accountability and complete situational awareness cannot be adequately achieved, resulting in the concatenation of disparate data sets without an overarching business purpose or priority.

The Office of the Deputy Under Secretary of the Army – Business Transformation (DUSA-BT) has embarked on creating a comprehensive strategic transformation program, aimed at meeting the objectives and requirements articulated in the Army Posture Statement - an unclassified summary of Army roles, missions, accomplishments, plans, and programs designed to reinforce the Secretary and Chief of Staff of the Army posture and budget testimony before Congress. It serves a broad audience as a basic reference on the state of the Army. One of the objectives of the program is situational awareness.

An integrated and agile business situational awareness capability supports the use of business intelligence in the decision-making process.

There are a number of factors that enable situational awareness, two of which are fundamental:

1) Develop a comprehensive business enterprise strategy that includes a vision, mission, objectives, governance structure, governance policy, guiding principles, and key milestones.

2) Enable integrated and agile business situational awareness across value chains and domains, fostering flexibility to meet evolving business needs. Increased integration across the Army will enable the alignment to an enterprise common operating picture.

[1] Situational awareness is the ability to generate actionable knowledge by using timely and accurate information about the Army enterprise, its processes, and external factors

Outlined below are the three key activities that lead to the development of a high-level outcome based enterprise architecture (EA) strategy, which should occur to support a sustainable situational awareness:

1) Create an enterprise architecture governance team and define the enterprise
2) Define the business priority to be addressed by the enterprise architecture
3) Define the enterprise architecture tools, products, implementation or transition plan and key performance metrics required to implement the outcome based enterprise architecture strategy

## Situational Awareness

By establishing a comprehensive transformation governance structure and an effective outcome based enterprise architecture strategy which includes developing a common operating picture that leverages common business processes, business rules, data and system functions, situational awareness can improve operational performance and reporting of logistics, finance, human resource utilization and other decision support information. Because situational awareness is predicated upon access to accurate information and sustainable business processes, achieving situational awareness generally requires transforming business processes and modernizing information technology investments. Once achieved, situational awareness can facilitate the effective, efficient planning and execution of the warfighting mission.

## What is Enterprise Architecture?

Though there are many definitions of "enterprise architecture" as shown in Table 1, for all intents and purposes, it is a blueprint used to guide and execute a business strategy, goal, objective, or course of action. It bridges the "As-Is" to the "To-Be" environment, and supports lifecycle models and the methods required to build and maintain them.

Enterprise architecture  consists of two major elements:1) a comprehensive transformation governance structure; (a structure of relationships, policies and processes that directs and controls the initiatives to achieve the enterprise's goals by adding value while balancing risk versus "return over" IT investments, business processes, activities and business rules );

and 2) a common operating picture that leverages common business activities with te required, data, business rules and system functions in an organized and purpose-driven framework.

A successful enterprise architecture enables the alignment of organizational structure, business strategy and IT investments, traceability from the business strategy through business processes down to the underlying technology with an explicit focus on the organization. Creating an effective enterprise architecture consists of the following tasks listed below and also graphically represented in Figure 1: High Level Business Transformation Approach:

1) Create an enterprise architecture governance structure
2) Define and develop business transformation priorities
3) Determine scope and assignment of architecture development responsibility
4) Build the required architecture and transition plan
5) Develop a business priority requirements document
6) Implement the business priority results in accordance with the transition plan

Table 1

**What is Enterprise Architecture?**

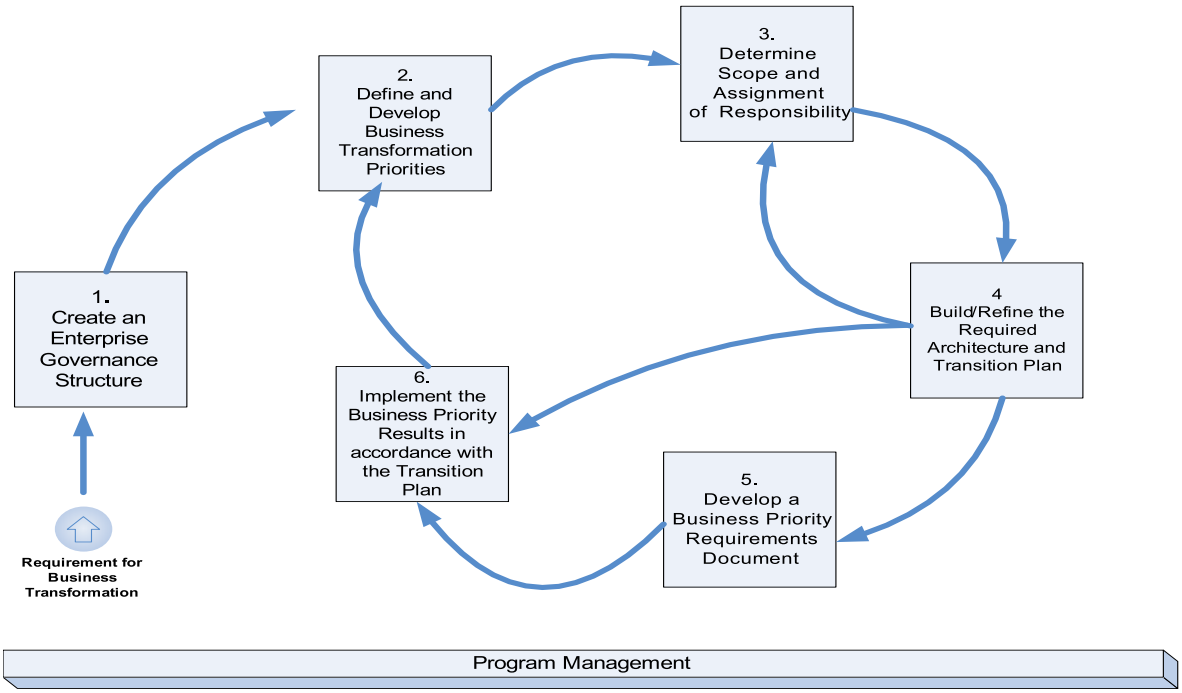
"A commonly accepted model of an organization, an industry or an enterprise. The model is built on and built by an integrated set of tools and methods which support creation, deployment, operation and disposal of the model and the system which is its embodiment."
– USAF Integrated Computer Aided Manufacturing Program (ICAM)

"The fundamental and unifying structure defined in terms of elements, information, interfaces, processes, constraints, and behaviors."
– Department of Defense Architecture Framework (DODAF)

"The explicit description and documentation of the current and desired relationships among business management processes and information technology."
– The Office of Management and Budget (OMB) Circular A-130

"The manner in which the components of a business or business system are organized and integrated."
– Merriam- Webster

**Figure 1: High Level Business Transformation Approach**




An enterprise architecture describes an organization's current state, future structure, business processes, information systems, personnel, and organizational subunits. The benefits of effective outcome based enterprise architecture include:

1) Better information for strategic resourcing decisions and reduced cost of operations
2) Resolution of material weaknesses where applicable
3) Establishment of commonly used business practices and business rules as a driver of business transformation
4) Identification of organizational metrics and decreased organizational risk (business continuity)
5) Reduced redundancy, inefficiencies and risks in an organization's human capital network, processes and technology
6) Interoperability between IT investments and business operations

Enterprise architecture with all of its potential benefits by itself holds no purpose unless it is driven, guided, and directed by an overarching business strategy, policy, or goal.

With proper guidance and direction an enterprise architecture can be used to align or realign an organization's core goals, business functions and strategic direction by optimizing its practices, information technology, performance, and organizational structure.

**Critical Success Factors to Defining and Developing an Enterprise Architecture**

The critical success factors or elements to defining, developing, and implementing a successful enterprise architecture lie in constructing an effective governance structure and documenting  well-defined business goals, and objectives . The well defined business goals or objectives should be measurable and driven by a specific business or operational priority as determined by an organization's enterpriser architecture governance board.

A successful and efficient enterprise architecture strategy should not address every business functional area in the organization, only specific areas, core functions or "hot buttons"; pockets or areas of greatest concern. Once addressed, these resolved areas form the baseline architecture for additional business enterprise priorities and create an enterprise common operating picture (ECOP).

**1. Create an Enterprise Architecture Governance Structure**. Many organizations in both the government and commercial industry which engage in enterprise architecture initiatives have intentionally or unintentionally created disparate transformation governance mechanisms. These uncoordinated mechanisms "silos" inherently result from a lack of governance, leading to uncoordinated, unstructured, and disparate attempts to transformation business operations without an overarching business transformation priority to address a potential "hot button" – areas of great concern that may exhibit business inefficiencies such as the non existence of interoperable data between systems, duplicative  and redundant processes, and a lack of well defined business rules to drive the behavior of an organizations core processes and supporting system functions.

Patching up the "hot buttons" as they arise without an overarching framework or common strategic vision, goals and objectives is a common defensive and costly tactic characterized as a "preemptive strike, first come first served or Oklahoma gold rush syndrome" that organizations employ which reduces transparency, and creates misalignment, instead of actively designing and implementing an effective governance structure around the key business transformation priorities, objectives, and goals.

One of the goals of an enterprise architecture governance structure or board is to assess, improve, and consolidate the number of business process or system initiatives based on the desired requirements of the business transformation priority. Developing and instituting an effective transformation governance structure requires that senior executives of an organization take the lead by allocating resources, attention, and support to the business priority being addressed. Once developed, an effective governance structure can be used as one of the levers to encourage a shift in perspective from "stove pipes" toward an enterprise view.

Like any major organizational initiative, business transformation and architecture governance must have an owner such as a governance board to oversee the development and implementation of the business priority. Membership of the board should consist of senior executive representation from all shareholders affected by the business priority in addition to other required advisors and subject matter experts.

The governance board must have an enterprise-wide view that embraces the business functional requirements and how technology enables the business process requirements.

An effective enterprise architecture strategy is driven by business process requirements and with an overlay of enabling information technology, and as an enterprise architecture program progresses it requires a governance structure that ensures the alignment between business strategy, and the path to needed outcomes over the life of the effort. In other words, the governance structure must help the enterprise architecture program sustain its potential to deliver its promised value. It must also provide oversight and control during the program execution and help managers assess the program's current state and adjust content and direction if necessary.

Architecture governance can also be described as a combination of individuals with the executive and management roles and responsibilities, program oversight functions organized into structures, and policies that define management principles and decision making. This combination is focused upon providing direction and oversight, which guide the development and implementation of the enterprise architecture and providing data and feedback, which measures the ongoing contribution by the enterprise architecture to needed results within the overall business strategy and direction.

The concept of architecture governance has multiple dimensions: people, roles, structures, and policies. Overseeing and actively managing the development and implementation of an enterprise architecture program is a more complex undertaking than general project or program management. An effective governance structure and set of governance functions must provide the means to identify, assess, and respond to internal and external business requirements and changes by adjusting its components or features. A poor (or nonexistent) governance structure will leave the enterprise architecture program in a continuously reactive state, constantly struggling to catch up with changing business requirements and conditions.

There are a number of elements that comprise an effective enterprise architecture governance structure:

- **Organizational Structure**. These may include a program steering committee, a Program Management Office (PMO), the program organizational model, and the project organizational model.
- **Roles**. These may include the executive sponsor(s), a steering committee member, the program director / manager, the PMO manager, and project managers.
- **Mechanisms**. Designed to provide guidance and direction, these may include policies, governance principles, and decision or authority specifications.

In developing an effective enterprise architecture governance structure, there is no single "best" structure; rather, the structure should "fit" the enterprise's organizational dynamics and practices. For example, within a consensus-oriented business culture, the governance structure should provide for achieving, and continuously refining, consensus around major program outcomes. A program organizational structure that runs counter to components of the business culture will struggle to achieve momentum and forward motion.
Active direction for an enterprise architecture program is achieved through a combination of the right individuals, an effective structure for management and oversight, and a "set" of program roles and responsibilities. Roles and responsibilities should be defined and structured, with the needed outcomes of the enterprise architecture program in mind, and to "fit" within the management philosophy and enterprise approach.

Establishing a governance framework is one of the most significant efforts required for enterprise architecture program mobilization. The success of this effort has a direct correlation with the program's potential for long-term success because governance enables the program work, addressing such needs as:

- Continuous linkage to enterprise business strategy and direction
- Clear and well-understood decision-making authority
- Effective oversight of (and insight into) enterprise architecture program progress and direction, including the capability to identify and execute necessary adjustments in the face of internal / external events and changes
- Executive control over enterprise architecture  program evolution and outcomes

Any effective governance approach is impossible without metrics. Architecture metrics measure performance to reinforce accountability for results, to assess usage and manage compliance. These metrics which are established and measured by the governance team are normally developed from a set of realistic performance objectives that lead to improved business performance and greater business value.

To effectively execute an enterprise architecture program it typically requires multiple organizations that must integrate and interact effectively. Program staff must understand each organization's value as well as the integration and interaction among different organizations -- so that they can navigate these organizations to best advantage and accomplish their work. To be truly effective, the organizational structure of each projector program must conform to the enterprise's overall management philosophy and approach.

**2. Define and Develop Business Transformation Priorities.** The purpose of this step is to determine the business priority and identify the required outcomes to be achieved through the transformation effort. The business priority of enterprise architecture effort is the focus or set of transformational objectives that the enterprise architecture is meant to address.
It is normally developed by the governance board after careful consideration of the various "hot buttons", and achieved by balancing the strategic transformation vision of the organization with the available resources, transformational objectives and/or "burning platforms" that need to be addressed.  A determined set of questions are developed from the business priority which the enterprise architecture must answer.

For example, one of the Business Enterprise Priorities (BEP's) of the Department of Defense Business Enterprise Architecture (BEA) version 3.0, 4.0, and 4.1 is the Real Property Accountability (RPA) BEP. The objectives of the RPA BEP is to facilitate:

1) Access to more reliable and accurate real property information for both warfighter and business mission planning use.
2) The ability to link individual people and personal property to specific real property assets and their physical locations within business and tactical systems.
3) Decreased operational cost and cycle times, enabled by increased consistency of data, reduced re-work, and data calls.
4) Improved accuracy and auditability of financial statements.
5) Reduction or elimination of duplicative data capture and access activities.
6) Provision of a single source for 24x7, secure and accurate location information available for transportation, warfighting logistics, and planning providing geospatial, technical and related real property data.
7) The inclusion of Environmental Liabilities Recognition, Valuation and Reporting (ELRV&R) requirements and processes into the BEA and link the data to real property inventory .

In addition to the RPA BEP objectives, a set of questions were developed for the RPA BEP that the BEA must answer are:

1) To which real property assets does DoD have legal interest, and what are their functions and capabilities?
2) Where are the assets located geographically?
3) Who has "touched" each asset throughout its life (including its current user)?
4) What is each asset's condition and status (open, closed, awaiting disposal, etc.)?
5) Who is/are the steward(s) of the asset?
6) How much is each asset worth (including liabilities)?
7) What are the restrictions associated with use of the property or asset?
8) What is the size of the asset?

9) How is DoD accounting for and reporting its investments in construction projects?

The developed business priority and questions that the enterprise architecture must answer are a critical step in developing, designing and implementing an effective outcome based enterprise architecture.

**3. Determine Scope and Assignment of Responsibility.** This step includes defining the business or operational requirements and functional scope to be addressed, and assigning responsibility or creating executions teams for designated functional areas that will be addressed thereby granting authority for assigned tasks and accountability for results.

**4. Build/Refine Required Architecture and Transition Plan.** The purpose of this step is to build the architecture that documents the blue print (a plan or design documenting an architecture) for business activities, system functions, rules, relationships, metrics, and key performance parameters to be addressed by the business priority using selected products from the Department of Defense Architecture Framework (DODAF), (All Views (AV), Operational View (OV), System View (SV), and Technical View (TV)). The step also creates a transition plan that serves as a roadmap for implementing the results of the architected business priority. A transition plan tells a story about what has been accomplished, what the impacts of those accomplishments are, and what is planned for the future. It also focuses on systems and initiatives targeted to improve business capabilities. It contains details on program objectives, risks, milestones, costs, system migrations, and metrics, as well as other planning information.

**Figure 2: Fundamental Linkages between the DODAF Views**

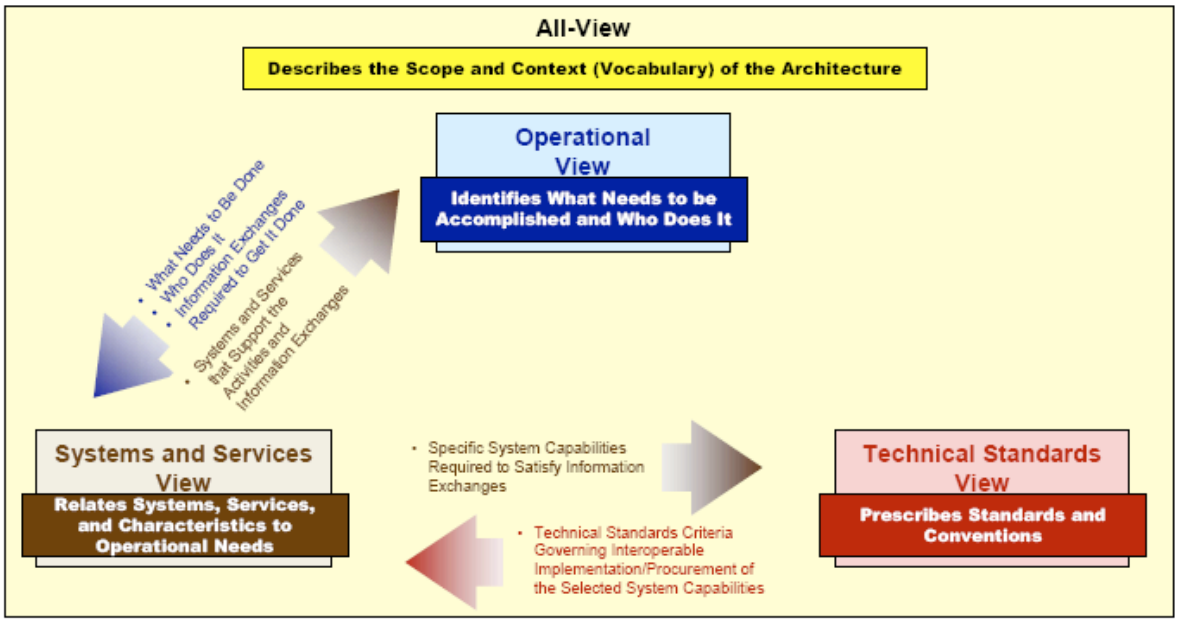



Figure 2: Fundamental Linkages between the DODAF Views represents the suite of DODAF product views available to drive business transformation**.**

**Operational View (OV)**

The OV captures the operational nodes, the tasks or activities performed, and the information that must be exchanged to accomplish DoD missions. It conveys the types of information exchanged, the frequency of exchange, which tasks and activities are supported by the information exchanges, and the nature of information exchanges.

**Systems View (SV)**

The SV captures system, service, and interconnection functionality providing for, or supporting, operational activities. DoD processes include warfighting, business, intelligence, and infrastructure functions. The SV system functions and services resources, and components may be linked to the architecture artifacts in the OV. These system functions and service resources support the operational activities, and facilitate the exchange of information among operational nodes.

**Technical Standards View (TV)**

The TV is the minimal set of rules governing the arrangement, interaction, and interdependence of system parts or elements. Its purpose is to ensure that a system satisfies a specified set of operational requirements. The TV provides the technical systems implementation guidelines upon which engineering specifications are based, common building blocks are established, and product lines are developed. It includes a collection of the technical standards, implementation conventions, standards options, rules, and criteria that can be organized into profile(s) that govern systems and system or service elements for a given architecture.

**All-Views (AV)**

There are some overarching aspects of an architecture that relate to all three views. These overarching aspects are captured in the AV products. The AV products provide information pertinent to the entire architecture but do not represent a distinct view of the architecture. AV products set the scope and context of the architecture. The scope includes the subject area and time frame for the architecture.

The setting in which the architecture exists comprises the interrelated conditions that compose the context for the architecture. These conditions include doctrine; tactics, techniques, and procedures (TTP); relevant goals and vision statements; concepts of operations (CONOPS); scenarios; and environmental conditions

Not all DODAF products are required to develop an enterprise architecture, and each product within the DODAF framework should be selected based on the objectives and implementation criteria of the business priority.. Table 2 lists the full suite of DODAF products. The first column indicates the view applicable to each product. The second column provides an alphanumeric reference identifier for each product. The third column gives the formal name of the product. The fourth column indicates if the product's definition and purpose were augmented to incorporate net-centric concepts. The fifth column captures the general nature of the product's content. The sequence of products in the table does not imply a sequence for developing the products.

## Table 2: Full suite of DODAF Products

| Applicable View | Framework Product | Framework Product Name | Net-Centric Extension | General Description |
|---|---|---|---|---|
| All View | AV-1 | Overview and Summary Information | ✓ | Scope, purpose, intended users, environment depicted, analytical findings |
| All View | AV-2 | Integrated Dictionary | ✓ | Architecture data repository with definitions of all terms used in all products |
| Operational | OV-1 | High-Level Operational Concept Graphic | ✓ | High-level graphical/textual description of operational concept |
| Operational | OV-2 | Operational Node Connectivity Description | ✓ | Operational nodes, connectivity, and information exchange need lines between nodes |
| Operational | OV-3 | Operational Information Exchange Matrix | ✓ | Information exchanged between nodes and the relevant attributes of that exchange |
| Operational | OV-4 | Organizational Relationships Chart | ✓ | Organizational, role, or other relationships among organizations |
| Operational | OV-5 | Operational Activity Model | ✓ | Capabilities, operational activities, relationships among activities, inputs, and outputs; overlays can show cost, performing nodes, or other pertinent information |
| Operational | OV-6a | Operational Rules Model | ✓ | One of three products used to describe operational activity—identifies business rules that constrain operation |
| Operational | OV-6b | Operational State Transition Description | ✓ | One of three products used to describe operational activity—identifies business process responses to events |
| Operational | OV-6c | Operational Event-Trace Description | ✓ | One of three products used to describe operational activity—traces actions in a scenario or sequence of events |
| Operational | OV-7 | Logical Data Model | ✓ | Documentation of the system data requirements and structural business process rules of the Operational View |
| Systems and Services | SV-1 | Systems Interface Description<br>Services Interface Description | ✓ | Identification of systems nodes, systems, system items, services, and service items and their interconnections, within and between nodes |
| Systems and Services | SV-2 | Systems Communications Description<br>Services Communications Description | ✓ | Systems nodes, systems, system items, services, and service items and their related communications lay-downs |
| Systems and Services | SV-3 | Systems-Systems Matrix<br>Services-Systems Matrix<br>Services-Services Matrix | ✓ | Relationships among systems and services in a given architecture; can be designed to show relationships of interest, e.g., system-type interfaces, planned vs. existing interfaces, etc. |
| Systems and Services | SV-4a | Systems Functionality Description | | Functions performed by systems and the system data flows among system functions |
| Systems and Services | SV-4b | Services Functionality Description | ✓ | Functions performed by services and the service data flow among service functions |
| Systems and Services | SV-5a | Operational Activity to Systems Function Traceability Matrix | | Mapping of system functions back to operational activities |
| Systems and Services | SV-5b | Operational Activity to Systems Traceability Matrix | | Mapping of systems back to capabilities or operational activities |
| Systems and Services | SV-5c | Operational Activity to Services Traceability Matrix | ✓ | Mapping of services back to operational activities |
| Systems and Services | SV-6 | Systems Data Exchange Matrix<br>Services Data Exchange Matrix | ✓ | Provides details of system or service data elements being exchanged between systems or services and the attributes of that exchange |

## Table 2: Full suite of DODAF Products (continued)

| Applicable View | Framework Product | Framework Product Name | Net-Centric Extension | General Description |
|---|---|---|---|---|
| Systems and Services | SV-7 | Systems Performance Parameters Matrix<br>Services Performance Parameters Matrix | ✓ | Performance characteristics of Systems and Services View elements for the appropriate time frame(s) |
| Systems and Services | SV-8 | Systems Evolution Description<br>Services Evolution Description | ✓ | Planned incremental steps toward migrating a suite of systems or services to a more efficient suite, or toward evolving a current system to a future implementation |
| Systems and Services | SV-9 | Systems Technology Forecast<br>Services Technology Forecast | ✓ | Emerging technologies and software/hardware products that are expected to be available in a given set of time frames and that will affect future development of the architecture |
| Systems and Services | SV-10a | Systems Rules Model<br>Services Rules Model | ✓ | One of three products used to describe system and service functionality—identifies constraints that are imposed on systems/services functionality due to some aspect of systems design or implementation |
| Systems and Services | SV-10b | Systems State Transition Description<br>Services State Transition Description | ✓ | One of three products used to describe system and service functionality—identifies responses of a system/service to events |
| Systems and Services | SV-10c | Systems Event-Trace Description<br>Services Event-Trace Description | ✓ | One of three products used to describe system or service functionality—identifies system/service-specific refinements of critical sequences of events described in the Operational View |
| Systems and Services | SV-11 | Physical Schema | ✓ | Physical implementation of the Logical Data Model entities, e.g., message formats, file structures, physical schema |
| Technical Standards | TV-1 | Technical Standards Profile | ✓ | Listing of standards that apply to Systems and Services View elements in a given architecture |
| Technical Standards | TV-2 | Technical Standards Forecast | | Description of emerging standards and potential impact on current Systems and Services View elements, within a set of time frames |

## Figure 3: Architecture Products by Use

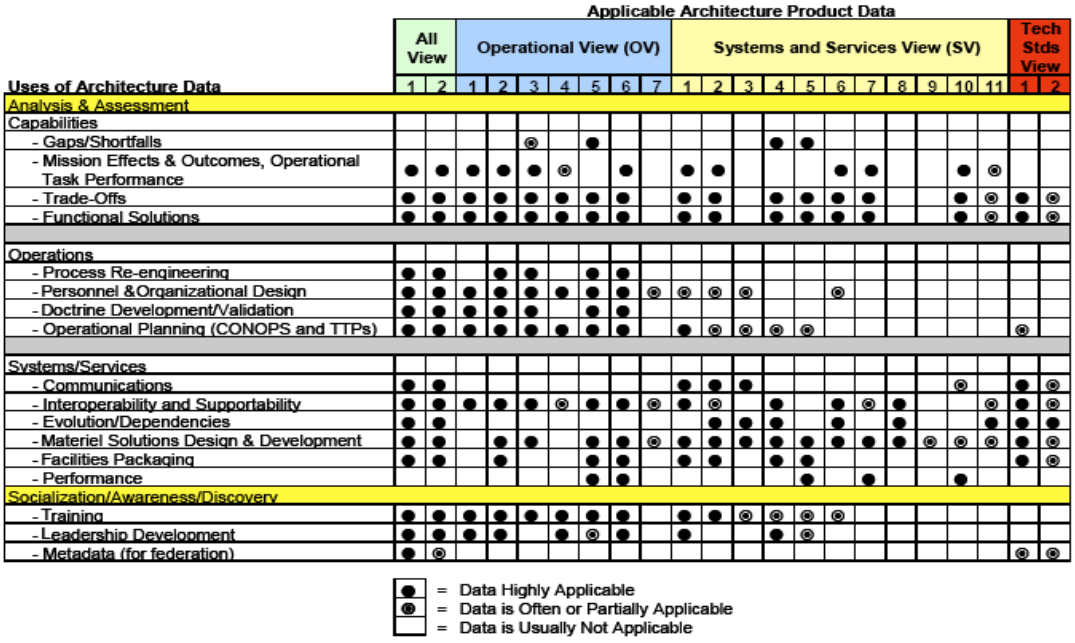


Figure 3: Architecture Products by Use identifies several categories for architecture usage and the related architecture product that provide pertinent input to that use. The listed items are not meant to be exhaustive or all inclusive, but are illustrated to provide a starting point for determining the architecture products needed to address a particular area. The architecture product appropriate for any individual use case is highly dependent on the specific situation, objectives, and scope of the effect.

The following legend is used in Figure 3:

- A solid black circle indicates that the architecture product(s) are highly applicable to the indicated use.
- A white circle with a center black dot indicates the architecture product(s) are often or partially applicable to the indicated use.
- A blank cell indicates that the architecture product(s) are usually not applicable

The list of uses is not exhaustive; instead, it is intended to provide initial insight into the use of the various architecture product data in supporting DoD processes.

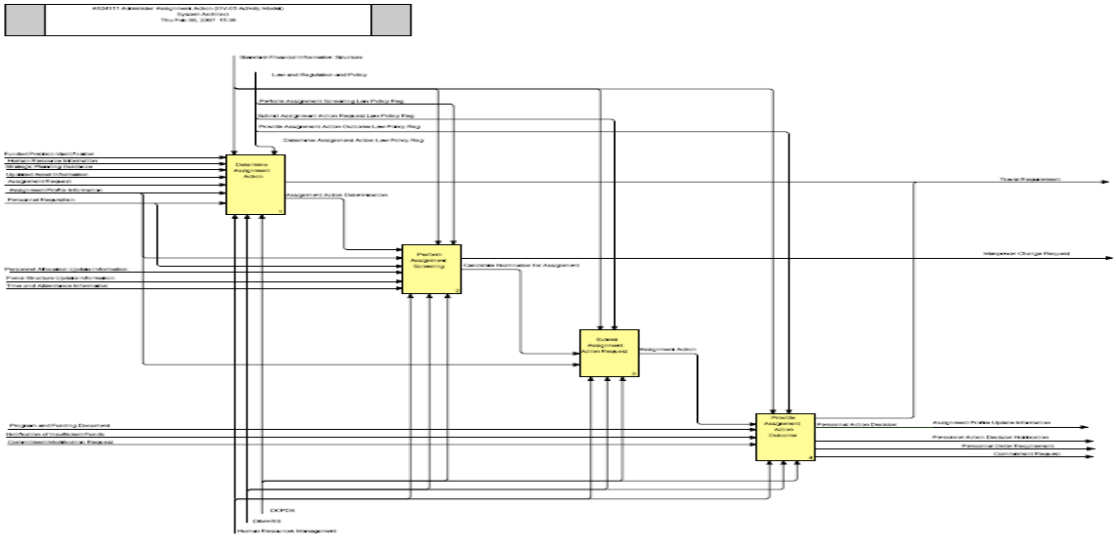
Appendix A has a list of DODAF products and accompanying descriptions used to drive business transformation. The 27 DODAF products are segregated into 3 categories:

1) Critical/Must have DODAF products
2) Beneficial DODAF products
3) Other DODAF products that may not be required (Based on the Transformation Objective)

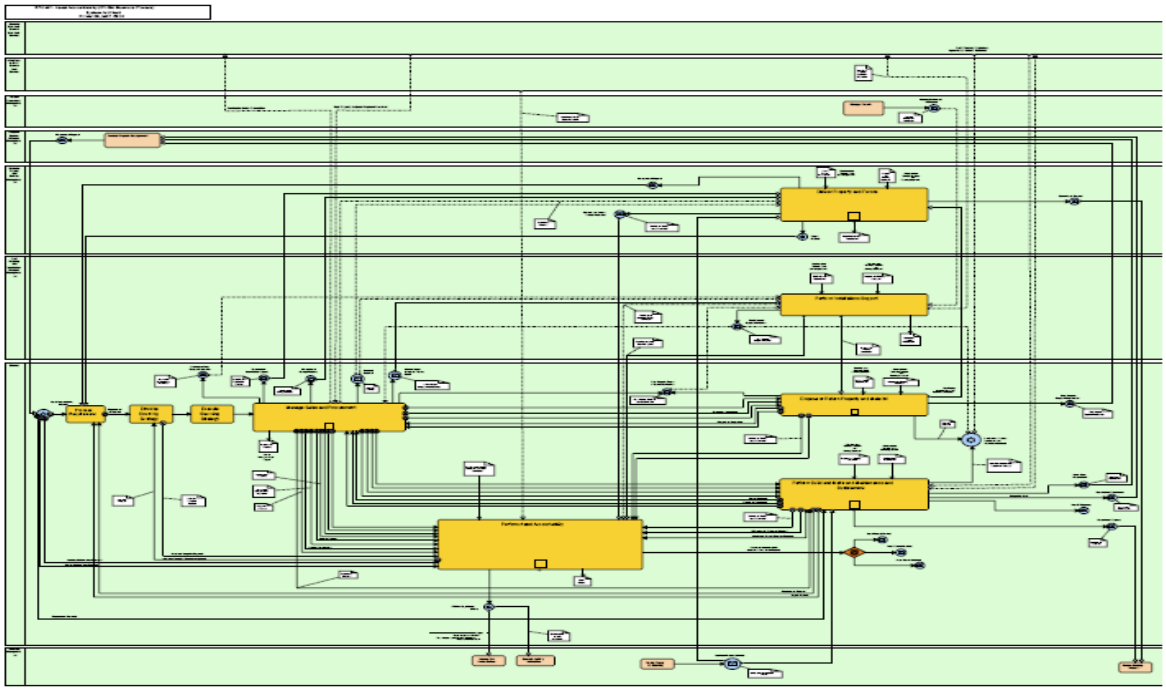
It is essential that in determining which DODAF products should be used to drive business transformation, the universe of DODAF products (27) must be examined in great detail, and the required set of products carefully selected based on the objectives and implementation criteria of the business priority.

**Figure 4: Graphic Example of some key Architecture Products**

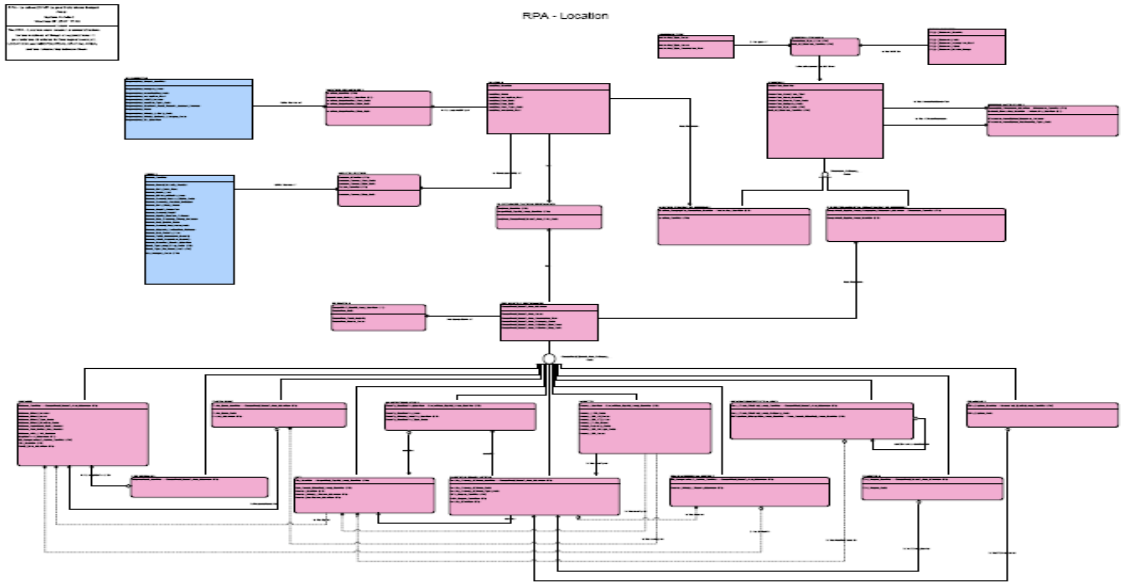
## Operational Activity Model OV-5



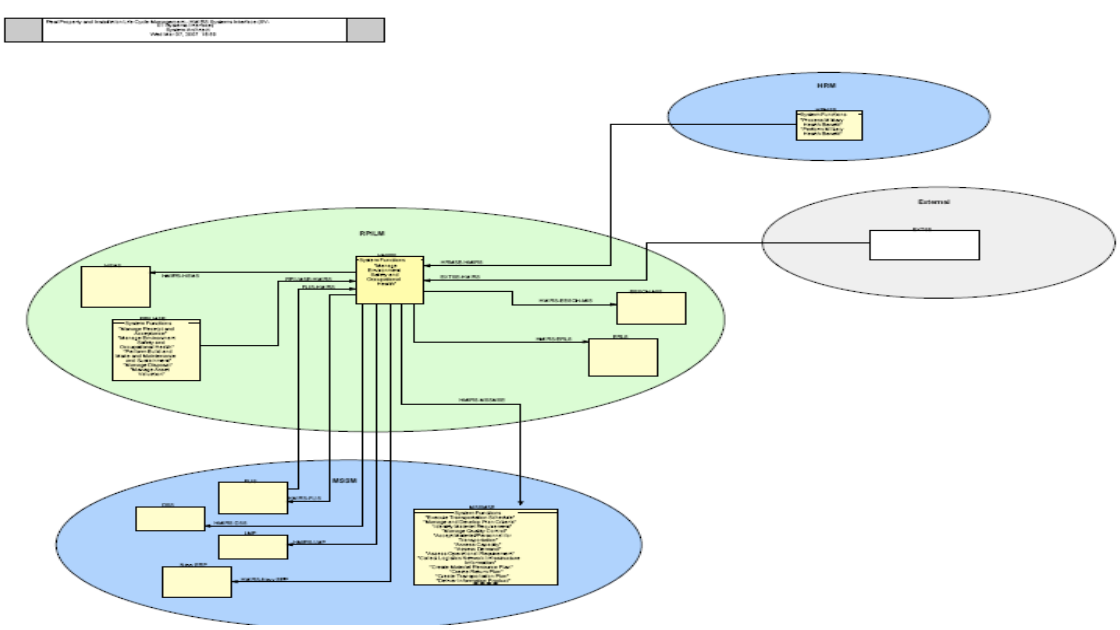
## Operational Event Trace Description OV-6c



**Logical Data Model OV-7**




**System Interface Description SV-1**




5. **Develop a Business Priority Requirements Document**. This document is created but not completed shortly after developing the initial architecture strategy (business priority definition, governance structure definition, scope identification etc are defined) and continues to evolve even after the architecture is designed.

6. It is the comprehensive documentation of selected business priority, rules, and requirements, processes, scenarios, and data elements in the language required to enable policy changes and assist the implementation of the enterprise architecture.

**6. Implement the Business Priority Results in accordance with the Transition Plan** comprises the implementation and monitoring of the business-priority improvements captured in the architecture and managed by the governance board, in accordance with the established transition plan, milestones, metrics, and other program implementation requirements. Implementation can be accomplished through pilots, on a project-by-project basis, or by a comprehensive enterprise-wide program. The implementation method is determined and managed by the governance board and key

business priority shareholders.

**Figure 5: Business Strategy/Architecture Relationship Diagram**

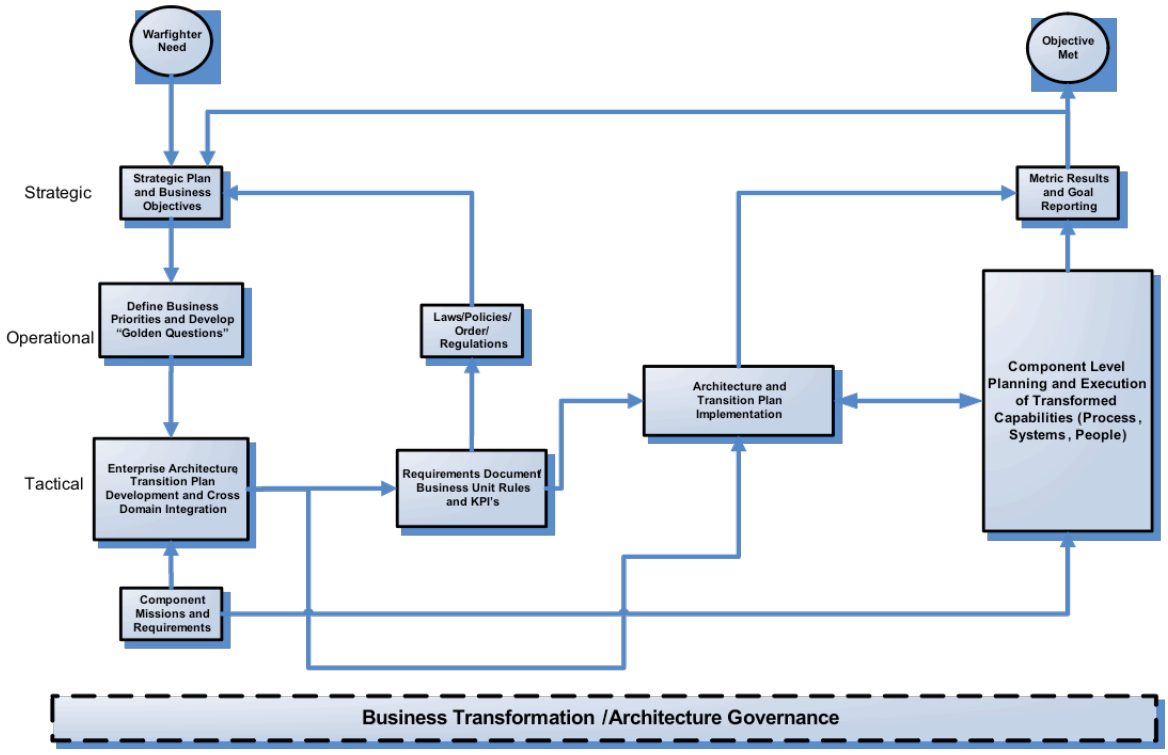



Figure 4: Business Strategy/Architecture Relationship Diagram illustrates a high-level intrinsic relationship of all the sub activities and actions required to develop an architecture.

It demonstrates the relationship between the business drivers; requirement (the need of the customer—in this case, the warfighter and the Component mission requirements); the strategic plan and management priorities; and the subsequent methods or tools used to address the business driver requirements (Enterprise architecture, and transition plan requirements documents). The diagram also demonstrates a key item in implementing the results of the transformation effort: the need to influence or change required laws, policies, and external requirements through the use of requirements documents. This also has a multiplier effect of influencing business objectives, metrics, and the reporting of goals.

The enterprise architecture is also used to drive the development of required metrics for the transformed business priority.

**Example/Scenario**

Below is a high level notion of how an effective enterprise architecture strategy may transform the Reliability Availability and Maintainability (RAM) Data and Metrics Program. A program designed to provide the Army with an understanding of the readiness risk for major combat systems, provide the Army with the ability to identify depot/industrial operations workload and the ability to define IO budget based on RAM factor not FMC.

Figure 5 on the next page is an illustration of the vision.

**Potential Issue:** The RAM metrics program does not deliver the required accuracy and reliability due to inconsistent data element names, definitions, structural assertions, accompanying business rules and business processes.

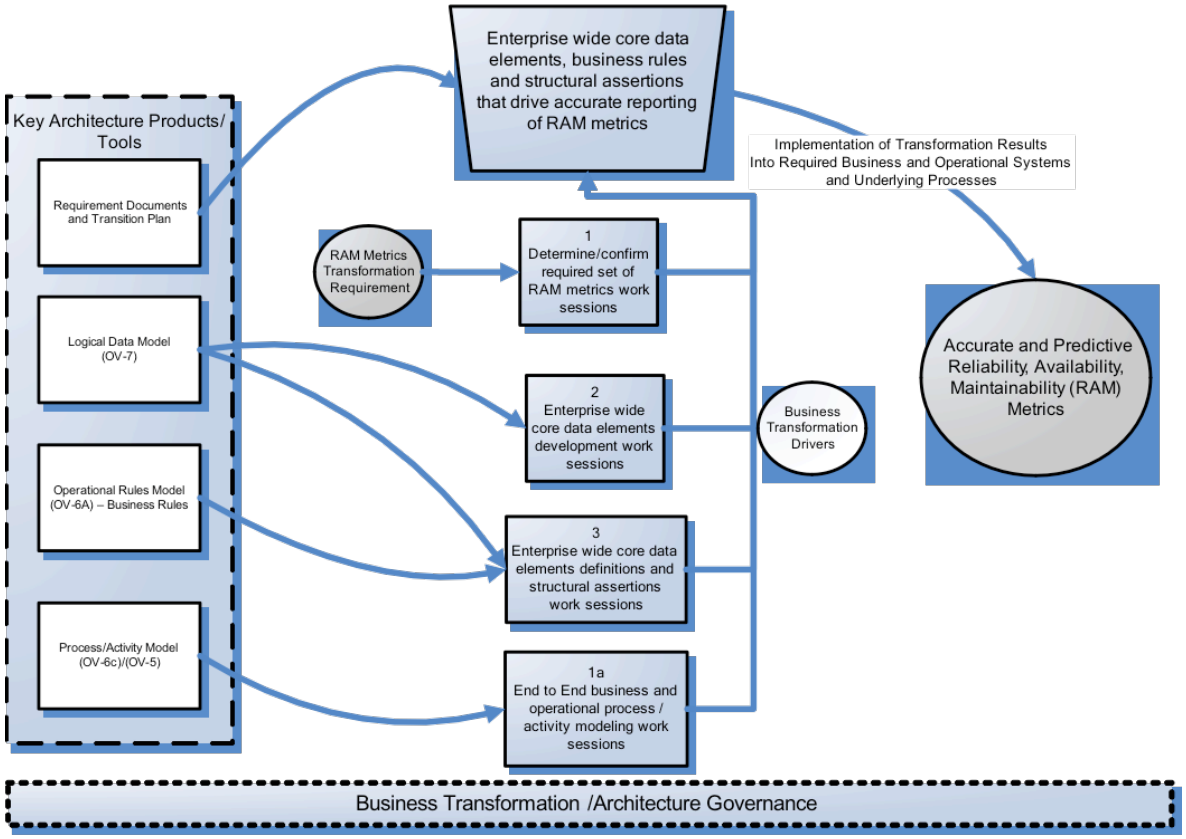
**High Level Tasks**

1. Develop a business transformation/architecture governance structure for the RAM metrics transformation task
2. Conduct shareholder work sessions to determine/confirm the required set of RAM metrics
3. Conduct shareholder work sessions to determine the set of core enterprise wide data elements required to drive the selected RAM metrics

4. Conduct shareholder work sessions to develop and define a consistent set core enterprise wide data elements, and create accompanying structural assertions and business rules
5. Conduct shareholder work sessions to develop an end-to-end activity or business process model that illustrates the use of the core data elements, business rules and metrics at each stage the business lifecycle
6. Develop a logical data model of the core enterprise wide data elements
7. Develop an business functional requirements document and transition/ implementation plan
8. Implement the transformation results into required business and operational systems, processes and organizations

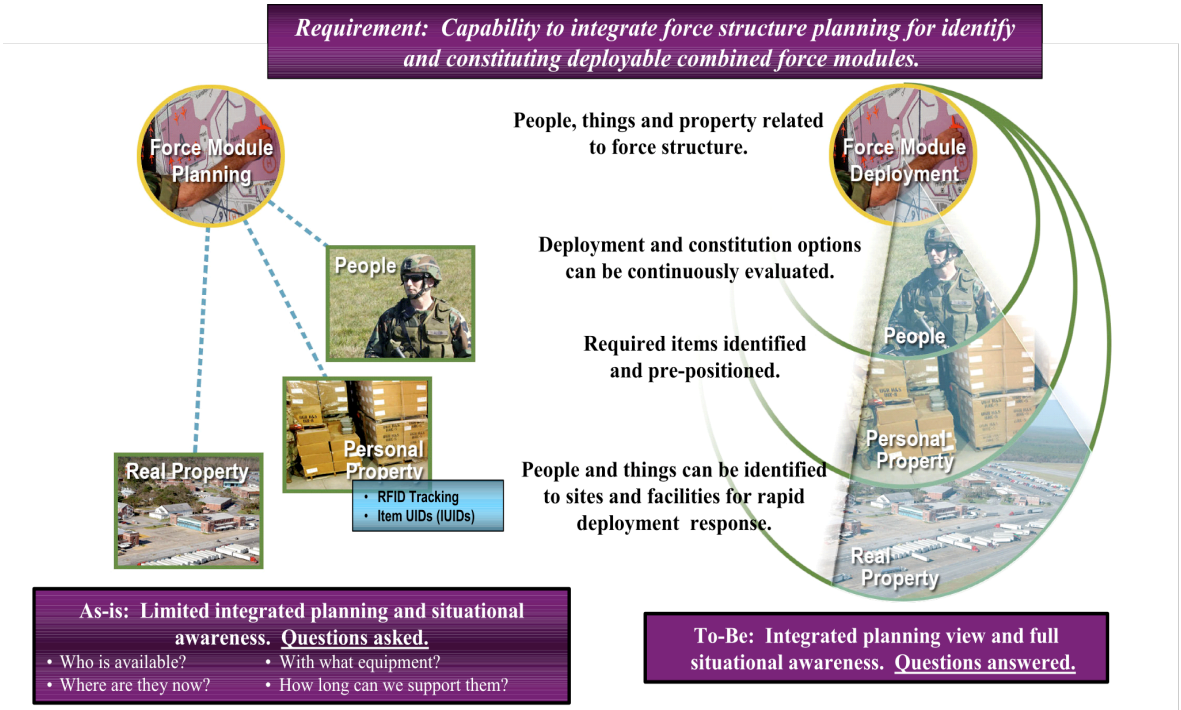
**Transformation Result:** Consistent, Accurate and Reliable RAM Metrics that enables Situational Awareness

**Figure 6: High level Notional Graphic of Reliability Availability and Maintainability (RAM) Data and Metrics Transformation**




The figure below is a graphical example of how a real and personal property business transformation effort coupled with an effective enterprise architecture strategy can enable Total Situational Awareness.

**Figure 7: Operational Concept of Real and Personal Property Situational Awareness**




## Conclusion and Recommendations

Situational awareness can be achieved by developing, implementing and managing a common operating framework that leverages common business processes, business rules, and data and system functions from a business transformation priority perspective, directed by a well developed enterprise architecture strategy and governed by a well defined disciplined accountable and empowered architecture or business transformation governance board. To improve the department's efforts to achieve business transformation and further enhance its efforts to improve the control and accountability over business system investments, it is recommended as a first step the Army develop a concept of operations that clearly addresses how its business systems and processes, individually and collectively, will provide the desired functionality to achieve business transformation; and develop a governance structure - policies, procedures, and processes to support the oversight and management of selected groupings of business systems that are intended to provide a specific capability or functionality.

Table 3: Draft High-level Enterprise Architecture Strategy Plan of Action and Milestones (POAM), illustrates suggested high-level tasks essential to developing and implementing an effective enterprise architecture. The draft POAM is not exhaustive, but represents some of the tasks already highlighted in this document that can be undertaken if the determination is made to improve situation awareness using the tool of enterprise architecture.

**Table 3: High-level Enterprise Architecture Strategy POAM**

1. **Enterprise Architecture (EA) Strategy Definition and Development**
    a. Create an EA Governance Team and Define the Enterprise
    b. Determine shareholders with the required authority to direct implementation of the EA Strategy
    c. Create EA Governance team
    d. Create EA Governance charter
    e. Create an EA/Transformation Scope and Execution Team
    f. Create and conduct briefing on developing and implementing an effective EA Strategy
    g. Conduct work sessions to define The Enterprise
    h. Develop preliminary CONOPS Document for the Defined Enterprise
    i. Work product - Initial CONOPS Document for EA Strategy
2. **Define Business Priority to be addressed by the EA**
    a. Conduct Shareholder EA Business Priority Visioning and Scoping Sessions
        i. Identify Business Priority to addressed by the EA
        ii. Analyze current Business Priority goals, issues and challenges
        iii. Review existing business rules for Business Priority
        iv. Review existing regulatory compliance requirements for Business Priority
        v. Identify key performance metrics for Business Priority
        vi. Select applicable leading practices for Business Priority

vii. Create business context scope diagram for selected Business Priority
viii. Document results of visioning and scoping sessions
ix. Update the initial CONOPS documents with Business Priority documentation
x. Work product - Updated CONOPS Document for EA Strategy

3. **Define EA tools and Products Required to Implement EA strategy**
    a. Determine EA Technical Products (DODAF) to be developed for Business Priority
    b. Develop framework and goals of the transition/implementation plan for the Business Priority
    c. "Develop the framework, outline and goals of the Business Priority requirements document"
    d. "Conduct Governance Team briefing (EA products, Transition plan and Requirements document)"
    e. Deliverable: Enterprise Architecture Strategy for Selected Business Priority

## Appendix A: List of DODAF Products and Descriptions

### A. Critical/Must have DODAF Products

1. **Overview and Summary Information (AV-1)** - This product is used to define and capture the scope, purpose, intended users, environment depicted and analytical findings.

   It provides executive-level summary information in a consistent form that allows quick reference and comparison among various architecture products. The AV-1 includes assumptions, constraints and limitations that may affect high-level decision processes involving the architecture.

   The AV-1 contains sufficient textual information to enable a reader understand the content and intent of the architecture. It serves a dual purpose. In the initial phase of architecture development, it serves as a planning guide. Upon completion of the architecture, it provides summary textual information concerning the architecture. It is usually developed using in a Microsoft Word template and contains information such as the architecture project identification (name, organization developing the architecture, assumptions and constraints, approval authority, date completed, level of effort and projected and actual Costs to develop the architecture)

2. **Integrated Dictionary (AV-2)** – The Integrated Dictionary contains definitions of terms used in the architecture. It consists of textual definitions in the form of a glossary, a repository of architecture data, their taxonomies, and their metadata (i.e., data about architecture data). It provides a central repository for a given architecture's data and metadata and enables the architecture products to stand alone, thus allowing them to be read and understood in context with a limited reference to external resources, Its value lies in unambiguous definitions and is considered by most architects to be one of the most valuable DODAF products.

3. **Operational Rules Model (OV6a)** – The Operational Rules Model specifies operational or business are constraints on an enterprise, a mission, an operation, a business, or an architecture. "Rules are statements tat define or constrain some aspect of the mission, or the architecture." The rules captured in the OV6a are operational rule (i.e. mission-oriented) not systems oriented.

It describes what the mission or business must do, or what it cannot do. It describes the rules under which the architecture or its nodes behave under specified conditions. Such rules can be expressed in a textual form.

2. **Operational Event-Trace Description (OV-6c) "Process Model"** - The Operational Event –Trace Description allows the tracing of actions in a scenario or critical sequence of events. It can be descried as a set of operational activities with sequence and timing attributes and includes the information needed to accomplish the activities and is valuable for moving to the next level of detail from the initial operational concepts. It allows tracing of actions in a scenario and can be used to describe the dynamic behavior of business processes or a mission/operational thread (a set of operational activities) with sequence and timing attributes of the activities and incuse the information needed to accomplish the activities.

3. **Logical Data Model (OV-7)** – The Logical Data Model describes the structure of an architecture domain's system data types and the structural business process rules that govern the system data. It provides a definition of architecture domain data types, their attributes or characteristics, and their interrelationships. The OV-7 is a key product that supports interoperability between architectures since these elements may be used by other organizations to determine system data compatibility. An OV-7 may be required to determine interoperability when there are shared system data syntax and semantics form the basis for greater degrees of information systems interoperability or when a shared database is the basis for integration and interoperability among business processes and at a lower level among systems.

4. **Operational Activity Model (OV-5)** – The Operational Activity Model describes the operations that are normally conducted in the course of achieving a mission or a business goal. It describes capabilities, operational activities (or tasks), input and output flows (I/O) between activities and I/O flows to/from activities that are outside the scope of the architecture. High-level operational activities should trace to (are a decomposition of) a Business Area, an Internal Line of Business, and /or a Business Sub Function. The OV-5 can be used to clearly delineate lines of responsibility for activities, uncover unnecessary operational activity redundancy, making decisions about streamlining, combining or omitting activities, defining or highlighting issues,

opportunities, or operational activities and their interactions that need further scrutiny and can provide the foundation for depicting activity or process sequencing. To a large extent, the OV5 provides the foundation for other OV products.

5. **Operational Activity to System Functional Traceability Matrix (SV-5)** - The Operational Activity to System Functional Traceability Matrix depicts the mapping of operational activities to system functions and thus identifies transformation of an operational need into a purposeful action performed by a system.

   This product allows decision makers and planners to quickly identify stove piped systems, redundant/duplicative systems, gaps in capability and possible future investment strategies all in accordance with the given time stamp given to the architecture. The SV-5 is an exact mapping between the Activities of the OV-5 and the system functions on the SV-4.

**B. Beneficial DODAF products**

**6.Operational Node Connectivity Description (OV-2)** – The Operational Node Connectivity Description graphically the operational nodes (or organizations) with need lines between those nodes that indicate a need to exchange information.

7. The product includes internal operational nodes (internal to the architecture) as well as external nodes.

8. **Operational Information Exchange Matrix (OV-3)** - The Operational Information Exchange Matrix details information exchanges and identifies "who exchanges what information, with whom, why the information is necessary, and how the information exchanges must occur.

9. **Systems Interface Description (SV-1)** – The Systems Interface Description depicts system nodes and systems that support operational nodes or activities. Interfaces that cross organizational boundaries (key interfaces) can also be identified in this product. Initial version of this product may also be developed, as needed, for use in system acquisition, as part of requirements specifications, and for determining system interoperability at a finer level of technical detail.

10. **Systems Functionality Description (SV-4)** - The Systems Functionality Description describes system functions and the flow of system data among system functions. It is the System View (SV) counterpart to the Operational Activity Model (OV-5).

    It illustrates a clear description of the necessary system data flows that are input (consumed) by and output (produced) by each system.

    It ensures that the functional connectivity is complete (i.e., that a system's required inputs are all satisfied), and ensures that the functional decomposition reaches an appropriate level of detail.

11. **Systems Data Exchange Matrix (SV-6)** - The Systems Data Exchange Matrix specifies the characteristics of the system data exchanged between systems. This product focuses on automated information exchanges that are implemented in systems. The focus of the SV-6 is on how the system data exchanges is implemented, in system – specific details covering periodicity, timeliness, throughput, size, information assurance and security characteristics of the exchange. In addition, the system data elements, their format and media type, accuracy, units of measurement, and system data standards are also described in the matrix.

12. **Technical Standards Profile (TV-1)** – The Technical Standards Profile consists of the set of systems standards rules that govern systems implementation and operation of the architecture. It describes each standard that is applicable to each system as it relates to each service standards that are applicable. It is concerned with delineating systems standards rule and conventions that apply to architecture implementations. When the standards profile is tied to the system elements to which they apply, the TV-1 serves as the bridge between the SV and TV

**C. Other DODAF products that may be required (Based on the Transformation Objective)**

**13.High – Level Operational Concept Graphic (OV-1)** The OV-1 describes a capability and highlights main operational nodes (see OV-2 definition) and interesting or unique aspects of operations. It provides a description of the interactions between the subject architecture and its environment, and between the architecture and external systems. A textual description accompanying the graphic is crucial. The

purpose of OV-1 is to provide a quick, high-level description of what the architecture is supposed to do, and how it is supposed to do it. This product can be used to orient and focus detailed discussions. Its main utility is as a facilitator of human communication, and it is intended for presentation to high-level decision makers.

The OV-1 consists of a graphical executive summary for a given architecture with accompanying text. The product identifies the mission/portfolio covered in the architecture and the viewpoint reflected in the architecture. OV-1 should convey, in simple terms, what the architecture is about and an idea of the players and operations involved. The content of OV-1 depends on the scope and intent of the architecture; in general, it describes the business processes or missions, high-level operations, organizations, and geographical distribution of assets. The product should frame the operational concept (what happens, who does what, in what order, to accomplish what goal) and highlight interactions to the environment and other external capabilities.

**14.Organizational Node Connectivity Description (OV-4)** The OV-4 illustrates the command structure or relationships (as opposed to relationships with respect to a business process flow) among human roles, organizations, or organization types that are the key players in an architecture. This product clarifies the various relationships that can exist between organizations and sub-organizations within the architecture and between internal and external organizations. The OV-4 illustrates the relationships among organizations or resources in an architecture. These relationships can include supervisory reporting, command and control relationships, and command-subordinate relationships. Another type of relationship is a coordination relationship between equals, where two organizations coordinate or collaborate without one having a supervisory or command relationship over the other. The product illustrates the relationships among organizations or organization types that are the key players in an architecture.

15. **Operational State Transition Description (OV-6b)**The OV-6b is a graphical method of describing how an operational node or activity responds to various events by changing its state. The diagram represents the sets of events to which the architecture will respond (by taking an action to move to a new state) as a function of

its current state. Each transition specifies an event and an action. The explicit sequencing of activities in response to external and internal events is not fully expressed in OV-5. An OV-6b can be used to describe the explicit sequencing of the operational activities. Alternatively, OV-6b can be used to reflect the explicit sequencing of actions internal to a single operational activity or the sequencing of operational activities with respect to a specific operational node.

16. **Systems Communication Description (SV-2)** The SV-2 depicts pertinent information about communications systems, communications links, and communications networks. SV-2 documents the kinds of communications media that support the systems and implements their interfaces as described in SV-1. Thus, SV-2 shows the communications details of SV-1 interfaces that automate aspects of the need lines represented in OV-2. The SV-2 can be used to document how interfaces (described in SV-1) are supported by physical media. This kind of communications media support information is critical in performing certain infrastructure and system acquisition decisions.

15. **Systems – Systems Matrix (SV-3)** The SV-3 provides detail on the interface characteristics described in SV-1 for the architecture, arranged in matrix form. The SV-3 allows a quick overview of all the interface characteristics presented in multiple SV-1 diagrams. The matrix form can support a rapid assessment of potential commonalities and redundancies (or, if fault-tolerance is desired, the lack of redundancies). The SV-3 can be organized in a number of ways (e.g., by domain, by operational mission phase) to emphasize the association of groups of system pairs in context with the architecture purpose. It can be a useful tool for managing the evolution of systems and system infrastructures, the insertion of new technologies/ functionality, and the redistribution of systems and processes in context with evolving operational requirements

16. **Systems Performance Parameters Matrix (SV-7)** The SV-7 product specifies the quantitative characteristics of systems and system hardware/software items, their interfaces (system data carried by the interface as well as communications link details that implement the interface), and their functions. It specifies the current performance parameters of each system, interface, or system function, and the expected or

required performance parameters at specified times in the future. Performance parameters include all technical performance characteristics of systems for which requirements can be developed and specification defined. The complete set of performance parameters may not be known at the early stages of architecture definition, so it should be expected that this product will be updated throughout the system's specification, design, development, testing, and possibly even its deployment and operations life-cycle phases. One of the primary purposes of SV-7 is to communicate which characteristics are considered most crucial for the successful achievement of the mission goals assigned to the system. These particular parameters can often be the deciding factors in acquisition and deployment decisions, and will figure strongly in systems analyses and simulations done to support the acquisition decision processes and system design refinement.

17. **Systems Evolution Matrix (SV-8)** The SV-8 captures evolution plans that describe how the system, or the architecture in which the system is embedded, will evolve over a lengthy period of time. Generally, the timeline milestones are critical for a successful understanding of the evolution timeline. The SV-8, when linked together with other evolution products such as SV-9 and TV-2, provides a clear definition of how the architecture and its systems are expected to evolve over time. In this manner, the product can be used as an architecture evolution project plan or transition plan. The SV-8 describes plans for *modernizing* system functions over time. Such efforts typically involve the characteristics of *evolution* (spreading in scope while increasing functionality and flexibility) or *migration* (incrementally creating a more streamlined, efficient, smaller, and cheaper suite) and will often combine the two thrusts

18. **Systems Technology Forecast (SV-9)** The SV-9 defines the underlying current and expected supporting technologies that have been targeted using standard forecasting methods. Expected supporting technologies are those that can be reasonably forecast given the current state of technology and expected improvements. New technologies should be tied to specific time periods, which can correlate against the time periods used in SV-8 milestones. The SV-9 provides a summary of emerging technologies that impact the architecture and its existing planned systems. The focus should be on the

supporting technologies that may most affect the capabilities of the architecture or its systems.

The SV-9 provides a detailed description of emerging technologies and specific hardware and software products. It contains predictions about the availability of emerging technological capabilities and about industry trends in specific time periods. The specific time periods selected (e.g., 6-month, 12-month, 18-month intervals) and the technologies being tracked should be coordinated with architecture transition plans

19. **Systems Rules Model (SV–10a)** The SV-10a are constraints on an architecture, on a system(s), or system hardware/software item(s), and/or on a system function(s). While other SV products (e.g., SV-1, SV-2, SV-4, SV-11) describe the static structure of the Systems and Services View (i.e.,what the systems can do), they do not describe, for the most part, what the systems *must* do, or what it *cannot* do. At the systems or system hardware/software items level, SV-10a describes the rules under which the architecture or its systems behave under specified conditions. At lower levels of decomposition, it may consist of rules that specify the pre- and post-conditions of system 5-71 functions. Such rules can be expressed in a textual form, for example, "If (these conditions) exist, and (this event) occurs, then (perform these actions)." The purpose of this product is to allow understanding of behavioral rules and constraints imposed on systems and system functions.

20. **Systems State Transition Description (SV -10b)** The SV-10b is a graphical method of describing a system (or system function) response to various events by changing its state. The diagram basically represents the sets of events to which the systems in the architecture will respond (by taking an action to move to a new state) as a function of its current state. Each transition specifies an event and an action. The explicit time sequencing of system functions in response to external and internal events is not fully expressed in SV-4. SV-10b can be used to describe the explicit sequencing of the system functions. Alternatively, SV-10b can be used to reflect explicit sequencing of the actions internal to a single system function, or the sequencing of system functions with respect to a specific system.

Basically, statechart diagrams can be unambiguously converted to structured textual rules that specify timing aspects of systems events and the responses to these events, with no loss of meaning. However, the graphical form of the state diagrams can often allow quick analysis of the completeness of the rule set, and detection of dead ends or missing conditions. These errors, if not detected early during the systems analysis phase, can often lead to serious behavioral errors in fielded systems, or to expensive correction efforts.

21. **Systems Event Trace Description (SV- 10c)** The SV-10c provides a time-ordered examination of the system data elements exchanged between participating systems (external and internal), system functions, or human roles as a result of a particular scenario. Each event-trace diagram should have an accompanying description that defines the particular scenario or situation. SV-10c in the Systems and Services View may reflect system-specific aspects or refinements of critical sequences of events described in the Operational View.

    The SV-10c products are valuable for moving to the next level of detail from the initial systems design, to help define a sequence of functions and system data interfaces, and to ensure that each participating system, system function, or human role has the necessary information it needs, at the right time, in order to perform its assigned functionality.

22. **Physical Schema (SV-11)** The SV-11 is one of the architecture products closest to actual system design in the Framework. The product defines the structure of the various kinds of system data that are utilized by the systems in the architecture. The product serves several purposes, including 1) providing as much detail as possible on the system data elements exchanged between systems, thus reducing the risk of interoperability errors, and 2) providing system data structures for use in the system design process, if necessary. The SV-11 is an implementation-oriented data model that is used in the Systems and Services View to describe how the information requirements represented in OV-7 are actually implemented. Entities represent 1) system data flows in SV-4, 2) system data elements specified in SV-6, 3) triggering events in SV-10b, and/or 4) events in SV-10c

23. **Technical Standards Forecast (TV-2)** The TV-2 contains expected changes in technology-related standards and conventions, which are documented in the TV-1 product. The forecast for evolutionary changes in the standards should be correlated against the time periods as mentioned in the SV-8 and SV-9 products. One of the prime purposes of this product is to identify critical technology standards, their fragility, and the impact of these standards on the future development and maintainability of the architecture and its constituent elements. The TV-2 lists emerging or evolving technology standards relevant to the systems covered by the architecture. It contains predictions about the availability of emerging standards, and relates these predictions to the Systems and Services View elements and the time periods that are listed in the SV-8 and SV-9.