# Impact of Joint Technical Architecture On Navy Acquisition

## Commonality — Easy to Talk About, Difficult to Achieve

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Today's battlespace is a complex and dynamic environment requiring increased levels of data and information processing in order to make timely and accurate operations planning and combat decisions.

To improve and facilitate the ability of Department of Defense (DoD) systems to support joint and combined operations, in August 1996 the Under Secretary of Defense for Acquisition and Technology (USD[A&T]) and the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD[$C^3$I]) mandated Joint Technical Architecture (JTA) – a minimum set of standards and guidelines for the acquisition of all DoD Command, Control, Communications, Computer, and Intelligence ($C^4$I) systems and their interfaces.[1]

### Commonality

Although commonality among programs is hardly a new concept, it is difficult to achieve, especially from a joint perspective. Project designers with no knowledge of other systems with similar capabilities tend to "reinvent the wheel," which is not only expensive but potentially detrimental to operational commonality. (In other words, "my radio can't talk to your radio.")

The JTA attempts to apply sound technical and business practices in an area that continues to experience exponential growth. It is critical that you, the Navy program manager (PM), be aware that the JTA exists, and how it will affect your program, large or small. Ultimately, you are responsible for ensuring your program complies with JTA requirements.

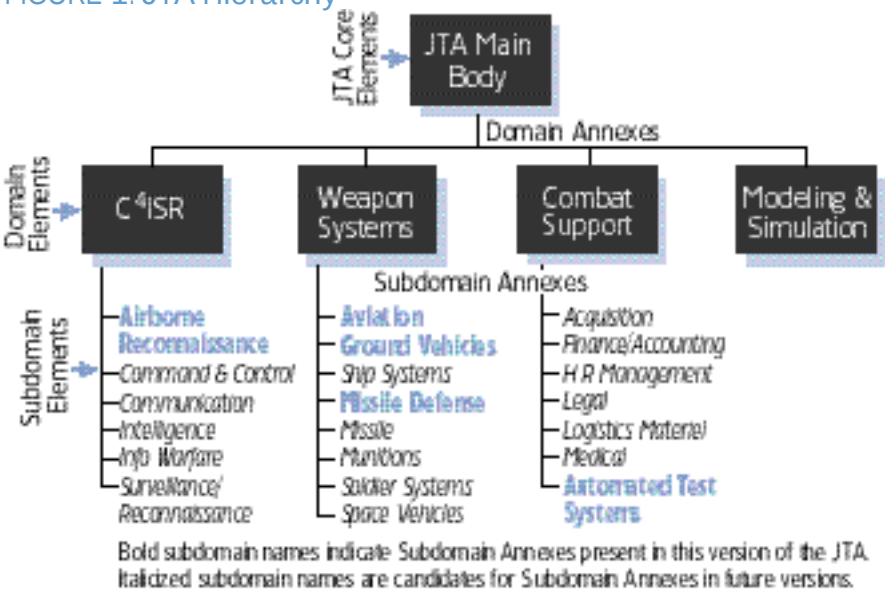
### Where Did JTA Come From?

The JTA resulted from the ASD($C^3$I) tasking Service and Agency principals involved in developing $C^4$I systems to establish a unifying technical architecture for all future DoD $C^4$I acquisitions so that new systems would be joint and interoperable, and existing systems would have a baseline to move toward interoperability.[2]

A Joint Technical Architecture Working Group, chaired by ASD($C^3$I)/$C^4$I Integration Support Activity (CISA) was formed, and subsequently enhanced in 1997 under the direction of a Technical Architecture Steering Group, co-chaired by the ASD CISA and USD(A&T) Open Systems Joint Task Force.

Department of the Navy interests are represented by Space and Naval Warfare

FIGURE 1. JTA Hierarchy

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Systems Command 051-1 Architectures Division, the office responsible for the development and coordination of the Navy JTA Process. The JTA replaced the standards' guidance for DoD $C^4I$ applicable system acquisitions delineated in *Technical Architecture for Information Management (TAFIM).*

The JTA contains performance-based, primarily commercial, information processing, transfer, content, format and security standards that specify the logical $C^2$ interfaces and the $C^4I$ systems that directly support them.

Although initially focused on information technology (IT), the JTA concept will eventually be applied to promote joint interoperability in other technological areas, such as electrical power, electronic backplane bus standards, and hydraulic connectors.[3]

## JTA Structure

The JTA is organized into a main body, followed by domain annexes, subdomain annexes, and a set of appendices.

The main body identifies the "core" set of JTA elements, including service areas, interfaces, and standards. Except for the overview, each section of the main body is divided into three subsections as follows:

- Introduction – Defines the purpose and scope of the subsection and provides background descriptions and definitions that are unique to the section.
- Mandates – Identifies mandatory standards, profiles, and practices that are applicable to the domains covered by the JTA.
- Emerging Standards – Provides an abbreviated description of "candidates" to add to or to replace present standards. This subsection helps PMs determine technological requirements that likely are to change in the near term (within three years), thereby enabling them to identify areas in which "upgradability" should be a concern.

Emerging standards may be implemented, but should not be used in lieu of a mandated standard. However, the expectation is that as emerging standards are implemented, they will be elevated to mandatory status.

## Information Technology (IT) Standards

Section 2, also called the JTA core or main body, addresses commercial and government standards common to most DoD IT, grouped into the following categories: information processing standards; information transfer standards; information modeling, metadata, and information exchange standards; human-computer interface standards; and information systems security standards. Each category addresses a set of functions common to most DoD IT systems.

## Domain and Subdomain Annexes

JTA domain and subdomain annexes use the common service areas, interfaces, and standards supporting interoperability across systems within the domain or subdomain. In addition to the elements in the JTA core, the JTA domain annexes contain domain-specific JTA elements applicable within a specified family of systems to further support interoperability within all systems in the domain.

Domains may be composed of multiple subdomains. Subdomains represent the decomposition of a domain (referred to as the subdomain's parent domain) into a subset of related systems, exploiting additional commonalities and addressing variances within the domain.

Subdomain annexes also contain domain-specific JTA elements applicable within a specified family of systems to further support interoperability within all systems in the subdomain, in addition to those in the JTA core and the parent domain annex.

Figure 1 shows the currently defined JTA core, domain annexes, and subdomain annexes and their relationships. Domain annexes include:

- Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
- Combat Support
- Weapon Systems
- Modeling and Simulation

Subdomain elements include:

- Airborne Reconnaissance
- Automated Test Systems
- Missile Defense
- Ground Vehicles
- Aviation

The goal is to build on these annexes by incorporating the requirements of additional domains and subdomains. Each annex includes an introduction clearly specifying the purpose, scope, description of the domain, and background of the annex.

In addition, each annex maps its standards and guidance to the JTA structure, with exceptions, additions, and extensions as necessary. Annexes generally use the technical reference model, but may include a different or expanded model. They may also address emerging standards that are of interest to the domain.

Appendices provide supporting information that is not mainline to the purpose of the document, but facilitates its use, such as how to get a copy of mandated standards, and available links to home pages of various standards organizations.

Supplements address technical architecture exceptions, additions, and extensions for specific DoD organizational entities. Each supplement has an introduction clearly specifying its purpose, scope, and background. Supplements identify mandated standards within a framework that can be mapped to the JTA structure and address emerging standards that are of interest to the organization. Supplements may address JTA annexes as well as standards and guidance from the body of the JTA.

The JTA is mandated for all DoD Services and Agencies; supplements are mandated only for the specific Service or Agency preparing them. Service or Agency supplements are, however, sub-

ject to joint review to ensure the supplements are within the scope of the JTA and are consistent with the approved mandates.

The JTA always takes precedence over supplements except where a supplement documents and justifies an exception to a JTA mandate. DoD Service or Agency supplements may be published with or separate from the JTA.

## How JTA Applies to Navy Acquisition and Modernization

JTA applies to all systems that produce, use, or exchange information and is mandatory for emerging systems and systems upgrades. It also applies to all C4I systems and the interfaces of other key C4I system assets, such as weapon systems, sensors, and office automation systems. In addition, the JTA applies to C4I Advanced Concept Technology Demonstrations (ACTD) and other activities that lead directly to the fielding of operational C4I capabilities.

All emerging Navy C4I systems and system upgrades are required to implement the JTA.[4] C4I systems with Milestone II approval must implement the JTA at the earliest opportunity considering cost, schedule, and performance impact. The definition and implementation of new C4I systems and system upgrades are accomplished through the in-place Department of Defense-Department of Navy (DoD-DoN) acquisition process.

The Navy's strategy for evolving to the JTA-compliant C4I system (shown in Figure 2) is documented in *Copernicus... Forward Annual Naval C4I Implementation Guidance (CFANCIG).*

A core element of this strategy is to field standards-based applications and resources. Although not explicitly stated in the first *CFANCIG* version, the standards-based applications and resources being fielded must comply with the JTA. Through incremental fielding of JTA-compliant improvements, baseline C4I systems evolve to the fully JTA-compliant, objective C4I system.

Figure 3 depicts a summary-level timeline for Naval C4I implementation that uses four overlapping five-year phases for C4I system implementation. Staggered phasing, which aligns with Program Objective Memoranda 96, 98, 00, and 02 accommodates incrementally establishing system engineering activities, such as requirements, security architecture, and introducing system capabilities.

Section 7 of the *CFANCIG* document describes each of the four implementation phases and its focus:

Phase 1 – Establishes the networking foundation for the objective C4I system.

Phase 2 – Adds communications capacity; enhances wide area networking; implements fully joint interoperable messaging; transitions software applications to a more unified Common Operating Environment (COE); initiates the integration of Command, Control, and Intelligence ($C^2I$) and Combat Direction Support (CDS) functions; implements shared data environment with standard data elements; integrates simulation and modeling with C4I systems; installs computer-based secure network servers; embeds Information Warfare (IW) into C4I architecture; and integrates new $C^2$ functions into the Fleet.

Phase 3 – Adds communications capacity; introduces a high-capacity backbone to Naval ship and submarine platforms; implements an integrated C4I equipment suite; introduces 3-D $C^3I$ applications; and proliferates knowledge-based training and simulation.

Phase 4 – Integrates C4I systems with weapons and sensors; adds virtual reality to applications; and implements intelligent, programmable front-end sensors.

## Compliance

To achieve and validate JTA compliance, the requirements of Compatibility, Interoperability, and Integration (CII) will be reviewed as part of the phased update of all documentation, processes, and procedures currently required by the existing acquisition process and applicable DoD/DoN documentation.

The process of defining and validating requirements requires the coordinated use of a Mission Needs Statement (MNS), an Operational Requirements Document (ORD), a System Specification, and a Test and Evaluation Master Plan (TEMP) to ensure accurate system identification. Complying with current industry standards requires, at a minimum, the following progressive steps:

- Select the intended standards approach.
- List and identify applicable interface standards.
- Develop a standards profile(s).
- Demonstrate and assess system's CII in its respective Joint Mission Area .

FIGURE 2. Navy's Strategy for Evolving to Objective C4I System

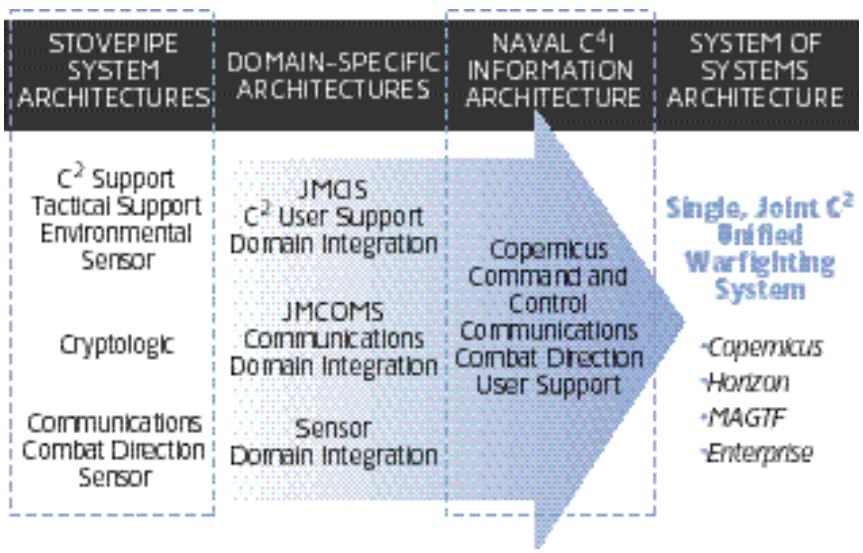
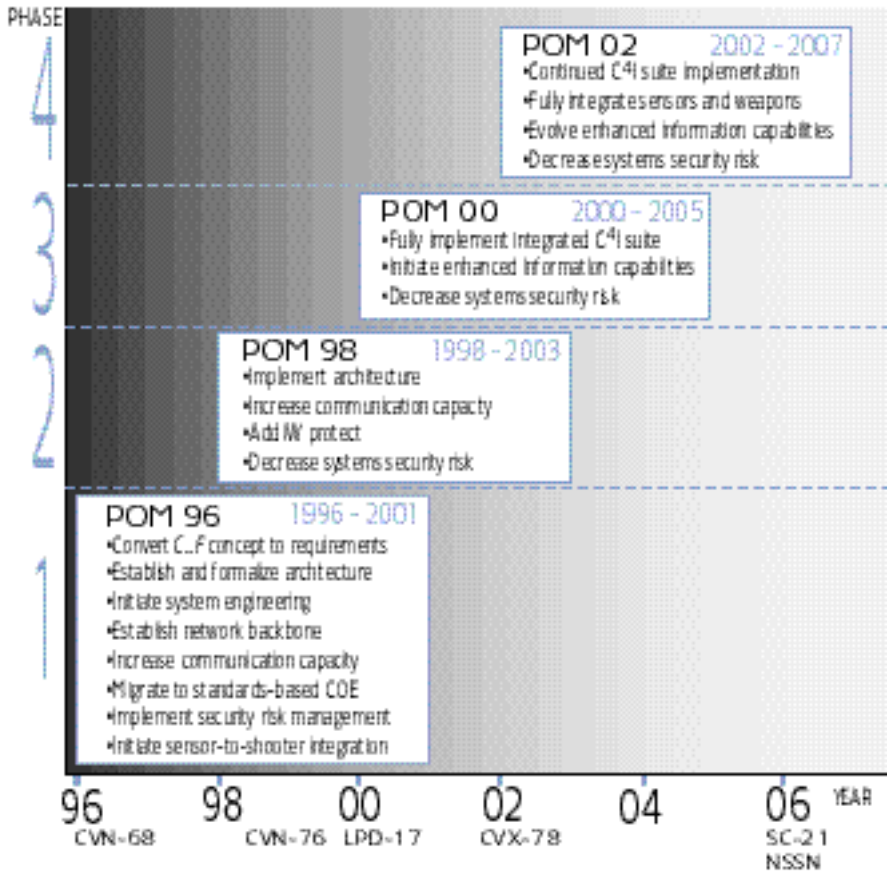


FIGURE 3. Phasing Toward Objective C4I System




JTA Compliance — Approval Process

JTA compliance is attained by using documentation, processes, and procedures already required by the existing acquisition process. Figure 4 shows an overview of the process, responsible activities, and data requirements with respect to the approval of the MNS, ORD, System Specification, and TEMP.

Before approving any C4I capability, the Director, J-6, and the Joint Staff must certify the need as identified by the MNS, the operational requirement as defined in the ORD, and conformance to joint C4I policy as it pertains to doctrine, interoperability, architectural integrity, and joint potential.

Figure 4 shows how JTA requirements are addressed in the program requirements and acquisition documentation phase. JTA requirements are reviewed and, if necessary, modified throughout the entire acquisition process. Applicable documentation is also updated to reflect changes and modifications to the baseline system requirements. Deviations from JTA requirements are reviewed at each milestone decision point. Recertification of the JTA requirements, as they are reflected in the MNS/ORD, is accomplished, as necessary.

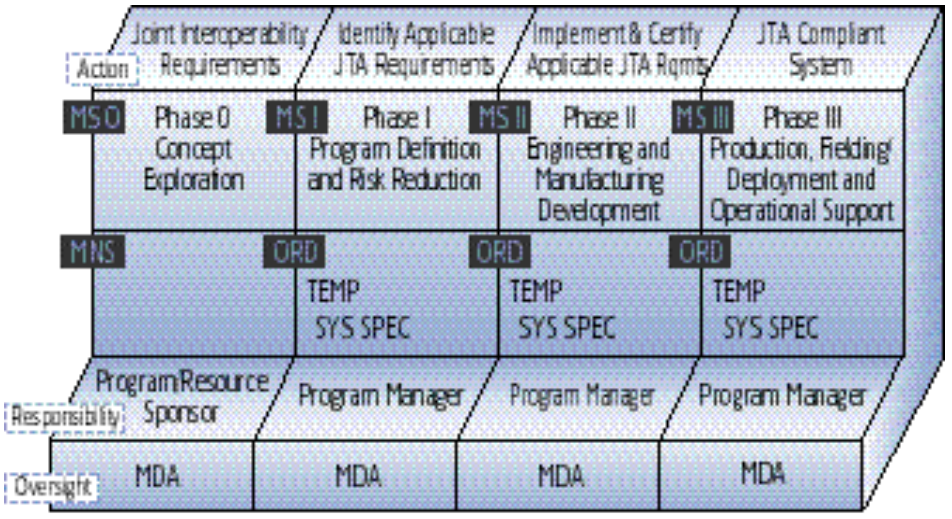
Roles and Responsibilities

The primary roles and responsibilities of those DoN components involved in the JTA compliance approval process follow:

- Program Managers (PM) are responsible for the identification and implementation of applicable JTA requirements for those programs for which they have acquisition responsibility. PMs identify, plan, and budget the necessary resources to support JTA implementation efforts, including compatibility, interoperability, and integration testing and evaluation of systems and equipment.
- Systems Command (SYSCOM) Commanders ensure that PMs have identified and implemented applicable JTA requirements.
- Program Executive Officers (PEO) review and assess assigned programs, and act as milestone decision authorities for certain programs. PEOs ensure that PMs have identified and implemented applicable JTA requirements.
- Milestone Decision Authority (MDA) serves as the decision authority for assigned programs and ensures that DoN programs have identified and implemented applicable JTA requirements. The Assistant Secretary of the Navy for Research, Development and Acquisition (ASN[RD&A]) is the DoN MDA for Acquisition Category (ACAT) IC, II, and III level programs. SYSCOM Commanders, PEOs, and Direct Reporting Program Managers (DRPM) act as MDAs for ACAT IV programs, as assigned by ASN(RD&A).

  Current ACAT/MDA assignments are part of the Acquisition Program Database maintained and issued by ASN(RD&A). The Milestone Decision Authorities report JTA implementation status to the Deputy Assistant Secretary of the Navy for C4I/Electronic Warfare/Space, who consolidates the information for the Service Acquisition Executive.
- Service Acquisition Executive (SAE) delegates milestone decision authority to the appropriate level and ensures that DoN programs have identified and implemented applicable JTA requirements. The SAE for the Navy is the ASN(RD&A).
- Program/Resource Sponsor acts as the user representative, providing explicit direction with regard to joint interoperability, mission need, and operational requirements generation (MNS/ORD) and changes; programming the funds necessary for proper execution; defining the thresholds and parameters for operational testing; preparing the necessary program documentation; and keeping the Chief of Naval Operations informed on issues and the need for programmatic changes.
- Chief of Naval Operations (CNO) serves as the Navy ACAT I program MNS and ORD validation and approval authority whenever the Joint Requirements and Oversight Council (JROC) does not retain the authority.

FIGURE 4. JTA Milestone Requirements




- Incorporates JTA compliance/validation into DoN acquisition process
- Systems past Milestone II will implement the JTA at earliest opportunity considering cost, performance, and schedule.

The Deputy Chief of Naval Operations (Resources, Warfare Requirements, and Assessments) (CNO [N8]) reviews, validates, and prioritizes MNSs and ORDs for Navy ACAT II-IV level programs. The CNO (N8) (ACAT IC-IV) validates Acquisition Program Baseline Key Performance Parameters extracted from the ORD and serves as the principal interface between CNO and ASN(RD&A) on matters relating to Test and Evaluation (T&E).

The CNO reviews or endorses ACAT I-III TEMPs and also identifies, defines, validates, and prioritizes mission requirements; programs the appropriate resources through the Planning, Programming, and Budgeting System (PPBS); and coordinates the T&E process.

- Commander, Operational Test and Evaluation Force (COMOPTEVFOR) is responsible for independent operational T&E for the Navy, assisting the PM in developing inputs to applicable sections of the TEMP and reviewing or endorsing ACAT IV TEMPs.
- Force Warfare Systems Engineering Board (FWSEB) coordinates the technical implementation of transition to open systems in the Automated Information Systems, $C^3I$, and weapon systems domains. The FWSEB coordinates standards with DoD and other Services, adjudicates standards differences, as needed, and recommends additions and changes to the DoN Center For Architecture and Standards library.

## Are You Compliant? Do You Need To Be?

The 1996 memorandum from the USD(A&T) and ASD($C^3I$) mandated that the JTA (Version 1.0) was effective immediately for all emerging systems and systems upgrades. Services, Agencies, and other Components were given 90 days to provide a plan outlining their approach for implementing the JTA.

The Navy issued its response in January 1997, and joint working groups were formed to refine JTA guidance, resulting in JTA Version 2.0, published May 26, 1998. However, almost two years after the initial USD(A&T) memo, Navy PMs, who shoulder the ultimate responsibility to make it happen, still seem to have limited knowledge about the JTA.

## From the Authors

"How will JTA affect my program?" Good question. JTA has the potential to reduce life-cycle cost. The intent is not to require compliance at any cost, but to make the smart choice, taking into account the status of each program. While JTA may not apply in every case, you need to do an analysis to determine if the long-term benefits might outweigh the short-term pain. Programs that are just beginning likely would not present a difficult decision. The tough calls have to be made on programs that have recently committed to a specific design and that may not comply with mandated standards.

Perhaps the most important question should be whether you can afford not to play, especially from a technological standpoint. With JTA inevitably the wave of the future, most programs can expect to become assimilated at some point.

From a big-picture perspective, all military forces will need JTA for mutual long-term survival. In a few years, everyone will be connected. Where are the blue forces, the red forces? If your platform is not part of that network and you don't have a common picture of the battlespace, you are going to be at a distinct disadvantage.

If this article didn't answer all your questions about JTA, more information may be obtained through two Web sites: http://www.jta.itsi.disa.mil/ for the "DoD Joint Technical Architecture" and http://www.csc.com/jta/ for the "Navy Implementation Plan for the DoD Joint Technical Architecture."

## ENDNOTES

1. Memorandum, U.S. Assistant Secretary of Defense for Command, Control, Communications, and Intelligence and Under Secretary of Defense for Acquisition and Technology, Aug. 22, 1996, Subject: "Implementation of the DoD Joint Technical Architecture."

2. U.S. Department of Defense, Joint Technical Architecture (Version 2), May 26, 1998.

3. An electronic backplane bus is the electronic medium used to interconnect a number of circuit boards or electronic assemblies.

4. U.S. Department of the Navy, Implementation Plan for the Department of Defense, Joint Technical Architecture, Jan. 17, 1997.