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Naval OA Document Review: Initial NCOIC Response

This document is a summary of comments from individual NCOIC member companies and represents the viewpoints of those member companies plus that of the review group in general. This document has not been voted upon by the Consortium membership and does not represent an official position of the NCOIC.

This document is being submitted to the U.S. Navy in response to an invitation to review the Naval OA documents.

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Approved for Release NCOIC Nov 05-109

23 August 2005

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Published by the Network Centric Operations Industry Consortium, August 2005

Comments relating to the material contained in this document may be submitted to the NCOIC Open Standards Working Group through us-openstandards-chair@us.ncoic.org

Network Centric Operations Industry Consortium

Industry working together with our customers to provide a net-centric environment where all classes of information systems interoperate by integrating existing and emerging open standards into a common evolving global framework that employs a common set of principles and processes.

More information is available at www.ncoic.org.

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Introduction to this Review

Foreword

The contributors and editors of this review acknowledge the tremendous intellectual effort, vigorous debate, and hard work that was devoted to the creation of the U.S. Navy OACE and NESI document set. The NCOIC thanks the U.S. Navy for this opportunity, and believes that this review is consistent with the NCOIC's mission: "…*to help accelerate the achievement of increased levels of interoperability within, and amongst, all levels of government."*

This report summarizes the considered opinion of participating scientists and engineers from the NCOIC member companies. The NCOIC believes that this summary could provide a basis for improving the usefulness of the network centric operations (NCO) effort being undertaken by the U.S. Navy.

We draw attention, where appropriate, to areas where direct overlap exists between the U.S. Navy OA effort and the work of the NCOIC and its affiliates. Our goal is to provide value-added inputs to the U.S. Navy toward a mutual goal of fostering the transformation to NCO and widespread system interoperability.

The responses contained in this review are those of the individual reviewers, all members of the NCOIC, but do not represent an official response from the NCOIC.

This review may contain opposing points of view on some topics. These are included for consideration of future and ongoing discussions on matters of key importance to both organizations. Additionally, there was insufficient time to process and include all comments received in this initial response; it is the intent of the NCOIC to continue internal discussions and analyses of the Naval OA documents. Please also note that the technical deliverables and tools being developed by the NCOIC will likely complement, and in some areas replicate, the Naval OA documentation. This is a topic for future discussions.

Review Approach

Upon receipt of the U.S. Navy OACE documents, the chairman of the NCOIC Technical Council invited the technical representatives from the member companies to participate in the review. An ad hoc review team was formed, and comments from the reviewers were collected by the team and reviewed and ranked for consistency with the NCOIC's philosophies as described in the Consortium's Position Paper (currently available from http://www.ncoic.org/download/NCOIC_Position_Paper_V21.pdf). The comments contained in this letter constitute the summary of the reviewed responses. They have been grouped in topical categories for ease of understanding and address only high-level

concerns. In all cases the comments contained in this document are provided for consideration to potentially increase the usefulness the documents in support of the US Navy. While the majority of comments are directed towards Naval OA, many of the general principles described have applicability within FORCEnet as well.

Response Comments

The comments that follow are provided as general observations and specific comments on individual document sections. It should be noted that comments represent individual contributor's opinions, and that a variety of opinions were received for most document sections.

Reading this document: Text which appears in a bulleted format with an arrowhead represents either direct comment from reviewers, or paraphrasing of their comments. Text which is not bulleted represents a more general thought based on multiple comments. These do not, however, represent an official position of the Consortium, nor should it be assumed that there is universal agreement on the comment

Standards Responsibility:

Several reviewers indicated that the US Navy should not specify standards, architecture, and design guidance beyond the basics of widely-adopted middleware, information management, frameworks, operating systems, etc. Specification beyond these are best left to industry, provided that industry, in conjunction with organizations like NCOIC, is successful in establishing a common and widely accepted set of standards for the building and integration of interoperable and interdependent information systems.

Additionally, many reviewers agreed that the design guidelines, while well-stated and very useful, should ideally not be prescribed by the U. S. Navy but defined within the best practices of industry. The U.S. Navy's current desire to impose design guidelines given the current state of definable best practices within the industry is understandable; however, as described, many are neither testable nor verifiable; their inclusion as the part of an acquisition procedure might create diversionary issues which would be extremely difficult to contend with or to otherwise solve. The NCOIC and its affiliated organizations are most interested in working with the U.S. Navy to establish mutually acceptable design guidelines and best practices that could be maintained and controlled by an industry organization.

While a set of standards, design guidelines, and best practices does not yet exist within any industry organization, it was noted that the OACE documents in particular lay a solid foundation upon which the NCOIC and its affiliated organizations can build.

It was clear to many that joint agreement between the NCOIC and the U.S. Navy (and other services) on ownership of responsibilities and standards would benefit all. The NCOIC has complementary goals with respect to the rapid and cost effective deployment of network centric systems, and this may provide a unique opportunity for all parties to be engaged in a solution.

Industry is generally reluctant to assume responsibility for roles which traditionally have fallen in the government domain. However, traditional approaches to managing the

defense environment are unquestionably in period of rapid transformation, and these changes are affecting all markets. Given government's desire to foster and maintain a robust and competitive marketplace, it seems natural to assume that the determination and maintenance of some specifications and standards in select areas will be outsourced to industry. Indeed, there is a significant body of evidence available to support the conclusion that widespread adoption of common standards by industry will result in the achievement of cost effective solutions for government. However, those standards which do not have broad industry support, but are critical to mission systems, should be mandated and maintained by the government.

Guidance Management and Format:

- Taken as a collective body the U.S. Navy OACE and NESI appears to be quite unwieldy. The approximately 1,300 pages of guidance seem excessive. Worse, the apparent attempt to deliver an all-encompassing set of guidelines may unwittingly result in creation of a very porous missive subject to highly variable degrees of interpretation. As written we think this body of literature may be very difficult to enforce.
- The U.S. Navy might consider combining these two documents into a single, enforceable artifact, absorbing the best of both while eliminating overlap and redundancy. In general, we feel that guidance documents should rely upon the smallest set of understandable and executable principles.

U.S. Navy OA and the Global Information Grid:

- Major sub-systems should be designed and implemented with the expectation that either now or at some time in the future they will need to access the GIG.

OACE Scope:

- Taken as intended – to serve as guidance for implementing network centric solutions - these documents do not sufficiently define the environment or processes necessary to accomplish this goal. In contrast, the NCOIC's mission includes the definition of standards, as well as specific components, interfaces, and tools necessary to fully describe architecture. Some actual systems are defined this way and are operating successfully. For example, the GCSS-AF effectively utilizes an integrated suite of COTS products, and is defined by real interfaces, components, and configurations. Standards create the basic framework for architecture, but are insufficient to build real systems from approved components.
- Most of the Naval OA design guidance seems focused at the NESI Node level and higher. Almost all of the standards assume non-real-time applications or nodes, representing systems with physical implementations significantly larger than a handheld form factor. It seems to the review team that the scope of Naval OA

should be expanded to include interoperability down to mobile weapon/sensor and soldier-based systems. The NCOIC currently has a very active working group addressing mobile, ad-hoc networking. The most effective approach for establishing recommended standards in this area might form the basis for joint discussions between the U.S. Navy and NCOIC.

- The scope and contents of the documents should be expanded to address applications and inter-application interfaces within the context of existing and new, custom applications currently being built to conduct and support warfare.

- The U.S. Navy should investigate these documents for their OA surface warfare applicability to the entire Navy, other services, and beyond.

Document Organization:

- The U.S. Navy might consider either consolidating or reorganizing the OA, NESI, and FORCEnet documents according to two guiding principles:

    - One set of guidance should apply to nodes. Nodes are weapons platforms, or capabilities within a platform that is accessible by the external net, e.g., FORCEnet. These guidelines are mainly architectural in nature, with communications guidelines for the parts of the system within a node. These principles are different than communications between two independent nodes.

    - One set of guidance should apply to inter-node behavior. In other words, the interoperability amongst nodes. These principles should rely heavily on standards-based protocols and meta-data for ensuring that communications are semantically synchronized.

Validation:

- The documents should provide a validation process for:

    - Component and product certification

    - Verification of performance/functionality

    - Utilization of commercial industry best practices for qualifying software

- The documents should focus on desired characteristics/properties of the architecture and components and avoid prescribing what the architecture would or should be. Individual programs and integrators could then focus on developing systems that subscribe to those principles.

- The documents need to ensure consistency and flexibility. A standard process needs to be documented that provides a uniform way to allow Industry to deviate from this guidance, if or when necessary.

Hardware Platforms:

- The OACE document is largely software-oriented. It is suggested that the scope be expanded to include a standards-based, modular hardware platform architecture definition that supports the OA software direction and promotes the realization of the OA vision.

  The use of standards-based modular building blocks in system design is not new, but only recently have the underlying standards reached a level of capability where they can be used to deploy innovative new applications such as those required by the U.S. Navy. Historically, modular systems could be achieved in combination of standards based Rack Mount Servers (RMS), cPCI and VME boards. This modular approach improved cost effectiveness and support for an increased pace of technological innovation.

  The modular design concept is rooted in several industry-wide standards and spans a broad ecosystem of building blocks. One of the newest and most promising standards-based architectures is built upon the AdvancedTCA specification. The AdvancedTCA specification was originally developed to support the latest commercial communications infrastructure build-outs, but is equally well suited in multiple open architecture-type systems. These specifications are driven by more than 100 companies including Intel, Agere Systems, Alcatel-CIT, Hewlett-Packard, IBM Engineering and Technology, Lucent Technologies, Motorola Inc., and Nortel Networks. The AdvancedTCA specifications incorporate the latest trends in high speed interconnect technologies; support next-generation, reduced geometry microprocessors; and provide improved reliability, manageability and serviceability, resulting in a new blade (board) and chassis (shelf) form factor that, while originally developed for communications, are also applicable in C4ISR, mission computing, and military communications applications.

Resource Management:

- A less complex resource management option might be beneficial. The following observations are made:
  - The documents should also allow/support the notion of managing resources at the processor boundary vice process boundary. In many cases the current cost of processors is low enough to ignore inefficiency concerns. This would greatly reduce test and integration time.
  - While dynamic allocation and Quality-of-Service are worthy characteristics, some programs might not require that level of sophistication. The OACE

should support an interface with a resource manager and this interface should be defined in terms of existing COTS standards, where possible.

Real-Time Processing:

- Distributed real-time processing is a critical consideration of OACE and should be explicitly addressed. These documents should provide guidance on how to partition the system to ensure deterministic real-time processing. OACE should distinguish and define several “performance enclaves” (e.g. data processing, real-time data distribution, signal processing) and should break the system into several different classes of service.
- In addition, real-time Quality-of-Service (e.g. latency and throughput) guarantees are increasingly important and are not adequately and distinctly addressed by either NESI or FORCEnet. More fidelity in defining interoperability between embedded/real-time edge and enterprise applications is needed. This is especially true as the distinction between embedded Edge-to-Enterprise (e2E) nodes blurs.

Information Assurance:

- All guidance needs to be fully compliant with the directives emerging from OSD S&S and AT&L concerning “Critical Technology and Information Protection.”

Use of Open Standard Features and Functionality:

- Documents should not prescribe a specific standard when others would work equally well. CORBA is a good example. Real-time Java and Data Distribution Service (DDS) middleware might work just fine, but contractors are driven to the hyper-complex implementations of CORBA because it is in the OACE specification. The effect of this approach is counter-NCO.
- The U.S. Navy should focus primarily on basic architectural guidelines. Requirements in excess of the basics impose a limiting effect on technical innovation. When government becomes too deeply involved in the technical architecture of industry solutions it eliminates the flexibility/agility that is critical to the growth of net-centric systems.
- Restricting the use of commercial products which implement open standards to only a minimum set or profile of functionality unnecessarily restricts their use and stifles innovation. Commercially implemented portions of open standards prescribed by OACE should not be withheld for use by OACE system integrators.

Data Centricity:

- The NESI statement: “Always use XML format to exchange information across systems” is overstated and inappropriate.

- Moreover, the NESI statement: “The use of other data-exchange mechanisms or other well-known document formats [other than XML] is contrary to the spirit of web enablement” is inaccurate and does not adequately address the needs of real-time, streaming, file-sharing, and other communities.

Standards Lifecycle:

- The U.S. Navy should consider taking a “revolving disposition” toward standards. Working with industry, the U.S. Navy should indicate which standards are emerging, mature, declining, and sunset.

Joint Concurrence:

- Concurrence among OAET and Joint GIG NCOW Leadership prior to release is highly recommended. Publication without concurrence can cause significant complications if “other” releases do not substantially agree with this initial release – causing confusion, funding shortfalls, schedule overruns, and program pushback.

- Based on “lessons learned,” NESI Guidance must have formal buy-in and mandated compliance across the JCIDS transformational initiatives. This is especially critical due to the joint program movement. Presumably, the U.S. Navy will no longer specifically develop or procure software and hardware solely for U.S. Navy use since it must go through the JCIDS process. Additionally, many of the software and hardware products used by the U.S. Navy in the future might be developed / acquired by other services.

Concluding Remarks

The OACE and NESI documents were well received by the NCOIC reviewers and triggered a wide breadth of responses. The NCOIC looks forward to increased collaboration with the Department of Defense, to the mutual benefit of both industry and the Government. We share a common vision to successfully implement network centric operations.