Roles and Responsibilities Panel Report

C4ISR **AWG**
Architectures Working Group

19 November 1997

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1.0 Executive Summary

"The Defense Science Board and other major studies have concluded that one of the key means for ensuring interoperable and cost effective military systems is to establish comprehensive architectural guidance for all DoD."

-- OSD Memorandum, 14 Jan 97, Subject: DoD Architecture Coordination Council (ACC)

This C4ISR Architecture Working Group, Roles and Responsibilities Panel final report is the culmination of efforts to institutionalize the use of architectures within the requirements, resource allocation, and acquisition processes of the DOD. This final report, organized into four sections (Background, Policy "Target Set," Panel Accomplishments, and Issue and Way Ahead) plus three appendices (Panel Membership, Line-by-Line Directive Changes, and C4ISR SIM Feasibility Study Overview), provides the Panel's recommendations of changes to specific policy documents. The final report recommendations are part of a necessary first step to institutionalize the use of architectures throughout the DOD. This first step must also include CINC/Service/Agency (C/S/A) staffing of directive changes (SD 106 for DOD policy documents and JS Form 136 for CJCS Instructions) incorporating the Panel's recommendations for policy changes.

The first section (Background) of the final report highlights the reasons for forming the Panel, the Panel's tasks, and the areas of concentration assumed by the Panel to accomplish its tasks.

The second section (Policy "Target Set") summarizes the Panel's review of what level of detailed architecture influences exist in five requirements policy documents; what level of detailed architecture influences exist in emerging DOD Chief Information Officer (CIO) policy documents (versus resource allocation documents); and what level of detailed architecture influences exist in two primary acquisition policy documents.

The third section (Panel Accomplishments) provides the overview of proposed changes to policy documents for use by C/S/A POCs for the documents reviewed in section two of the report. Line-by-line recommended changes, with accompanying rationale for each change, for each policy document appear at Appendix B.

The fourth and final section (Issue and Way Ahead) explains the Panel's conclusions regarding the additional steps beyond this necessary first step needed to institutionalize the use of architectures through the DOD. From the Panel's perspective, there is one overriding issue for DoD: the need for a DoD enterprise-level architecture process and a single DoD proponent for this process. The Panel concludes that there is the continuing need for development of a DOD architecture principle/strategy; there is the continuing need for a DOD overarching architecture policy; there is the continuing need for instruction on how to evolve the Architecture Framework from reliance upon product-

based to reliance upon information model-based methodology; there is the continuing need for an architecture compliance control mechanism; there is a continuing need to determine the relationship of a DOD architecture process to the existing DOD requirements generation, resource allocation, and acquisition processes; and there is the continuing need to update core DoD process policy directives with architectural language.

Finally, the Panel recommends the needs discussed in the fourth section of the final report be vigorously pursued by a subordinate body of the DOD ACC specifically chartered to address these DOD enterprise-wide issues and not lose current momentum.

2.0 Background

2.1 Introduction

On 18 October 1996, the Principal Deputy Assistant Secretary of Defense for Command, Control, and Communications, (PDASD(C3I)) and the Joint Staff, J6 co-signed a memorandum that established an ad hoc Architecture Working Group (AWG) consisting of the major C4ISR stakeholders. The memorandum tasked the Working Group to review recommendations of the preceding C4ISR Integration Task Force (ITF) and develop a DoD-wide C4ISR architecture implementation strategy.

An effective DoD-wide C4ISR architecture implementation strategy requires clear delineation and specification of roles and responsibilities for the architects (developers and integrators) from the major DoD components -- CINCs, Services, and Agencies; OSD organizations; and the Joint Staff. Processes and practices are needed to promote C4ISR architecture development and integration at every step of the C4ISR "system-of-systems" life cycle, from strategic planning to requirements identification to resourcing to acquisition. Today's fragmented C4ISR development and integration processes need to be more focused, disciplined, and effective. Architectures development and management need to be reflected in consistent, comprehensive policy and instituted by the right management structures. DoD management practices, processes and structures must integrate divergent organizational architecture initiatives into a common, seamless, architectures-based, quality, affordable mechanism for C4ISR "system-of-systems" development and integration DoD-wide.

2.2 Objective

The objective of the Roles and Responsibilities Panel was to assist the AWG in defining organizational roles and responsibilities for C4ISR architecture development and integration in context with a process for effectively applying architectures to support the improved integration of C4ISR capabilities across the DoD. Panel membership (see Appendix A) was sought from all major DoD stakeholders with an interest in making DoD development, management, and use of C4ISR architectures a success.

2.3 Panel Tasking

The Roles and Responsibilities Panel was charged with the following tasks which were derived from Appendix A, Final Report of the C4ISR ITF:

- Ensure that all relevant Department directives and instructions are changed to implement the C4ISR Architectures Framework as direction for developing and presenting C4ISR architectures.

- Analyze the use of architectures in other DoD processes; most notably the requirements generation, resources allocation, and acquisition process.

- Identify those DoD Directives and Instructions that must be modified or written to define a formal process for managing architectures and articulate the

relationship between architectures and the Joint Strategic Planning System (JSPS), Acquisition System and Programming, Planning and Budgeting System (PPBS).

• Determine the feasibility of implementing Department of Defense Intelligence Information System (DoDIIS) Systems Integration Management (SIM) type process DoD-wide.

2.4 Panel Strategy

To accomplish the above objective and tasks the Roles and Responsibilities Panel decided on four areas of concentration:

• Clarify architecture roles, responsibilities, relationships, and key interactions between and among principal C4ISR organizations (e.g., Joint Staff, ASD(C3I), ISB/ISS, CISA, DISA, C/S/A architects).

• Strengthen architecture policy and guidance by establishing/modifying/ integrating relevant DoD directives, instructions, CONOPs, policies, and procedures (e.g., CJCSI 3170.01 ("MOP 77"), CJCSI 6111.01, DoDI 4630.8, DoDD 5000, and the DoD 8000-series directives).

• Define architecture relationships to other DoD processes (e.g., requirements, PPBS, acquisition).

• Conduct a study of the feasibility of implementing SIM DoD-wide, using DoDIIS SIM as the baseline.

Initial efforts of the Panel were directed toward an analysis of the "DoD Landscape of Policy Documents" and developing an agenda for making architectural changes to the most pertinent documents. The general course of action for the Panel was to apply architecture definitions, types (views), and other architectural guidance consistent with the C4ISR Architecture Framework, Version 1.0, to the policy documents. The Panel also worked closely with the Joint Staff in constructing their proposal for the development of an overarching Joint Operational Architecture (JOA), and in deliberations concerning the DoD-wide "mandate" of the architecture views and the C4ISR Architecture Framework, Version 2.0 (see the Framework Panel Report).

3.0 DoD Policy "Target Set" for Panel Review

3.1 Current Formal Processes

Within the DoD there are three formal processes that guide, direct and control C4ISR activities. These are the requirements generation, resource allocation, and the acquisition processes. All are governed by their own policies. Though these processes are interlocking, there are many significant disconnects. Most importantly, the absence of an "architectural process" influence on these three is a critical missing link in the assurance of end-to-end C4ISR integration. The Panel chose to review these processes and the policies that govern them. The intent of the review was to analyze and develop a position with respect to interjecting the architectural concepts documented in the C4ISR Architecture framework into these three processes.

3.2 Requirements Generation Process

The requirements generation process is a major element of the JSPS, a formal means by which the Joint Chiefs of Staff gives strategic direction to US armed Forces. This process identifies materiel and non-materiel deficiencies and needs ins Mission Needs Statements (MNS) and Operational Requirements Documents (ORD). The Services perform Mission Area Assessments (MAA) and Mission Need Analyses (MNA) to identify deficiencies relative to actual or planned capabilities, which are then documented in MNS and ORD. The Joint Requirements Oversight Council (JROC) is responsible for assessing the force structure and making recommendations to the SecDef for required capabilities. The JROC has established a Joint Warfighting Capabilities Assessment (JWCA) process to assist the Chairman in developing his Program Recommendations (CPR), Program Assessments (CPA), and Net Assessments.

3.3 Policies Governing Requirements Generation

The Panel chose to review five policy documents that govern and/or influence the requirements generation process. These include:

- **DoD Directive 4630.5, "Compatibility, Interoperability, and Integration of C3I Systems."** DoDD 4630.5 is currently under revision with the intent to refocus the Directive on information interoperability. Formal coordination was initiated in September 1997. The draft directive proposes to describe and establish the mandatory portions of the process whereby, interoperability requirements for new or modified systems are stated, coordinated, certified, and approved.

- **DoD Instruction 4630.8, "Procedures for Compatibility, Interoperability, and Integration of C3I Systems."** This Instruction is also undergoing revision and much like DoDD 4630.5 will be refocused on

information interoperability upon successful coordination of DoDD 4630.5. In its current state the instruction focuses on the policy of the approved 1992 version of 4630.5 assigning responsibilities and prescribing procedures to achieve compatibility and interoperability of a consolidated, DoD-wide, global C3I infrastructure.

- **CJCSI 3170.01, "Requirements Generation System."** Formerly known as "MOP 77," CJCSI 3170.01 establishes policies and procedures for the requirements generation system called for by DoD Directive 5000.1. It provides the policies and procedures for developing, reviewing, validating, and approving MNSs and ORDs required by DoDD 5000.1 and DoD Regulation 5000.2-R. In addition it delegates oversight responsibility for the requirements generation system to the Vice Chairman of the Joint Chiefs of Staff, assisted by the JROC and members of the Joint Staff.

- **CJCSI 6111.01, "Command, Control, Communications, and Computers (C4) Systems Architectures, Master Plans, Assessments, and Evaluations."** This instruction establishes policy guidelines and assigns responsibilities for the definition of and guidance for C4 architectures, the development and change management of C4S master plans, the assessment of C4 systems, and the exercise and evaluation of C4 systems.

- **CJCSI 6212.01A, "Compatibility, Interoperability, and Integration of C4I Systems."** CJCSI 6212.01A implements the policy established in DoDD 4630.5 and DoDI 4630.8. The instruction states that all C4I systems, and computer resources associated with weapon systems, developed for use by or in support of US forces are defined to be for use in joint operations. Such systems must be certified as interoperable with systems with which they have a requirement to exchange information.

3.4 Resource Allocation Process

The resource allocation process, better known as the Planning, Programming, and Budgeting System is utilized by the Secretary of Defense to allocate and manage the resources of the Department. The key objectives of the system are to identify mission needs, match these needs with resources, and translate results into a budget proposal. The system employs top-down guidance, adapted into more refined guidance and passed down through many echelons of command to the lowest management levels where program and budget proposals are initiated. Once budgets are approved and funds are allocated, the requestors are responsible for spending these funds on the proposed programs.

3.5 Policies Governing Resource Allocation

Most of the policies governing the resource allocation process are overseen by the DoD Comptroller under the general heading of the Planning, Programming and Budgeting System. The Panel chose not to review these policies given the impracticality of influencing any change at the present time. Instead the Panel will review the DoD CIO's policies in the area of information technology resource allocation as they are developed.

3.6 DoD Acquisition Process

The acquisition process is mandated for proper oversight and reporting of acquisition activities. The key objectives of the process are to ensure adherence to laws, regulations, and policies; promote sound acquisition practices; manage risks; report to Congress; and ensure the Department acquires the assets and resources it needs to perform its missions effectively and efficiently. The process is managed through an acquisition chain of command that reaches the Secretary of Defense down into the Services and Agencies.

3.7 Policies Governing Acquisition Management

The Panel chose to review two major acquisition management policy documents:

- **DoD Directive 5000.1.** The Directive describes broad management principles that are applicable to all DoD acquisition programs. The document describes the policies and principles that frame a highly disciplined, yet flexible management framework that effectively translates operational needs into stable, affordable acquisition programs.

- **DoD Regulation 5000.2-R.** This regulation establishes a general model for managing Major Defense Acquisition Programs and Major Automated Information System acquisition programs. The acquisition process is structured in logical phases separated by major decision points called milestones.

3.8 DoD Chief Information Officer (CIO) Documents

In compliance with the Clinger-Cohen Act (PL 104-106), the DoD CIO is responsible for "…developing, maintaining, and facilitating the implementation of a sound and integrated information technology architecture….". Amplification of this statement of responsibility can be found in OMB memorandum M-97-16, June 18, 1997. The memorandum establishes the minimum criteria for an agency information technology architecture required by the Clinger-Cohen Act. DoD CIO guidance, strategy and policies will reflect this responsibility. Therefore the Panel chose to begin a review of DoD CIO policy and procedural documentation.

3.9 Policies Governing DoD CIO Responsibilities

During the Panel's review effort DoD CIO policy statements were in the formulation stage and not available for Panel inspection. Thus the Panel chose to examine the following CIO documents:

- **Information Technology Strategic Plan.** This CIO strategic plan provides overall direction and guidance for managing the Department's information resources. It establishes the DoD shared vision for information technology management, top goals and objectives, measures of performance, and strategies to accomplish the goals.

- **CIO Business Plan.** The purpose of the CIO Business Plan is to convey the DOD CIO's emphasis areas, priorities, and key planned actions for implementing the Clinger-Cohen Act. The plan describes a context for actions to be taken during the next 18 months, and establishes a common, shared view of opportunities and impediments to better information technology management.

- **OSD Memo, Subject: Requirements for Compliance with Reform Legislation for Information Technology (IT) Acquisitions (Including National Security Systems), 1 May 1997.**   The memo makes it clear that the Clinger-Cohen Act applies to all acquisitions, including IT supporting weapon systems and other National Security Systems. An attached matrix correlates the ITMRA, GPRA, and PRA requirements with the other statutory and DoD regulatory acquisition requirements. The memo states that these requirements shall be applied, as appropriate, to each increment of incremental and evolutionary acquisition programs.

3.10 Architecture Relationship to DoD Requirements, PPBS, and Acquisition Processes

The processes described above have evolved over many decades and shape the way DoD does business today. Currently, these processes are "loosely federated." "Loosely federated" can be characterized as follows:

- The direct interfaces between the processes are not clearly defined in terms of either schedule or the information products (content, level of detail, orientation) to be exchanged

- There is enormous variation in how individual organizations implement these processes, interface with defense-wide activities, and conduct their own internal operations

Some process-related problems are described below.

Requirements

- Multinational force operations needs are not factored in from the start

- Joint needs are not described from a DoD enterprise perspective

Resource Allocation

- Joint funding requirements are not consolidated or prioritized

Acquisition

- A system-of-systems approach for attaining interoperability and information assurance is lacking

- Technology insertion approaches are not managed from a DoD enterprise perspective

Today, at several key points in each process, products are developed that contain information that is useful (critical in some cases) for completing certain steps in the other processes. However, due to the conditions cited above, there is no mechanism for ensuring that these critical data pass between and among the processes in the right form and at the right time to support effective decision making. Thus, decisions are made at key points in each process without the full benefit of supporting information that, in many cases, is present within the other processes.

For example, most of the resource allocation decisions that support POM-building in the PPBS process are made each year by March. These decisions would benefit from supporting information that described the integrated planning priorities expressed by the unified commands. However, these priorities are not typically documented each year until June. Furthermore, each command's priorities are documented in separate products -- there is no focused product that integrates the command submissions to present a single, across-the-board view for POM decision makers.

In order to achieve the goals embodied in current DoD strategic direction (e.g., JV 2010) and management guidance (e.g., ITMRA), the requirements, resource allocation, and acquisition processes must be better integrated. A critical first step toward process integration is to provide a mechanism that mitigates the conditions cited above and that supports integrated requirements, resource allocation, and acquisition decision making from a cross-DoD perspective.

This "integration mechanism" must embody characteristics that meet the needs of each process. In the requirements process, the mission area analyses from which the mission needs statements are derived must be supported by a clear, cross-DoD mission context and understanding of operations. The resource allocation process needs a basis for making comparative assessments of emerging capabilities to understand how they match to requirements from a cross-DoD perspective and to determine how much it would cost to posture current capabilities to meet the cross-DoD needs. A combination of these assessments, based on a cross-DoD viewpoint, is necessary to do effective POM-building. Given the results from the POM-building process, the acquisition process needs clear rules

and criteria that govern system/capability implementation – the basis for building product specifications.

Architectures, because they convey the information necessary to support all three processes, can serve as a principal integration mechanism.   In order to support process integration, architectures should:

- Provide a clear audit trail from the mission needs to the capabilities developed and deployed to meet the needs, and

- Enable a DoD enterprise perspective, i.e., present descriptions of each organization's operations and supporting systems' structure that can be easily compared and related to those of other organizations.

4.0   Panel Accomplishments and Summary of Reviews

4.1 Panel Accomplishments

The Panel reviewed ten major DOD and Joint Staff directives and guidance documents over the course of its existence. The Panel also oversaw the conduct of a feasibility study of the implementation of a DoDIIS-type Systems Integration Management (SIM) type process DoD-wide. An overview of the results of the SIM feasibility study is at Appendix C of this report. Additionally, the Panel assisted the AWG Integration Panel in its struggle with the difficult issue of whether to mandate use of the enhanced C4ISR Architecture Framework Document (a set of matured architecture document descriptions) upon its release later this year or, in the absence of a commonly-understood "overarching" process for developing, managing, and using Framework-defined architecture products, to continue to encourage the "voluntary" Departmental use of the architecture framework document.

4.2 Summary of Panel Reviews

At the completion of each of its reviews, The Panel developed an overview or "synopsis" of each directive in regard to its current coverage of C4ISR architecture processes or products. The summaries of each directive or other guidance follow, while the detailed results – the general and "line in/line-out" comments – are at Appendix B.

4.2.1 CJCSI 3170.01, "Requirements Generation System," June 13, 1997

The Panel found that the instruction very adequately addresses the generation and processing of requirements for new system capabilities (Mission Need Statements, Capstone Requirements Documents, and Operational Requirements Documents), as required by the DOD 5000-series directives. However the instruction, in its discussion of the preceding C/S/A Mission Area Analysis (MAA) process, does not recommend the use of any of the architectural products described in the C4ISR Architecture Framework as part of, in support of, or as products of the C/S/A MAA process.

4.2.2 CJCSI 6111.01, "Command, Control, Communications and Computer (C4) Systems Planning, Assessments, and Evaluations," November 19, 1996

The Panel found that the instruction concentrates on "C4" systems, while its still-draft architecture enclosure uses the terms "C4I" and "C4ISR." This leads to some C/S/A confusion regarding applicability of the overall instruction to existing and planned C4/C4I/C4ISR systems. The Panel was not certain that the CJCSI Enclosure A (circulated in mid-January 1997 for CINC and Service coordination) was ever published as a formal change to the instruction. The Panel therefore reviewed the draft version of the enclosure, dated 10 January 1997.

4.2.3 CJCSI 6212.01A, "Compatibility, Interoperability, and Integration of Command, Control, Communications, Computers, and Intelligence Systems," June 30, 1995

The Panel found the instruction to be so highly procedural in content that it offered small opportunity for recommended insertions of broad policy, responsibility, or other statements to further institutionalize the new DOD C4ISR architecture paradigms. In general, the Panel would support the general update and movement of the instruction's DISA- and JITC-specific procedures for reviewing requirements documents, assessing MNS/ORDs for IT standards "intentions," and testing system-to-system(s) interoperability into more appropriate DISA/JITC-level directives. Additionally, the CJCSI does not reflect the current mandates for the DOD Joint Technical Architecture (JTA) and the Defense Information Infrastructure (DII)-Common Operating Environment (COE).

4.2.4 DoD Directive 5000.1, "Defense Acquisition," March 15, 1996, and DoD 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information System (MAIS) Acquisition Programs," March 15, 1996

While the Panel found the high-level policies in this directive not amenable for recommending any detailed changes regarding the institutionalization and use of C4ISR architectures in the DoD acquisition process, the Panel members developed two high-level paragraphs for inclusion in the directive (see Appendix B). The Panel had neither the organic expertise nor the time remaining in its tenure to finish a thorough and expert review of DoD 5000.2-R, and recommends a follow-on integrated process team (IPT) effort address the use of C4ISR architecture products in the system engineering/software engineering processes (see Section 5.0, Issue and Way Ahead).

4.2.5 Draft DoD Regulation 4630.8-R (Version 11), Retitled "Information Interoperability," Dated August 13, 1997

The purpose of the Panel review of this draft revision was to constructively influence the thrust of the proposal prior to formal coordination (the "SD106" process) of the revised directive. The Panel found that, while the updated draft addresses the testing and certification of new DoD C4I systems for conformance to the Joint Technical Architecture (JTA), it still does not provide adequate guidance for using any of the architecture products described in the new C4ISR Architecture Framework document.

4.2.6 Clinger-Cohen (ITMRA) Compliance Matrix

This matrix is an attachment to USD(A&T)/Comptroller/ASD(C3I) memorandum, "Requirements for Compliance with Reform Legislation for Information Technology (IT) Acquisitions (Including National Security Systems), May 1, 1997." The requirements matrix is based on the statutory requirements of the ITMRA (Clinger-Cohen Act of 1996), the GPRA, and the PRA. An acquisition program milestone-by-milestone approach is used. The matrix references both the JTA and the TAFIM, but makes no mention of "consistency checking" milestone review documents with pre-existing Operational or Systems Architectures prior to each milestone decision. Panel comments were limited to deletion of the TAFIM reference, however, since C/S/A development, management, and use of OAs and SAs has been voluntary, not mandated, to this point.

4.2.7 DoD CIO Business Plan, Version 1, May 1997

The Panel review determined that C4ISR architectures "coverage" in this publication was up-to-date and adequate, with the need for minor editorial changes.

4.2.8 DoD CIO Information Technology Management (ITM) Strategic Plan, March 20, 1997

The Panel review determined that C4ISR architectures "coverage" in this publication was up-to-date and adequate.

4.2.9 Proposed Draft DoDD 8000.1 (Reissuance), "Management of Information and Information Technology," October 8, 1997

The Panel found that the draft very adequately addresses the requirement for development and use of integrated information technology architectures (Operational, Systems, and Technical Architectures), with the need for minor editorial changes.

4.3 FEASIBILITY STUDY OF DOD-WIDE IMPLEMENTATION OF DODIIS C4ISR SIM

The contracted SIM Feasibility Study was completed as planned on September 30, 1997. While the Roles and Responsibilities Panel neither endorses nor approves the study, its executive summary is included for reader information at Appendix C. Further analysis of implementation costs and other impacts are required before any decision can be made regarding the DoD-wide implementation of DODIIS SIM.

5.0 ISSUE AND WAY AHEAD

5.1 Issue

For the Roles and Responsibilities Panel, the overriding issue is the need for a DoD enterprise-level architecture process and a single DoD proponent for this process.

5.2 Way Ahead

There are several additional steps that should be taken by the Office of the Secretary of Defense to institutionalize the development, management, and use of architectures throughout DoD.

Section 5125(b)(2) of the Clinger/Cohen Act of 1996 directs the DoD Chief Information Officer (CIO) to develop, maintain, and facilitate the implementation of a sound and integrated information technology architecture (ITA). While the DoD ITA has not been fully defined or its uses established, such DoD enterprise-level architectures as the Joint Technical Architecture (JTA) and the Joint Operation Architecture (JOA) are under development. When fully established, these architectures will form the enterprise-level guidance for the development of all information technology (IT) systems that use, exchange, and produce information electronically. These DoD enterprise level architectures, guiding the systems implemented by the Services and Agencies, should foster joint and combined interoperability among IT systems, reduce systems costs, shorten development and fielding time, focus the elimination of unnecessary duplicate systems, and improve system functionality.

As a first step, **the DoD CIO should develop a DoD Architecture Strategy** that describes the purposes, definition, scope, and goals/objectives of the DoD ITA. The overall goal of the DoD architecture strategy would be synchronized, integrated, and focused ITA components. The strategy must identify the purpose of the DoD ITA, ITA components (Systems, Operational, and Technical "views"), ITA scope (e.g., include IT architectures only or IT and other DoD domain architectures), what will be incrementally built as part of the DoD ITA, and how ITA components will be integrated and synchronized. The strategy must identify the architectural principles and strategic tasks that would govern the development, management and use of the DoD IT Architecture. The DoD Architecture Strategy must be tied to the National Military Strategy and Joint Vision 2010.

Next, the relationships among DoD's key institutional processes and the DoD architecture process must be understood and established. The benefits of architectures will not be realized if the architecture process is considered a self-contained process that

does not enhance the core DoD processes of resource management, acquisition, and requirements determination. **The DoD CIO should determine the relationships among the DoD Architecture process and core DoD business processes,** using an integrated concept team that includes representatives from the JCS, CINCs, Services, and DoD Agencies.

Once the DoD Architecture Strategy has been developed and the relationships of the architecture process to core DoD business processes defined, **the DoD CIO should develop an Overarching Departmental Architecture Policy.** This policy should identify architecture roles/responsibilities and the DoD enterprise-level architecture process. Moreover, this policy should identify who is going to build which architecture "views," what will be the components/capabilities of the architectures to be built, under what circumstances are they to be built, and who will manage, use and enforce architectures in DoD. The policy should also outline how these architectures will be managed, used, and enforced in the core DoD processes of resource management, acquisition, and requirements determination.

The DoD CIO should develop comprehensive DoD Architecture Framework Instructions -- a comprehensive set of instructions regarding how to "describe" architectures for pertinent domains within DoD. This set of instructions should be a logical expansion of the current C4ISR Framework Document. Delineating the pertinent DoD architectural domains should be the critical first step. The instruction should then identify what data needs to be exchanged to ensure the architectures being built can be integrated, reflect a common or DoD enterprise view, and will be interoperable after fielding. The products required under these instructions should facilitate the migration from the current product-based architectural approach to a data- or model-based methodology.

If architectures are required by DoD policy but there are no adequate control mechanisms to ensure compliance and enforcement of these architectures, then the architectures will inevitably become 'shelfware." To prevent this from happening, **a DoD Architecture Control Structure should be established**. As a minimum, what must be determined is how the current MAISRC, DAB, DoD Architecture Control Committee (ACC), CIO Council, etc., can be used collectively to ensure that DoD IT systems are being built and maintained to reflect appropriate architectural guidance. The data needed by these forums for oversight of architecture activities also needs to be established. In addition, the overlap between such advisory bodies as the CIO Council and ACC must be resolved, and the ACC support structure examined in light of the DoD Architecture Strategy and other recommendations from the panels of the 1997 C4ISR Architecture Work Group.

Finally, **C/S/A staffs should advocate the "line-by-line" changes** recommended by the Roles and Responsibilities Panel (Appendix B) during later coordination staffing of pertinent policy directives.

APPENDIX A

MEMBERS OF THE AWG

ROLES AND RESPONSIBILITIES PANEL

Mr Frank Ruggeri	OASD(C3I)/CISA - Architectures Division	Co-Chair
Mr John Shipp	ODISC4/OCIO/SAIS-PAA - Architecture Directorate	Co-Chair
Mr Dave Gurtner	HQ AFCIC/ITA	Executive Secretary
Ms Pamela Krause	NIMA/NP1	Member
MAJ David Armstrong, USA	NIMA/NP1	Member
Ms. Vickey Beasley	DIA/DS-MB2	Member
Ms Chris Condon	ODASD(C3IA)	Member
Mr Dennis Fife	IDA (Representing BMDO)	Member
Mr Terry Hagle	ODASD(C3I)/C3	Member
LT COL Robert E. Lee, USA	JS/J6I	Member
Mr Tom Libby	NKF, Inc. (Representing Navy)	Member
Mr Truman Parmele	OASD(C3I)/CISA-AD	Member
Mr Fritz Schulz	DISA OSFL (JEXF)	Member
Mr Mike Swindle	DODIIS Management	Member

APPENDIX B

DETAILED COMMENTS

B-1. RECOMMENDED CHANGES TO CJCSI 3170.01, "REQUIREMENTS GENERATION SYSTEM," 13 JUN 97

B-1.1. ENCLOSURE A, CJCSI 3170.01

1. Page A-2, Paragraph 1.a, Line 3: Change to "...the definition phase. Mission needs will be identified as a direct result of continuing assessments of the activities and information exchange requirements of current and projected mission capabilities (Mission Area Analysis or equivalent Service or DOD component procedure). The Mission Area Analysis will be conducted in the context of changing military threats and national defense policy. Mission activities and information exchange requirements will be analyzed in the context of an operational architecture (see CJCSI 6111.01). Mission Needs will be assessed..."   RATIONALE: Relates the MAA process to the architecture requirements described in CJCSI 6111.01 and the Joint Technical Architecture.

2. Page A-3, Paragraph 1.b, Line 7: Change "overarching system requirements" to "operational architecture requirements" RATIONALE: As described in Enclosure C, the Capstone Requirements Document does not describe a proposed system or set of systems.

3. Page A-8, Paragraph 3.a, Line 6: Insert "activities and information exchange requirements of the" between "the" and "current"   RATIONALE: Relates the MAA process to the activity descriptions and information exchange requirements included in the operational architecture described in CJCSI 6111.01 and the Joint Technical Architecture.

4. Page A-8, Paragraph 3.a, Line 7: Insert the following sentence after "..assigned missions": "Mission activities and information exchange requirements will be analyzed in the context of an operational architecture (see CJCSI 6111.01)." RATIONALE: Relates the MAA process to the architecture responsibilities described in CJCSI 6111.01 and the Joint Technical Architecture.

5. Page A-9, Paragraph 3.b, Line 10: Insert "mission activities and information exchange requirements and" between "current" and "capabilities"   RATIONALE: Relates the MNS to the MAA process and the architecture responsibilities described in CJCSI 6111.01 and the Joint Technical Architecture.

6. Page A-14, Paragraph 4, Second Line: Change "overarching requirements" to "operational architecture requirements (see CJCSI 3170.01)"   RATIONALE: Relates the CRD to the operational architecture for the "system of systems" (described in CJCSI 6111.01 and the Joint Technical Architecture).

7. Page A-14, Paragraph 4.a, Line 3: Change "systems-of-systems" to "system-of-systems" RATIONALE: Corrects typographical error.

8. Page A-14, Paragraph 4.a, Line 7: Change "overarching system requirements" to "operational architecture requirements"   RATIONALE: As described in Enclosure C, the Capstone Requirements Document does not describe a proposed system or set of systems.

B-1.2. ENCLOSURE B, CJCSI 3170.01

Roles and Responsibilities Panel

1. Page B-1, Paragraph 2, Line 3: Add ", mission activities, and information exchange requirements" to end of the second sentence. RATIONALE: Introduces another type of context for the mission need(s) described in an MNS.

2. Page B-2, Paragraph 5, Line 7: Add "per the Joint Technical Architecture" to the end of the first sentence. RATIONALE: The JTA is an important part of the answer to systems' standardization and interoperability.

3. Page B-2, Paragraph 5: Add "Include information operations in the discussion of operational environments in which the mission is expected to be accomplished." RATIONALE: Information operations are not the sole province of AIS mission needs.

4. Page B-2, AIS Considerations, Line 3: Insert "(including joint)" before "requirements, if known." RATIONALE: Prompts the MNS preparer to consider joint as well as service interoperability requirements.

5. Page B-2, AIS Considerations, "Constraints," Last Sentence: Change "information warfare" to "information operations"   RATIONALE: Preferred term.

B-1.3. ENCLOSURE C, CJCSI 3170.01

1. Page C-1, Paragraph 1, Second Line: Change "system proposed" to "capabilities proposed" RATIONALE: Per paragraph 3 of this enclosure, a proposed system or set of systems will not be described in the CRD.

2. Page C-1, Paragraph 1, Line 4: Insert a new second sentence "Define the operational and support concepts in the context of the operational architecture for the mission area (see CJCSI 6111.01)." RATIONALE: Relates the CRD to the operational architecture described in CJCSI 6111.01 and the Joint Technical Architecture.

3. Page C-1, Paragraph 3, Title and First Sentence: Change "Systems" and "systems" to, respectively, "Capabilities" and "capabilities"   RATIONALE: Per this paragraph of the enclosure, a proposed system or set of systems will not be described in the CRD.

4. Page C-2, Paragraph 4.a: Change "System Performance" to "Operational Performance Requirements" "   RATIONALE: Per paragraph 3 of this enclosure, a proposed system or set of systems will not be described in the CRD.

5. Page C-2, Paragraph 4.b, First Line: Change "system performance parameters" to "operational performance parameters"   RATIONALE: Per paragraph 3 of this enclosure, a proposed system or set of systems will not be described in the CRD.

B-1.4. GLOSSARY, CJCSI 3170.01

1. Page GL-4: Add the following definitions. RATIONALE: These recommended definitions will aid understanding of the architectural concepts.

   a. Information Exchange Requirement (IER). The requirement for information to be passed between and among forces, organizations, or administrative structures concerning ongoing activities. IERs identify "who" exchanges "what" information with "whom," as well as "why" the information is necessary and "how" that information will be used.

   b. Operational Architecture. A description (often graphical) of the operational elements, assigned tasks, and information flows required to support the warfighter. It defines the type of information, the frequency of exchange, and what tasks are supported by the information exchanges.

B-2 RECOMMENDED CHANGES TO CJCSI 6111.01, "COMMAND, CONTROL, COMMUNICATIONS, AND COMPUTER (C4) SYSTEMS PLANNING, ASSESSMENTS, AND EVALUATIONS," 19 NOV 96.

B-2.1 BASIC INSTRUCTION

1. GENERAL: Using the model of the current acquisition policy of the Department of Defense, the Joint Staff should revise CJCSI 6111.01 into a single instruction encompassing the planning, assessment, and evaluation of **all** command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR) systems. RATIONALE: This would promote the integration and interoperability of all future C4ISR systems across the Department, while satisfying the major recommendations of the 10 Oct 95 DEPSECDEF memo, the Committee on Roles and Missions (CORM), and numerous Defense Science Board studies.

2. Page 3, Paragraph 5.b(5): Add the following additional JS/J-6 responsibility: "(f) Provide central management of the development and maintenance of the DOD Joint Operational Architecture." RATIONALE: This is a recent J-6 tasking from the DOD Architectures Coordination Committee (ACC).

B-2.2 ENCLOSURE A (DRAFT)

1. GENERAL: Change "C4I" to "C4ISR" throughout the enclosure.   RATIONALE: Use of the terms "C4I" and "C4ISR" leads to some confusion regarding the applicability of the instruction and the enclosure.

2. Page A-1, Paragraph 1, Line 15: Change "types of architecture" to "views of architecture" RATIONALE: Preferred term that will be used extensively in the forthcoming Version 2 of the C4ISR Architecture Framework document.

3. Page A-2, Paragraph 1.c, Line 1: Change "System Architecture" to "Systems Architecture" RATIONALE: Correct term, per C4ISR Architecture Framework, Version 1.0 and upcoming Version 2.0.

4. Page A-2, Paragraph 1.d, Line 11: Change "System Architecture" to "Systems Architecture" RATIONALE: Correct term, per C4ISR Architecture Framework, Version 1.0 and upcoming Version 2.0.

5. Page A-2, Paragraph 1.e, Line 4: Change "system and technical architectures" to "systems and technical architectures" RATIONALE: Correct term, per C4ISR Architecture Framework, Version 1.0 and upcoming Version 2.0.

6. Page A-3, Paragraph 2.a: Add "ASD(C3I) is also designated as the Chief Information Officer for the Department, responsible for all DOD Information Technology Architectures."   RATIONALE: ASD(C3I responsibility under the ITMRA, P.L. 104-106)

7. Page A-3, Paragraph 2.c: This doesn't match the present reality -- the JTA Steering Group of the DOD Architecture Coordination Council (ACC) now manages the JTA. Also, TAFIM is now under review for possible realignment with current DOD architecture concepts.

8. Page A-3, Paragraph 3.a, Line 1: Delete the version and CISA publication numbers, replace with a reference to Enclosure B. RATIONALE: Minimizes the number of places the instruction and enclosure A will have to be changed as the referenced C4ISR Architecture Framework document evolves.

9. Page A-4, Paragraph 3.a, Line 3: Insert "and presentation" after "development" RATIONALE: Very little of the current version of the C4ISR Architecture Framework document deals with "methodology" -- it mostly deals with how to describe the architecture views.

10. Page A-4, Paragraph 3.a, Line 5: Change "architecture type" to "architecture view" RATIONALE: Preferred term that will be used extensively in the forthcoming Version 2 of the C4ISR Architecture Framework document.

11. Page A-4, Paragraph 3.a, Last Sentence: Delete the sentence. RATIONALE: The "widely accepted" description may be questioned.

12. Page A-4, Paragraph 3.b: Delete the paragraph. RATIONALE: The TAFIM is now under review for possible realignment with current DOD architecture concepts. A possible outcome of that review could result in replacement of the TAFIM.

13. Page A-4, Paragraph 3.c, Line 1: Delete the JTA version number and replace with a reference to Enclosure B. RATIONALE: Minimizes the number of places the instruction and enclosure A will have to be changed as the referenced JTA evolves.

14. Page A-4, Paragraph 3.c, Last Sentence: Delete the sentence. RATIONALE: The TAFIM is now under review for possible realignment with current DOD architecture concepts. A possible outcome of that review could result in replacement of the TAFIM.

B-3 RECOMMENDED CHANGES TO CJCSI 6212.01A, "COMPATIBILITY, INTEROPERABILITY, AND INTEGRATION OF COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, AND INTELLIGENCE SYSTEMS," 30 JUN 95

B-3.1. BASIC INSTRUCTION: None

B-3.2. ENCLOSURE A, "DEFINITIONS," CJCSI 6212.01A

1.   GENERAL: The definitions in this enclosure need to be updated and rationalized with those in the Clinger-Cohen Act and the new DOD 5000-series acquisition directives. RATIONALE: Precludes reader confusion as to scope and applicability of the CJCSI.

2. Page A-4, Paragraph W: Delete the paragraph and replace with definition of "Joint Technical Architecture"   RATIONALE: The TAFIM is now under review for possible realignment with current DOD architecture concepts. A possible outcome of that review could result in replacement of the TAFIM.

B-3.3. ENCLOSURE B, "PROCEDURES," CJCSI 6212.01A

1. Page B-2, Paragraph 2 (Header), Line 13: Insert "operational" before "architectural integrity" RATIONALE: Recommended to fully incorporate the new C4ISR architecture management paradigms in DOD.

2. Page B-2, Paragraph 2.a, and Page B-3, Figure 1: The use of the new Joint Operational Architecture (under development by JS/J6) should be explained here. RATIONALE: These pages provide the opportunity to begin institutionalized use of the new JOA.

3. Page B-4, Figure 2: The use of the new Joint Operational Architecture (under development by JS/J6) to influence ACAT II-IV MNS/ORD should be explained here. RATIONALE: Provides another opportunity to begin institutionalized use of the new JOA.

4. Page B-6, Paragraph 3, Lines 9 and 10: Replace "Technical Architecture for Information Management (TAFIM)" with "Joint Technical Architecture (JTA)"   RATIONALE: The TAFIM is now under review for possible realignment with current DOD architecture concepts. A possible outcome of that review could result in replacement of the TAFIM.

5.   Page B-6, Paragraph 4, Title: Insert "Profile" after "Standards"   RATIONALE: Better description of what this paragraph is about.

6.   Page B-6, Paragraph 4, Lines 7 and 8: Insert "compliant with the JTA" after "base standards" RATIONALE: Indicates where the "base standards" in the profile will come from.

7. Page B-6, Paragraph 4, Line 11: Insert "DISA" before "Center for Standards" RATIONALE: Adds clarity for the reader.

8. Page B-6, Paragraph 5, Line 8: Replace "standards" with "JTA"   RATIONALE: Involves the JTA in the compliance testing process.

B-3.4. ENCLOSURE C, "RESPONSIBILITIES," CJCSI 6212.01A

1. Page C-1, Paragraph 1.e: Insert "operational" before "architectures"   RATIONALE: Reflects a new responsibility of the JS/J6.

2. Page C-2, Paragraph 2.b, Line 4: Insert "JTA-compliant" between "Implement" and "standards" RATIONALE: Involves the JTA in the compliance testing process.

3. Page C-2, Paragraph 2.b, Last Line: Add "For applicable systems, JTA compliance is required." RATIONALE: Involves the JTA in the compliance testing process.

4. Page C-3, Paragraph 2.e, Last Line: Add "For applicable systems, JTA compliance is required." RATIONALE: Involves the JTA in the compliance testing process.

5. Page C-3, Paragraph 2.i, Line 2: Change "Functional Process Improvement" to "Business Process Reengineering"   RATIONALE: Current preferred term.

6. Page C-3, Paragraph 3: This paragraph needs to state DISA's role and responsibilities in respect to JTA development and support. RATIONALE: Provides clarification of DISA's role in JTA development and support.

7. Page C-3, Paragraph 3.n, First Line: Insert "in the JTA" after "approved standards"
RATIONALE: Involves the JTA in the compliance testing process.

8. Page C-5, Paragraph 3.q, Last Line: Replace with "DII Master Plan."   RATIONALE: Current
wording fails grammatical clarity test.

9. Page C-5, Paragraph 3.5, Last Line: Delete the second "of information"   RATIONALE: Current
wording fails grammatical clarity test.

10. Page C-4, Paragraph 4.a, Line 2: Replace ""is complied" with "is applied"   RATIONALE:
Current wording fails grammatical clarity test.

11. Page C-6, Paragraph 5.a, Line 2: End the sentence after "DODIIS."   RATIONALE: Remaining
wording fails grammatical clarity test and Paragraph 5.b restates the DIA responsibility (we think).

12. Page C-6, Paragraph 5.c, Line 3: End the sentence with the term "are satisfied."   RATIONALE:
Remaining wording fails grammatical clarity test.

13. Page C-6, Paragraph 6, First Line: Change "Director, Defense Mapping Agency" to "Director,
National Imagery and Mapping Agency" RATIONALE: Reflects recent creation of NIMA.

14. Page C-6, Paragraph 6, Lines 3 and 4: Change "mapping, charting, and geodesy data" to
"imagery, imagery intelligence, and geospatial information"   RATIONALE: Reflects the NIMA
contribution.

B-3.5. ENCLOSURE D, "CONTROL, COMMUNICATIONS, COMPUTERS, AND INTELLIGENCE FOR THE WARRIOR CONCEPT," CJCSI 6212.01A

1. Page D-1, Paragraph 2.b: Add a new last sentence: "The mandated COE for the Department of
Defense is the Defense Information Infrastructure (DII)-COE (see reference "(nn)")"   RATIONALE:
Reflects the creation and mandate of the DII-COE since the original issue date of the CJCSI.

2. Page D-4, Paragraph 3: The entire C4IFTW Roadmap needs to be rewritten to reflect actions and
accomplishments since the original issue date of the CJCSI (especially the creation and mandate of the
JTA and the DII-COE) and moved into a Joint Staff brochure referenced by the CJCSI or the Vision
21 implementation plan. RATIONALE: Modernizes and "lightens" the CJCSI.

B-3.6. ENCLOSURE E, "INTEROPERABILITY ASSESSMENTS," CJCSI 6212.01A

1. GENERAL: If, as described by Enclosure E, C4I system interoperability is assessed through the
review of MNS/ORDs during the requirements generation stage, then the mechanism described in this
enclosure should be moved into CJCSI 3170.01, "MOP 77 - Requirements Generation System."
RATIONALE: Streamlines and "lightens" the CJCSI.

2. Pages E-A-1 Through E-A-11, Appendix A, "Assessment Criteria for Requirements Documents:"
Notwithstanding the previous recommendation for integrating this enclosure into CJCSI 3170, the
references in the appendix to "TAFIM" should all be changed to reflect the JTA mandate, and the
references to DOD 5000-series directives changed to reflect the recent reissuance of the

DOD acquisition directives.   RATIONALE: The TAFIM is now under review for possible realignment with current DOD architecture concepts. A possible outcome of that review could result in replacement of the TAFIM. Additionally, the current references to the DOD 5000-series in the appendix are outdated.

      a. Page E-A-4, Criteria Numbers 7,8, and 9: Revise to reference the JTA.

      b. Page E-A-6, Criterion Number 4: Delete.

      c. Page E-A-7, Criteria Numbers 13 and 14: Revise to reflect the impending demise of the TAFIM and incorporate the new DOD Operational, Systems, and Technical Architectures concepts.

      d. Page E-A-9, Criterion Number 26: Replace "functional standards areas" with "JTA"

      e. Pages E-A-10 (Criterion Number 35) and E-A-11 (Criteria Numbers 38 and 41): Replace "TAFIM" with "JTA"

      f. Page E-A-11, Criterion 40: Delete or make a MS II criterion, as it's impossible (if not misleading) to identify applicable IT standards (and any evolving changes to those standards) at acquisition program Milestone I.

B-3.7. ENCLOSURE F, "INFORMATION TECHNOLOGY STANDARDS PROCEDURES," CJCSI 6212.01A

1. GENERAL: Replace "TAFIM" with "JTA" throughout the enclosure. RATIONALE: The TAFIM is now under review for possible realignment with current DOD architecture concepts. A possible outcome of that review could result in replacement of the TAFIM by the JTA.

2. GENERAL: Recommend the movement of MNS/ORD assessments in this enclosure into CJCSI 3170.01 (MOP 77), with the remaining portion into the DOD Acquisition Deskbook. RATIONALE: These assessments and interoperability testing procedures should be part of the DOD "mainstream" directives.

3. Page F-5, Paragraph 4.h: Replace this paragraph and its sub-paragraphs with "Standards profiles will be certified against the DOD JTA."   RATIONALE: The TAFIM is now under review for possible realignment with current DOD architecture concepts. A possible outcome of that review could result in replacement of the TAFIM by the JTA. JTA management and implementation policy makes provision for waivered use of "gap filler" standards should they be needed for system development and fielding.

B-3.8. ENCLOSURE G, "INTEROPERABILITY TESTING PROCEDURES," CJCSI 6212.01A

1. GENERAL: Replace "TAFIM" with "JTA" throughout the enclosure. RATIONALE: The TAFIM is now under review for possible realignment with current DOD architecture concepts. A possible outcome of that review could result in replacement of the TAFIM by the JTA.

B-3.9. ENCLOSURE H, "COMPATIBILITY, INTEROPERABILITY, AND INTEGRATION CERTIFICATION," CJCSI 6212.01A

1. GENERAL: Recommend the movement of this enclosure into the DOD Acquisition Deskbook.
RATIONALE: These assessments and interoperability testing procedures should be part of the DOD
"mainstream" test and evaluation directive/process.

2. Page H-2, Paragraph 1.b(7)(a), Line 2: Replace "FIPS 146-1 (GOSIP), MIL-STD-188 series" with
"JTA"   RATIONALE: FIPS 146-1 is no longer mandatory for implementation, and the MIL-STD-
188 series standards are encompassed by the DOD JTA.

3. Page H-5, Paragraph 5.b: Delete. RATIONALE: The JTA waiver process has superceded this
mechanism.

B-3.10. ENCLOSURE I, "REFERENCES," CJCSI 6212.01A

1. Add a reference to the Joint Technical Architecture: "(nn) ASD(C3I) Memo, "Defense Information
Infrastructure (DII) Master Plan", Appendix C, December 19, 1996"   RATIONALE: Involves the
JTA in the compliance testing process.

2. Revise references "c" through "f" to reflect the issuance of the new DOD 5000-series acquisition
directives.   RATIONALE: Copes with changes in DOD acquisition policy and general procedures
since date of the CJCSI's issue.

B-4. RECOMMENDED CHANGES TO DOD DIRECTIVE 5000.1, "DEFENSE ACQUISITION," MARCH 15, 1996

1. Add to Section 4, "POLICY:" "4.1.x. Architectural Integrity. PMs and other acquisition
managers shall be responsible for the system architecture of the prime mission equipment under the
program -- the optimal arrangement of subsystems and components in the equipment, their
relationships, and the program-specific principles and guidelines governing their design and evolution
over time. PMs shall also concurrently ensure that this singular system architecture is consistent with
the demands of the "system of systems" architecture within which the system must operate and
interoperate, and the demands of the operational architecture supported by that "system of systems."

2. Add to Section 4, "POLICY:" "4.2.x Architecture. Architecture is a key element in the
acquisition of DoD systems. It is critical that DoD developers describe the architecture of their
systems using a common approach, mitigating the communications problems among warfighters
representatives, the resource allocation community, technologists, acquisition officials and system
managers. Further, the use of a common approach facilitates the comparison and integration of
systems across DoD. Architecture shall be used as a discipline that integrates the perspectives of the
Departments missions, aligns requirements with the processes that support these missions, fosters cost
effective acquisition strategies, and enhances the opportunities to promote interoperability on a
Department-wide basis."

B-5. RECOMMENDED CHANGES TO DRAFT DOD REGULATION 4630.8-R (VERSION 11), RETITLED "INFORMATION INTEROPERABILITY," DATED AUGUST 13, 1997

B-5.1. GENERAL

1. Use "C4ISR" (Command, Control, Communications, Computers, Intelligence, Surveillance, and
Reconnaissance) instead of "C4I" in the body of the document. RATIONALE: Integration

and interoperability of the entire range of C4ISR, not just C4I, systems in the DOD "system-of-systems" should be the goal of the proposed regulation.

2. The document should contain a definitions section comparable to that in earlier versions of DODI 4630.8. RATIONALE: Definitions of critical terms is required for understanding and proper C/S/A application of the proposed regulation.

B-5.2. SPECIFIC

1. References: Add "(k) ASD(C3I) Memo, "Defense Information Infrastructure (DII) Master Plan", Appendix C, December 19, 1996", "(l) OMB Memorandum M-97-16 "Information Technology Architectures," June 18, 1997", and "(m) OMB Memorandum M-97-02, "Funding Information Systems Investments," October 25, 1996". RATIONALE: These additional references are recommended to fully incorporate the new Chief Information Officer and C4ISR architecture paradigms in DOD and to enable the incorporation of our following comments.

2. Paragraph 1.3, Line 2: Insert "and Joint Vision 2010" after "(C4IFTW)". Also, make some mention of regulation's purpose regarding surveillance and reconnaissance systems in Section 1. RATIONALE: JV 2010 has enormous implications for DOD's present and future C4ISR "systems-of-systems."

3. Paragraph 1.4, First Line: Add "C4ISR architectures and" before "security". RATIONALE: Recommended to fully incorporate the new C4ISR architecture paradigms in DOD and to enable the incorporation of our following comments.

4. Section 2: Add additional subparagraph: "The regulation provides for adherence to the architecture types (Operational, Systems, and Technical Architectures) prescribed and defined in reference (k)." RATIONALE: Corrects the scope of the proposed regulation to cover implementation and use of the new C4ISR architecture views.

5. Paragraph 3.1.5: Add "and applicable Operational and Systems Architectures" after "(JTA)." RATIONALE: Helps the proposed regulation institutionalize these new C4ISR architecture paradigms in DOD.

6. Paragraph 3.2.1:

        a. Line 1: Insert "Operational Architectures and" after "All". RATIONALE: OMB guidance of June 18, 1997 (recommended new reference (l)), requires that an Operational Architecture form the context for each new requirements document and later Exhibit 43 data.

        b. Line 8: Use "C4ISR" instead of "intelligence and C4". RATIONALE: See general comment 1, above.

7. Paragraph 3.2.2, Line 3: After "JTA", insert "and the C4ISR Architecture Framework (reference (k))". RATIONALE: This points the reader to the new C4ISR architecture constructs that are defined by the framework document.

8. Section 4: Add the following paragraph on the systems interoperability-related/integration-related responsibilities of the Military Intelligence Board (MIB):

        "4.X The MIB serves as a forum for the discussion of Defense intelligence requirements and intelligence support provided to the DOD components by the DOD intelligence components,

and as an advisory body to assist the Director, DIA, in carrying out assigned functions. The MIB is convened at the call of, and is chaired by, the Director, DIA. Specific MIB responsibilities include coordinating intelligence support to military operations; serving as a forum for discussion/development of coordinated positions on community substantive and resource issues; and providing oversight and direction to Defense Intelligence production, collection, and infrastructure." RATIONALE: Section 4 of the draft presently does not contain these MIB responsibilities for systems and communications matters.

9. Section 4: Add the following paragraph:

"4.1.X. As the DoD CIO develop, maintain, and facilitate the implementation of a sound and integrated information technology architecture for the Department (reference (l))." RATIONALE: Under Public Law 104-106 (Clinger-Cohen Act of 1996), OMB has charged Federal agency CIOs with the responsibility of developing, implementing, and maintaining an integrated agency ITA that generally conforms to the OMB model described in reference l.

10. Subsection 4.6: Add new subparagraph:

"4.6.X. DOD CIO policy and procedures, and DoD Architectures Coordination Council (ACC) guidance on Operational, Systems, and Technical Architectures, are followed." RATIONALE: The DOD CIO and the ACC are building policies and guidance which will impact systems development and interoperability in the DoD.

11. Paragraph 4.6.2: Add "..., with the DoD based Levels of Information System Interoperability (LISI) identified for each system" to the end of the sentence. RATIONALE: Adds LISI use to the document, with the goal of improved interoperability in the future.

12. Paragraph 4.6.3: Revise to read "For applicable systems, the following documents are submitted to Joint Staff (J-6) for interoperability approval: Operational Architectures, MNS, ORDs, CRDs, C4ISR Support Plans (DOD 5000.2-R, part 2.2.1) or equivalent documents for non-traditional approaches (e.g., CONOPS, Interoperability Plan for ACTDs); system JTA Standards Profile; Systems Architectures, and a summary list of all systems with which the system must interoperate." RATIONALE: Institutionalize the process for review and approval of C4ISR Architectures to insure interoperability with the JTA, future JOA, and any future JSA.

13. Paragraph 4.6.3, Line 2: Insert "Operational Architectures," before "MNS,". RATIONALE: Conformance/consistency with our comment 6.a, above.

14. Paragraph 4.7: Add additional paragraphs:

"4.7.X. Coordinate with the National Imaging and Mapping Agency (NIMA) in the development of national and DoD standards, end-to-end architectures, technical guidance, and other direction related to imagery, imagery intelligence, and geospatial information." RATIONALE: Implements a NIMA-DISA relationship under DoDD 5105.60.

"4.7.X. Develop and maintain the Levels of Information System Interoperability (LISI) reference model and profile to which DoD joint and combined systems are expected to comply." RATIONALE: Clarity.

15. Paragraph 4.7.1. Add "and the Levels of Information System Interoperability (LISI)" after "(COE)". RATIONALE: Adds LISI use to document and improve interoperability.

16. Paragraph 4.7.2:

    a. Change "(f)" to "(g)". RATIONALE: Believe this is the proper reference.

    b. This paragraph requires extensive clarification with respect to who "develops" C4ISR standards (DISA, NIMA, DIA, NSA, etc.) and who is "in charge of" the DoD C4ISR standards program (DISA/CFS, ACC/JTASG, MCEB/SCC, etc.).

17. Paragraph 4.9.2: Move to Paragraph 4.8. RATIONALE: This is more a DIA than a NSA responsibility.

18. Paragraph 4.10, Lines 3 and 4: Change "imagery and Mapping, Charting, and Geodesy (MC&G) data" to "imagery, imagery intelligence, and geospatial information". RATIONALE: Preferred and more current terms.

B-6. CLINGER-COHEN (ITMRA) COMPLIANCE MATRIX

1. Page 2 of Attached Matrix: Delete "Technical Architecture for Information Management (TAFIM)." RATIONALE: The TAFIM is now under review for possible realignment with current DOD architecture concepts. A possible outcome of that review could result in replacement of the TAFIM by the JTA.

B-7. DOD CIO BUSINESS PLAN, VERSION 1, MAY 1997

1. Page 10, Architectures Paragraph, Lines 6 and 7: The reference to "C4ISR Architectures Framework," Version 1.0, June 1996, will have to be updated with the formal release of Version 2.0 of the framework.

2. Page 10, Architectures Paragraph, Line 9: Insert "description" between "architectural" and "process". RATIONALE: The present wording, "architectural process for the DoD" implies that the "C4ISR Architectures Framework," Version 1.0, June 1996, contains the complete DoD architectural process. In fact, the framework contains only descriptions of the various OA/SA/TA products, **not** how to build each one or how they relate to/are used in the C/S/A long range planning, requirements generation, PPBS, acquisition, and operational support processes.

B-8. PROPOSED DRAFT DODD 8000.1 (REISSUANCE), "MANAGEMENT OF INFORMATION AND INFORMATION TECHNOLOGY," OCTOBER 8, 1997

B-8.1. GENERAL

1. The verb "shall" should be used in place of "will" throughout the draft. RATIONALE: Using the term removes any ambiguity as to applicability of the requirements of the proposed DODD.

B-8.2. SPECIFIC

1. Page 3, Paragraph 4.1.1.1, First Line: Insert "(such as integrated information technology architectures)" after "..processes and tools". RATIONALE: Highlights the use of these IT architectures in completing the four key steps that follow in the paragraph.

2. Page 15, Paragraph E2.1.14, Second Line: Insert "or military operation" after "DoD function". RATIONALE: Aligns the definition of Operational with the definition in the draft "DOD C4ISR Architecture Framework, Version 2.0, 20 August 1997"

3. Page 16, Paragraph E2.1.16: Change to "A description of the tasks, operational elements, and information flows required to accomplish or support a military operation." RATIONALE: Uses the new definition of Systems Architecture found in the draft "DOD C4ISR Architecture Framework, Version 2.0, 20 August 1997"

4. Page 16, Paragraph E2.1.17, Second Line: Change "the" to "system" RATIONALE: Aligns the definition of Technical Architecture with the definition in the draft "DOD C4ISR Architecture Framework, Version 2.0, 20 August 1997"

5. Page 19, Paragraph E3.6: A similar paragraph needs to describe the relationship between the DoD CIO Council and the DoD Architectures Coordination Council (ACC), chaired by ASD(C3I), USD(A&T), and JS/J-6. RATIONALE: Clarify the relationship of the two councils in regard to IT architectures policy, procedures, and coordination matters.

APPENDIX C

C4ISR SYSTEMS INTEGRATION MANAGEMENT

(C4ISR SIM)

FEASIBILITY STUDY OVERVIEW

14 OCTOBER 1997

1.0 INTRODUCTION

This final report of the C4ISR SIM Feasibility Study provides first the purpose of conducting the Feasibility Study; second, the methodology used to conduct the Feasibility Study; third the findings of the effort; fourth the analysis of the findings that were conducted; and fifth, the recommendations of the Feasibility Study.

a. Purpose: The Feasibility Study is the method selected by CISA to respond to two separate recommendations resulting from the 1996 CIAP/CINC conference and the 1996 C4ISR Integration Task Force (ITF):

"Evaluate the potential of implementing DoDIIS Systems Integration Management (SIM) across DoD."

b. Timing: The C4ISR Feasibility Study was conducted from 4 April - 7 October 1997.

2.0 C4ISR SIM FEASIBILITY STUDY

a. Methodology: The Feasibility Study consisted of the following phases:

o Phase I - Conduct a baseline analysis of DoDIIS SIM to include information flows, SIM products and their usage, SIM reporting structure, roles and responsibilities of System Integration Management Offices (SIMOs-- the operational elements of the SIM process). The resulting deliverable from this process is a case study of current DoDIIS SIM.

o Phase II - Using the DoDIIS SIM case study as a model, develop case studies on selected organizations to include CINC, Service, Agency and transitional increment   elements. The organizations selected were : Service: AF Intelligence; CINCs -- STRATCOM, PACOM, and SPACECOM; Agency: Defense Intelligence Agency; and the transitional increment -- GCCS for Command and Control. The case studies defined the operational SIM processes within each of the organizations as to what is working and what is not working, information flows, SIM products used and not used, along with additional products developed and used locally; SIM roles and responsibilities; SIM reporting structures; current staffing along with staffing issues and problems. Deliverables from this phase are case studies on each of the organizations, with the findings identified for each of the use of SIM within the organization. (**For this study GCCS did not have an active SIM process.)**

o Potential to integrate the SIM process and products into the C4ISR Architecture Framework document and attendant documentation;
o Potential to expand the DoDIIS SIM reporting structure (infrastructure) within the C4ISR or other expanded environment (e.g., Combat Support);
o Potential C4ISR SIM roles and responsibilities for the C4ISR SIMOs or integration offices at each echelon level, and the percentages of effort required to perform the function;
o Potential C4ISR SIM products to be used in establishing the C4ISR SIM program. These products were synchronized with the existing DoDIIS SIM products, GCCS products and the C4ISR Architecture Framework Version 2 products.
o Overview of existing reporting assets, methods to employ them, and the potential staffing levels.

b. Feasibility Study Findings: The following represent the major findings from each of the organizations :

(1) DoDIIS SIM Findings-- SIM is working very well within the DoDIIS community, and is very active in the migration system development and integration programs. The reporting hierarchy is working and actively reporting the transition to the migration systems as well as the DII/COE. DoDIIS is committed to complete the transition to the DII/COE by Version 4. The DoDIIS SIMO has instituted a new reporting fora to discuss integration and interoperability issues--the Command Roundtable forum. The roundtable meets quarterly and consists of all the DoDIIS SIMO representatives, and meets before the DoDIIS Executive Conference. All DoDIIS sites reporting under SIM are using the majority of the prescribed products to report the status and health of the program. Several of the DoDIIS sites that we met with stated that the DoDIIS Site Transition Methodology (DSTM) was time consuming, but one of the most useful products they had. It prepares the site for the FYDP and allow the site to work issues in advance with the appropriate program office and SIMO. The documentation tree which provides the SIM CONOPS, Handbook, Instructions to DEXAs (DoDIIS Executive Agents), and PM handbook provide a well defined program which allows the participants to follow a roadmap on how to reach their objective or future states. An active training program keeps the proper level of training in the field for the users. Using the documentation and products , the SIMOs have proven to be a valuable asset in the management and integration of information technology within DoDIIS. One finding is interesting, in that configuration management is well defined at the site or node level through the DSTM program, but configuration management is done by individual project managers on their own, An enterprise wide configuration management program is missing, but a major effort underway by the DoDIIS SIMO is the re-establishment of an enterprise wide configuration management program.

(2) STRATCOM SIM Findings-- STRATCOM has the most robust SIM program of any one. They have established not only a robust intelligence SIM process, but have implemented the objective of this effort--achieving C4ISR or enterprise -wide SIM. Under the J6 an active program has been established outside of the Intelligence or DoDIIS program--but it is well grounded in the practices of DoDIIS SIM. In fact STRATCOM held its first C4ISR Integration Management Review (IMR) on 25 June 97. STRATCOM employees more personnel than other CINC SIMOs to accomplish SIM in that they fully have segmented the IT at STRATCOM and actively involve the users in defining and resolving the IT issues or problems. Segmentation requires up to 3 to 4 time s the normal SIM staffing levels. The DoDIIS SIM uses the full suite of SIM products, while the J6 SIM has implemented the program using seven key products. The SIM information flows are very segmented in both SIMOs and presents a very effective method of reporting and solving the issues. Both SIMOs actively share information especially where dependencies exist and an enterprise wide solution can be obtained. The Deputy CINC has even forwarded a letter to ASD/C3I indicating that this is a good practice and should become a DoD standard methodology. One of the first tasks of the C4ISR SIM analysis was to determine how many wide area backbones existed in the STRATCOM Headquarters. Using SIM, a multi-disciplined team conducted a baseline and found 25 wide area multi-level backbones at STRATCOM. They have a transition plan to reduce them from 25 to the current 7 to an objective of 4 wide area backbone networks, reducing operations & maintenance, and license costs.

(3) PACOM SIM Findings -- PACOM has an active DoDIIS SIM reporting structure and program. They have also accomplished partial C4ISR SIM by establishing a C4ISR SIMO in the J6 and reports on GCCS in the theater. PACOM has achieved an active theater wide reporting SIM structure for both DoDIIS and GCCS. DoDIIS reports by the PACOM ADP Server Site (PASS) node structure, while the J6 reports by the normal component route for GCCS status and information. There is a very robust information exchange between the DoDIIS and J6 SIMOs,

especially on system installation dates and dependencies. The DoDIIS SIMO uses the full set of products, while the J6 SIMO uses a limited set that have been modified for GCCS reporting. The DoDIIS structure holds integration management reviews (IMRs) quarterly through the Pacific Intelligence Agency Council (PIAC), while the J6 holds commanders conferences which deal with more than just SIM issues. The next step in this evolution will be to hold an enterprise wide IMR combining the DoDIIS, GCCS and adding other SIM information. The SIM staff at PACOM is 4 personnel, to include one at JICPAC; the J6 SIMO originally had one person, but is underway to expand to 5 personnel within existing staff. PACOM used the SIM methodology as the linchpin of the PACNET 21 program, where 12 existing secret and below backbones at PACOM headquarters are being reduced to 4.

(4) SPACECOM SIM Findings -- SPACECOM SIM is limited to the DoDIIS systems located within the J2. There is no enterprise wide SIM function, however in a recent visit during this study, there were some strong indications that this expansion was under consideration. SPACECOM has excellent reporting channels established to cover the entire Colorado Springs area, as well as their subcomponent commands. Our study found that this was one of the best DoDIIS SIM operations. They use the full suite of SIM products and have created several other products that they use daily. Also, SPACECOM has established segmentation within the Imagery functional area, and the SPACECOM staffing level (6 FTEs) is slightly higher than the average CINC SIMO. The IMR that is held monthly, is very sound and also includes the J3 systems interfaces for reporting status. SPACECOM SIMO has established a DoDIIS and GDIP first--they use the SIMO data to build the CINCs Intel information technology budget, providing detailed information to the GDIP tier III levels. This is a practice that other CINCs using the GDIP should closely examine for adoption.

(5) DIA SIM Findings - This is the only SIMO within DIA, and it is reporting at the enterprise level to include intelligence , command and control, personnel, logistics, administrative, finance systems (over 250). This is the largest number of systems or applications being monitored at any one DoDIIS location. The DIA SIMO has established reporting channels among and between the different organizational elements within DIA. However, at times the required data has not been forthcoming from the respective departments and has impacted a system on occasion. Reporting channels are also being established with AFMIC and MSIC to report on system upgrades and installations. This SIMO uses the full set of DoDIIS SIM products, and has actually modified some to handle the shear volume of systems. The staffing levels are adequate (10 FTEs) but since this is the only National Agency SIMO it is hard to state if this level is the average. They accomplish the full compliment of roles and responsibilities.

(6) AF Intelligence Findings -- This SIMO functions as the Service level SIMO for intelligence only. Well defined reporting channels have been established that include not only CINCs under AF intelligence funding, but also AF sites that are funded through GDIP. The SIMO does an excellent job in rolling up the requirements and totals to present a clear and concise AF picture of GDIP requirements and costs. The full suite of DoDIIS SIM products are used, for baselining as well as updating new changes. The AF SIMO has also developed an on-line database that provides formats and products that will allow sites or nodes to create the existing DoDIIS Site Transition Methodology (DSTM), and reduce the production time greatly. The staffing levels are higher (6 FTEs) than for other Service level SIMOs (3-4).

(7) GCCS SIM Findings -- Currently the GCCS program does not have a formal SIM reporting structure, however in designing the GCCS reports and structure, the leaders were very close to the DoDIIS SIM formats. Our analysis indicated that there is a 92% overlap in the commonality of the GCCS and DoDIIS SIM products. Only 5 products had significant format differences. Additionally, there is the same type of overlap between where the DoDIIS SIM

organizations and the GCCS organizations are located. Sixty eight percent of the units are co-located at the same places. Additionally, each GCCS location requires a minimum of 2 to a maximum of 8 personnel who perform similar functions (e.g., configuration management, planning, installation scheduling or upgrades), providing a key source of potential personnel. Although two thirds of the sites are co-located, the GCCS does not appear to have as an active reporting structure that DoDIIS SIM allows. GCCS focuses more on the site.

c. Other Feasibility Study Findings:

(1) Integration of SIM & SIM Products into the Architecture Framework:

Analysis revealed that with the inclusion of key SIM products into the version 2 of the Framework, that SIM can be the change management methodology for changes in the Systems Architectures for both IT projects and integration and installation at sites. SIM provides a roadmap between the baseline as is architectures and the objective architectures. Version 2 of the Architecture Framework will include up to 5 major SIM products in the preparation of Systems Architectures. The only remaining SIM products that are not included in this version are the project schedules and the integrated site installation schedules and dependencies, and the roll-ups of these slides to get CINC, Service/Agency or Domain wide master schedules.

(2) Extension of the DoDIIS Reporting Infrastructure to C4ISR:

Under the DoDIIS SIM, there is one major funding source, The General Defense Intelligence Program (GDIP) which allows for resource reallocation among the major Services. Once the SIM program expands to the C4ISR environment, all eleven major force programs (MFPs) are involved and each of these has separate funding authorities . These multiple funding authorities, make the establishment of the centralized structure within C4ISR Service echelon very tenuous.

o The DoDIIS reporting infrastructure is currently being implemented at two of the CINCs today with a third establishing the process. STRATCOM and PACOM have proven this concept works at the level even for reporting purposes for both intelligence and command and control (C2). SOCOM is also establishing an enterprise wide C4ISR SIM that integrates program 2, 3, 6, and 11 systems and acquisition oversight.

o There are several options for C4ISR service participation which include:

oo Integrate the proposed C4ISR SIM products into the individual service e systems integration process: or

oo Establish "Domain Integration Offices within the Service for Intelligence, Command & Control, and Combat Support. These domain entities will consolidate the reporting requirements for the "domain" from a Service Level. If this occurs, a decision will be required to include the Surveillance & Reconnaissance (S&R) with the Intelligence entity or create a separate one for S&R.

o Establish "Domain SIMOs" for Intelligence, Command & Control, and Combat Support above the service level to allow consolidation and reporting at the functional or domain level.

(3) Determine the potential C4ISR SIM Roles and Responsibilities

Analysis indicated a very high correlation between the DoDIIS SIM roles and responsibilities and the C4ISR SIM responsibilities. The major differences were the addition of the "domain level"

responsibilities , and the introduction of the Architecture Framework products and formats. These will have an impact on the development of the Site Transition Plan (STP) in terms of the products used and the formats.

   (4) Potential C4ISR SIM Products

An analysis was conducted between the Architecture Framework Version 2 products, GCCS products, and the DoDIIS SIM products. Where there was an overlap or duplication of product, the framework products took precedence. These product include:

   o Node Transition Templates   (V2)
   o Node Configuration Templates (V2)
   o Functional Interface to Systems Templates (V2)
   o Infrastructure Services Interface to Systems Template (V3)
   o Integrated Project Schedules (Node & Individual System)
   o Integrated Site Systems Installation & Dependencies Template
   o Transition Increment Template (Wishbone, V1 & V2)
   o System Quad Chart
   o Evaluation Criteria (Development & Site Integration)
   o Information Technology Portfolio Management Cost Model

   (5) Estimated Reporting Assets

A key point of this analysis is to determine the estimated reporting assets that are required to perform SIM at the different echelons. The analysis focused on the premise of:

   "**Don't change what the assets do--change the way they report."**
      Implement common business practices across the domain.

With this as the driving force, the following estimates indicate the reporting assets needed by echelon level and focus on using existing assets to conduct the reporting and analysis.

Level	DoDIIS	C2	CSS	C4ISR
C4ISR				6-8
Domain	10	5- 6	5-6	
Service (Per Domain)	3-7	2-3	2-3	
Agency	8-10			
CINC	3-11	2-3	2-3	
Node/Component	1-2	1	1	

Note: DoDIIS assets are existing
      C2 assets exist, performing identical functions to SIM

3.0 Recommendations

The following are the recommendations based on the findings and the analysis of the Feasibility Study results:

a. The findings of the Feasibility Study support extending DoDIIS SIM to C4ISR.

b. Accept SIM integration into the C4ISR Architecture Framework as the change management mechanism for Systems Architectures

(1) Complete the phased integration of SIM products into the Framework by V3.

c. Accept the C4ISR Framework as the basis for two phases in the SIM cycle

(1) Establishing Policy & Guidance

(2) Establishing Baselines

d. Accept the initial C4ISR SIM products as the starting point for reporting C4ISR SIM.

e. Extend the DoDIIS SIM reporting infrastructure to C4ISR SIM in the following manner using existing reporting assets to the greatest extent possible:

(1) Implement the infrastructure at CINC echelons and below;

(2) Implement the two phased approach for the Service Level

(a) Integrate key SIM products into the Service systems integration process for a period of six months;

(b) Establish Service "domain integration entities" for intelligence, command & control, and combat support after the initial six month period.

(3) Implement Intelligence, C2, and CSS "Domain or Functional" Integration Entities to consolidate the functional requirements for their respective domains.

(4) Implement a C4ISR or DoD SIMO to develop policy and guidance, consolidate, analyze, and provide recommendations across DoD/C4ISR.

4.0 Proof of Concept

Request J6 recommendation to proceed with Phase II: Proof of concept that the recommendations work by integrating DoDIIS SIM and GCCS using the recommended products and reporting structure.

      a. Will require approval by ASD/C3I.

      b. Will require modification to the existing SIM training program;

      c. Will be conducted at limited locations (determined by GCCS and DoDIIS).

      d. Period of test: 12 months from approval.