

Standardized Electromagnetic Environmental Effects (E³) and Spectrum Supportability (SS) Requirements for Navy and Marine Corps Acquisition Documents

Prepared by the US Navy Tri-SYSCOM E³ IPT

The Navy Tri-SYSCOM E³ Integrated Product Team (IPT) prepared this guide to assist Navy and Marine Corps acquisition programs in preparing acquisition procurement documentation to ensure that Electromagnetic Environmental Effects (E³) and Spectrum Supportability (SS) requirements are appropriately and adequately addressed in all phases of the acquisition process.

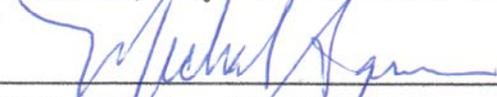
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Standardized Electromagnetic Environmental Effects (E³) & Spectrum Supportability (SS) Requirements for Various Navy & USMC Acquisition Documents

INTRODUCTION

Purpose

The Navy/Marine Corps Tri-SYSCOM E3 Integrated Product Team (IPT) has prepared this document for the purpose of assisting Navy and USMC acquisition programs in the preparation of acquisition/procurement documentation to ensure that Electromagnetic Environmental Effects (E3) and Spectrum Supportability (SS) requirements are appropriately and adequately addressed in all phases of the acquisition process.

For those that need to understand the organizational, process, and documentation relationships we have provided a detailed description within this introduction to explain each document's intent, content, and how it serves the acquisition community in accomplishing delivery of the product to the war fighter.

If you have the task of reviewing JCIDS, FORCENet documents and various other documents for E³ and SS requirements and know which document you are reviewing, you can go directly to that documents section, i.e., NR-KPP, ISP/ICD/CDD/CPD via the hyperlinks. We provide you with what each document requires, an interpretation of those requirements, and suggested "boiler plate" statements under the appropriate document that will be of use in ensuring E³ and SS requirements are being addressed appropriately addressed within that document. Furthermore, there are checklists provided for several Systems Engineering Technical Reviews that can be used to assess the progress being made by the contractor at reducing the risk of the program as it relates to E3 and Spectrum Management.

Applicability

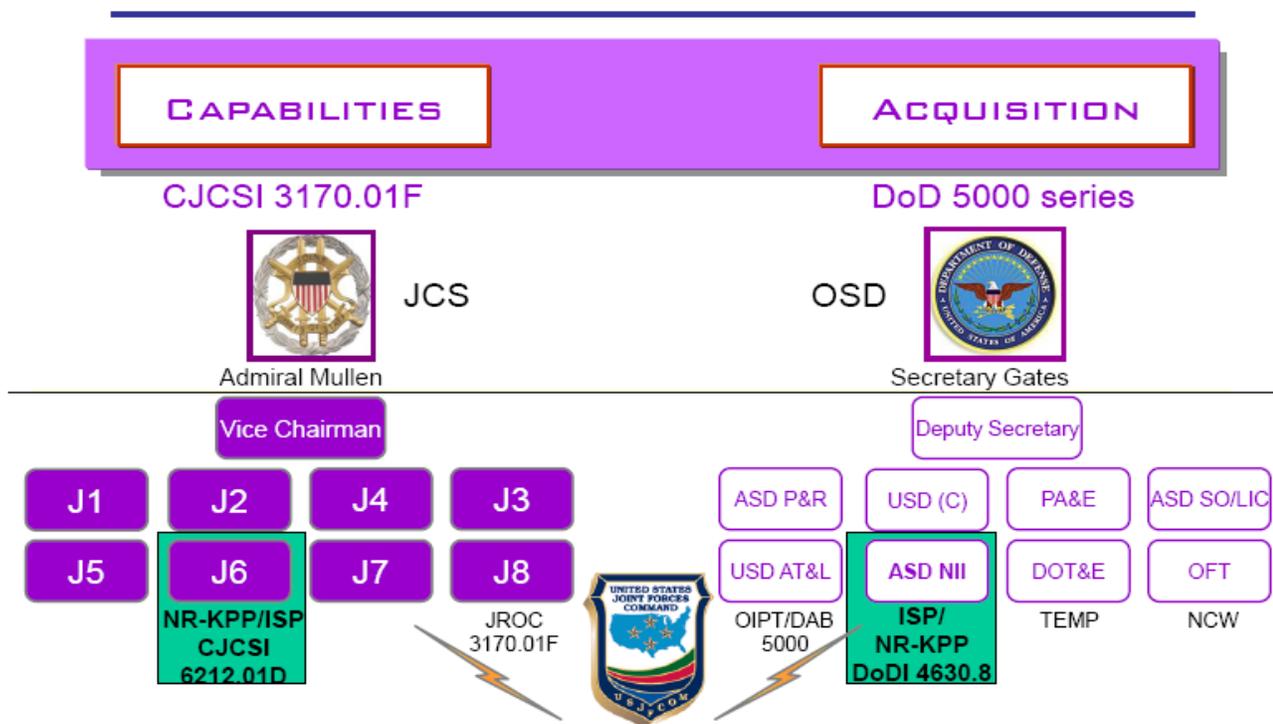
The requirement to impose E3 control and ensure Spectrum Supportability in the weapons system acquisition cycle is called out in a variety of policies, directives, and memos. Each document section of this document will state the standard, directive, or other documentation that was used to develop that section.

This information is provided as resource and guidance. Feel free to tailor these requirements for each acquisition program as necessary. ***It is highly recommended that the preparer of these documents engage the requisite Navy E3 office for assistance.***

Overview

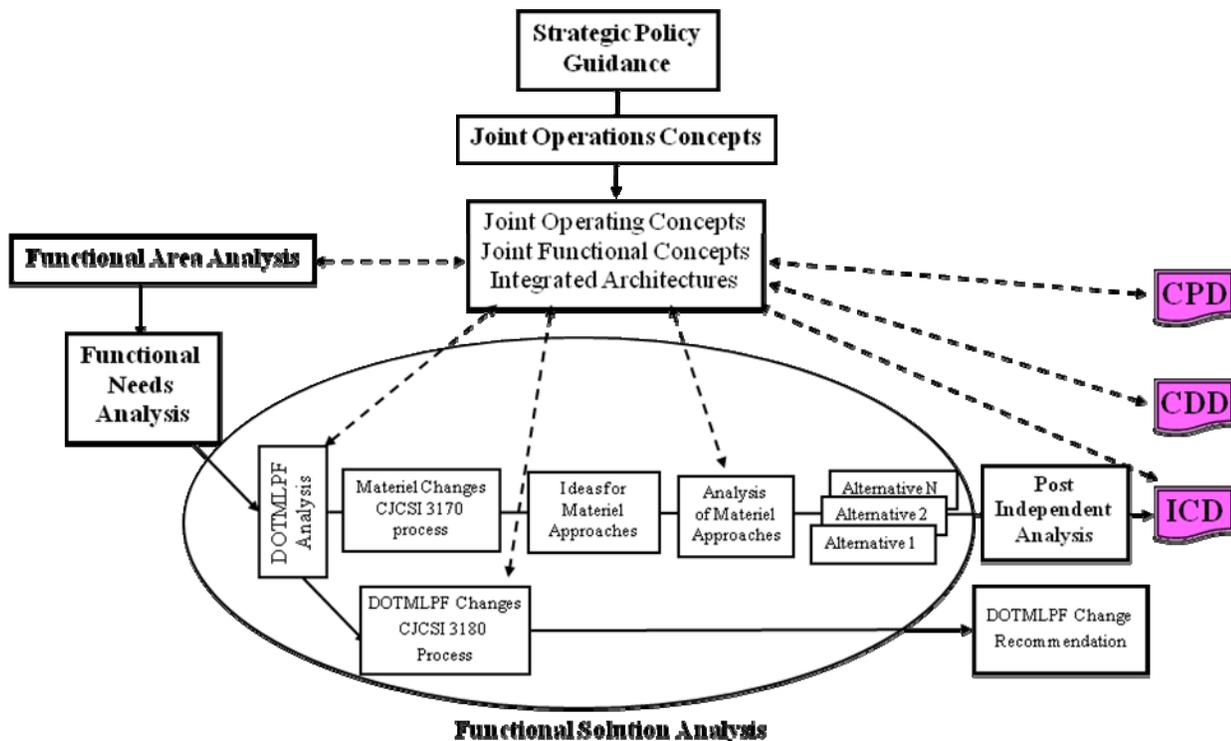
There are three key processes in the DOD that must work in concert to deliver the capabilities required by the warfighter: the capabilities (or requirements) generation process; the acquisition process; and the Planning, Programming, Budget, and Execution (PPBE) process. To field the capabilities our war fighters need, these processes must be aligned to ensure consistent decisions are made. The PPBE process will not be discussed in this document, because this document is aimed at E3 and Spectrum Supportability technical contents in various documents. **Suffice it to say that the correct imposition of E3 and Spectrum requirements will have budget planning impacts.**

Key Joint/DoD Players



The above diagram gives a pictorial representation of the relationship between the key players in delivering systems to the warfighter. The main linkage is provided by CJCSI 3170.01 and DoDI 4630.8 in that they both state the use of the NR-KPP, ISP/ICD/CDD/CPD to accurately state the capabilities that are necessary to be addressed in the acquisition and requirements documentation. Of course, we are concerned with the necessary content in all the documents to ensure the E³ and SS requirements are being addressed.

Joint Capabilities Integration and Development System



JCIDS validates and prioritizes joint war fighting requirements in a deliberate process. JCIDS works in concert with 5 other processes to deliver capabilities to the war fighter:

- Joint Concepts (J7)
- Guidance Analytic Agenda (OSD (P)/J-8)
- Concepts Strategic Guidance (OSD (P))
- Management DoD 5000 (OSD AT&L)
- Management PPBE (OSD (C/PA&E))

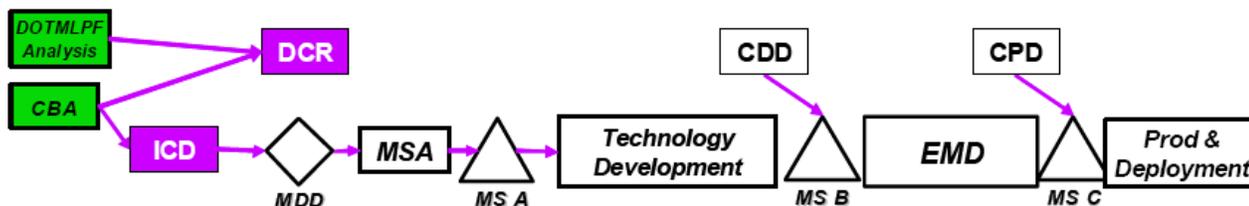
JCIDS Responsibilities

- Ensures the joint force has the capabilities to perform across the range of operations
- Is a primary interface to the DOD acquisition system
- Implements an integrated process to guide new capabilities development
- A key linkage on how the future joint force will fight
- Provides the analytic baselines to support studies to inform capability development
- Leverages expertise to identify improvements to existing capabilities and to develop new war fighting capabilities

JCIDS Document Descriptions (from CJCSI 3170.01E)

Services and other DOD components may develop ideas and concepts leading to draft JCDs, ICDs, CDDs, CPDs and joint DCRs. Whether a new materiel proposal proceeds initially to acquisition concept decision or Milestone A, B or C depends on criteria specified in DoDD 5000.1 and DoDI 5000.2. JCDs are developed to identify joint capability needs that will be further analyzed by sponsors for possible solutions. An ICD will be generated to define the capability in a joint context, review the options to provide the capability and ensure that all DOTMLPF and policy alternatives, impacts and constraints have been adequately considered. Programs that have already completed acquisition Milestone A or beyond are not required to update the MNS with an ICD. In certain cases where ACAT II or below programs proceed directly to Milestone B or C, a waiver to the ICD requirement may be requested from the Joint Staff/J-8. All initiatives transitioning to the acquisition process will have a corresponding validated and approved CDD and/or CPD prior to entering Milestone B or C, respectively. For joint non-materiel approaches, the sponsor will generate a joint DCR to document the approach. Sponsor specific non-materiel approaches will be implemented outside of JCIDS through sponsor processes. Brief descriptions of the documents are provided below.

CJCSI 3170.01G / CJCSM 3170.01C are the documents that establish the policies of the JCIDS process for identifying the capabilities requirements and putting them into a process to achieve those capabilities. They do not get into the content of the ISP, ICD, CDD, or CPD. That is left up to DoDI 4630.8 and CJCSI 6212.01E to describe the format and content of each of the documents. They focus on the requirements process as implemented in JCIDS as depicted below.



The JCIDS process is initiated through the execution of a Capabilities-Based Assessment (CBA). The objective of the CBA is to validate capability gap(s) by providing: identification of the mission; the capabilities required and their associated operational characteristics and attributes; capability gaps and associated operational risks; an assessment of the viability of a non-materiel solution; and a potential recommendation on a type of solution (transformational, evolutionary, or information technology) to be pursued. The results of the CBA are documented in one of two documents. If only non-materiel solutions are recommended or a non-materiel solution can be implemented independent of proposed materiel needs, a joint doctrine, organization, training, materiel, leadership and education, personnel, or facilities (DOTMLPF) Change Recommendation (DCR) is produced. If materiel solutions are to be pursued, an ICD is produced. The CBA is the most common entry point into JCIDS; however, gaps identified through DOTMLPF analysis may also be addressed through the joint DCR.

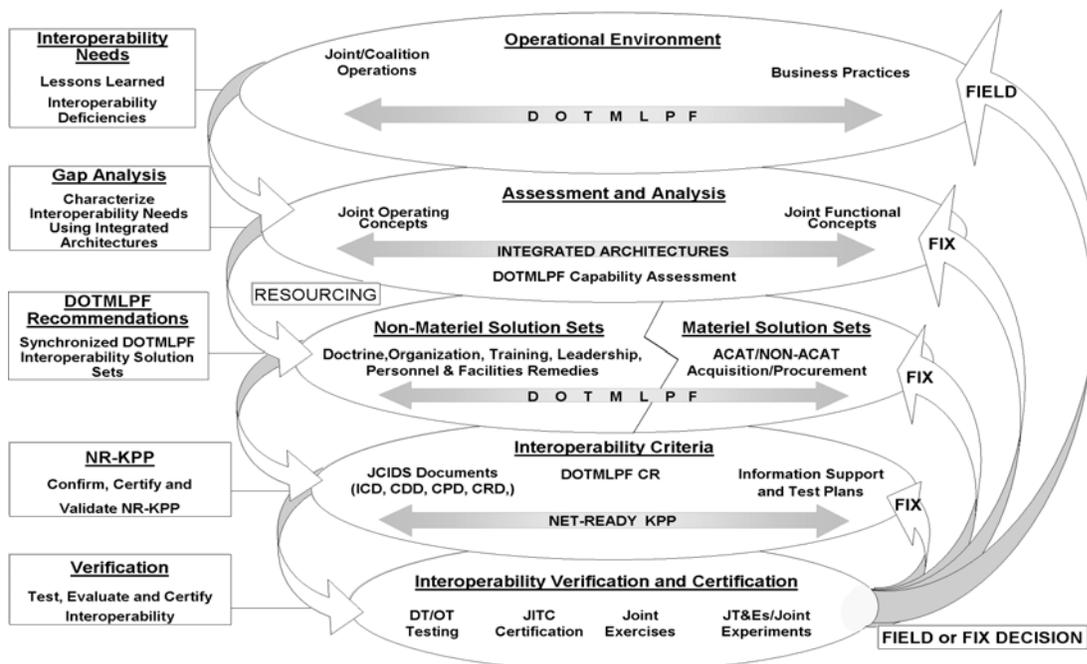
DoDI 4630.8

PROCEDURES FOR INTEROPERABILITY AND SUPPORTABILITY OF INFORMATION TECHNOLOGY (IT) AND NATIONAL SECURITY SYSTEMS (NSS)

- Implements a capability-focused, effects-based approach to advance IT and NSS interoperability and supportability throughout the Department of Defense (DoD). This approach incorporates both materiel (acquisition or procurement) and non-materiel (doctrine, organizational, training, leadership and education, personnel, and facilities) aspects to ensure life-cycle interoperability and supportability of IT and NSS throughout the Department of Defense.
- Implements the Net-Ready Key Performance Parameter (NR-KPP) to assess net-ready attributes required for both the technical exchange of information and the end-to-end operational effectiveness of that exchange. The NR-KPP replaces the Interoperability KPP and incorporates net-centric concepts for achieving IT and NSS interoperability and supportability.
- States in 6.2.2.5.3 that the DoD Components shall develop an ISP for all ACAT-designated programs. Format, content, and process for the ISP provide a mechanism to identify and resolve implementation issues related to IT and NSS infrastructure and support elements. ISPs shall identify IT and NSS information needs, dependencies, and interface requirements, focusing on interoperability, supportability, and sufficiency.
- States in 5.1.7 the establishment, in coordination with the USD(AT&L), the DOT&E, the Chairman of the Joint Chiefs of Staff, and the Commander, USJFCOM, process, procedures, format, and content guidance for developing and submitting Acquisition Category (ACAT) and non-ACAT Information Support Plans (ISPs).

Capability-Focused, Effects-Based Interoperability Process

(Figure F1. DODI 4630.8, June 30, 2004)



As can be seen from the above diagram the DoD uses the ICD, CDD, CPD, and ISP via the NR-KPP to ensure IT and NSS interoperability and supportability are addressed. The content of DoDI 4630.8 solidifies the DoD's commitment to use the JCIDS process. It also defines the NR-KPP as the link between the acquisition (ISP) and capability (CDD/CPD) communities.

CJCSI 6212.01E

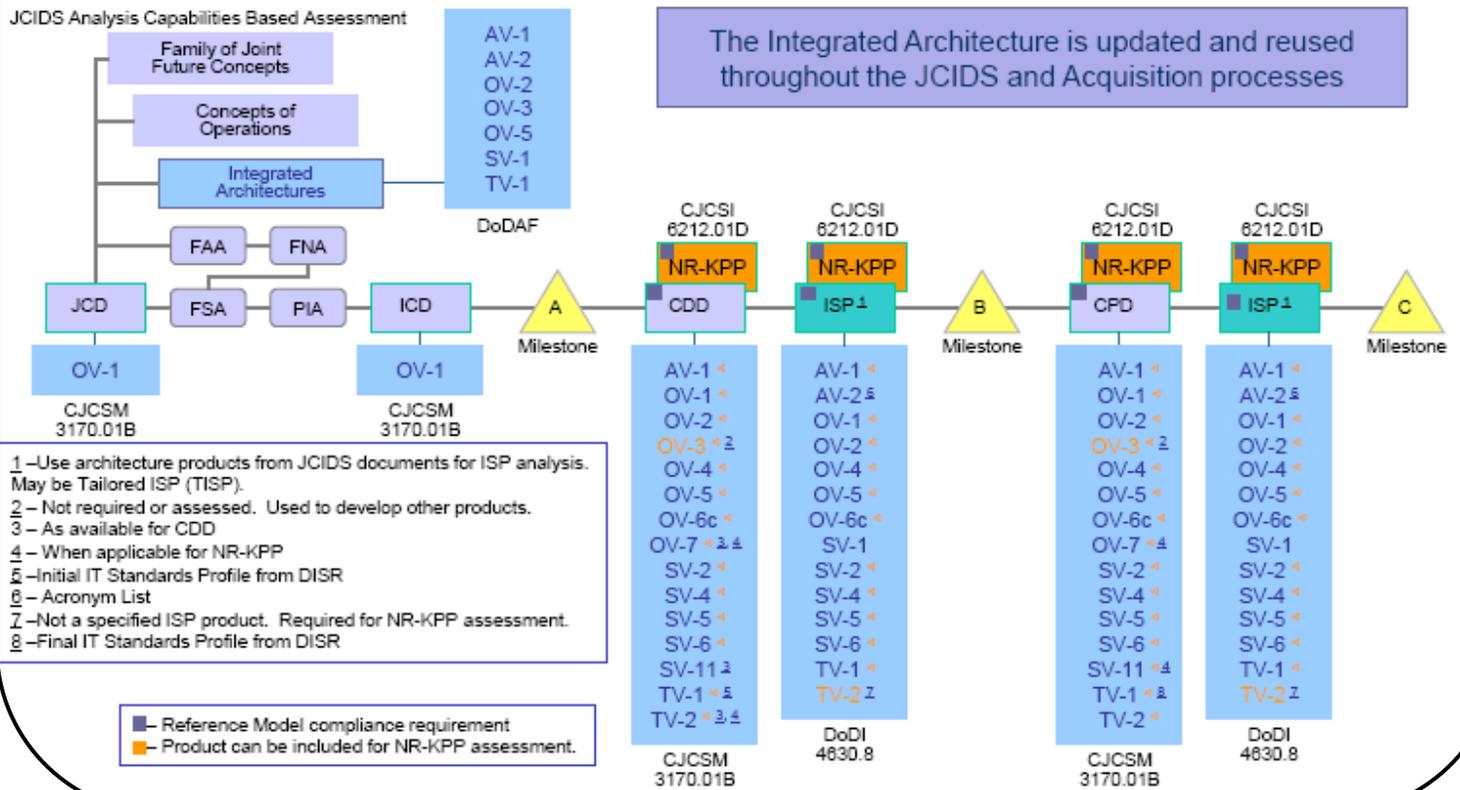
INTEROPERABILITY AND SUPPORTABILITY OF INFORMATION TECHNOLOGY AND NATIONAL SECURITY SYSTEMS

CJCSI 6212.01E provides the Joint Staff policy to assure that DOD components develop, acquire, and deploy IT and NSS that (1) meet the essential operational needs of US forces; (2) are interoperable with existing and proposed IT and NSS; (3) are supportable over the existing and planned global information grid; (4) are interoperable with allies and coalition partners; (5) are net-ready; and (6) allow US forces to protect mission essential data; detect and respond to network intrusion/system compromise; and restore mission essential data. The major components are as follows:

- A. Establishes policies and procedures for developing, coordinating, reviewing, and approving Information Technology (IT) and National Security System (NSS) Interoperability and Supportability (I&S) needs.
- B. Establishes procedures to perform I&S Certification and J-6 System Validation of Joint Capabilities Integration and Development System (JCIDS)
- C. Acquisition Category (ACAT) programs/systems
- D. Establishes procedures to perform I&S Certification and J-6 System Validation of Information Support Plans (ISPs) for all non-ACAT and fielded programs/systems.
- E. Defines the four elements of the Net-Ready Key Performance Parameter (NR-KPP)
 - 1. Compliance with the Net-Centric Operations and Warfare Reference Model (NCOW RM)
 - 2. Integrated Architecture Products
 - 3. Compliance with Applicable Key Interface Profiles
 - 4. Compliance with DOD Information Assurance Requirements
- F. Provides guidance for NR-KPP development and assessment.
- G. Establishes procedures for Joint Interoperability Test Command (JITC) Joint Interoperability Test Certification.
- H. Joint Capability Document (JCD) and Initial Capabilities Document (ICD). The NR-KPP is not required in and Interoperability and Supportability Certification is not provided for these capability documents.
- I. All CDDs and CPDs for systems that exchange information with external systems will be evaluated and certified for Interoperability and Supportability.
- J. The NR-KPP must be included in all CDDs, CPDs, and ISPs, describing systems that send and/or receive information with external systems.

INTEGRATED ARCHITECTURE

(Requirements & Acquisition Processes)



The above diagram gives an overall time and submittal relationship between the Capabilities (ISP) and Acquisition (JCID) Processes and Documents required for a successful program.

Of course, the program will dictate which documents will be required depending on the nature of the program. As can be seen, each program has a minimum amount of information that is required for that document, AND optional inclusions based on the program, determined by the program manager.

Refer to the noted CJCSI, CJCSM, and DoDI standards/directives contained in the [References](#) section of this document for more information.

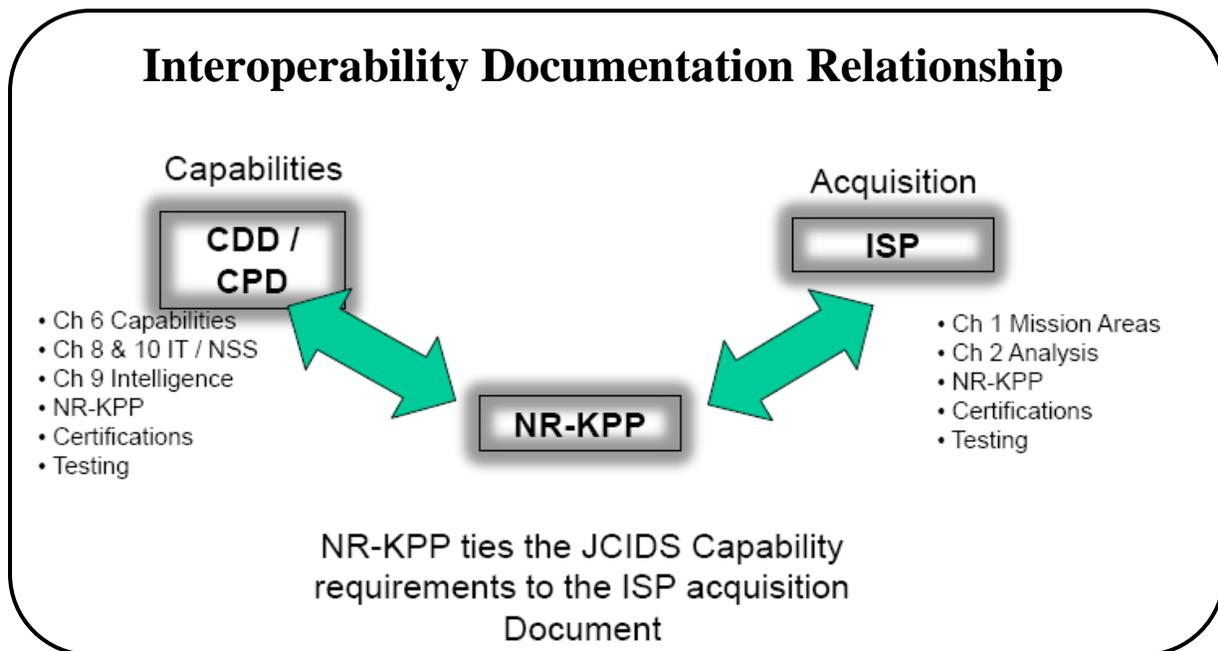
JCIDS-Required Mandatory Integrated Architecture Products

	All Views	AV-1	<i>Scope, purpose, intended users, environment depicted, analytical findings</i>
	All Views	AV-2	<i>Architecture data repository with definitions of all terms used in all products</i>
	Operational	OV-1	<i>High-level Operational Concept Graphic</i>
	Operational	OV-2	<i>Operational Node Connectivity Description</i>
	Operational	OV-4	<i>Organizational Relationships Chart</i>
	Operational	OV-5	<i>Operational Activity Model</i>
	Operational	OV-6c	<i>Operational Event-Trace Description</i>
*	Operational	OV-7	<i>Logical Data Model</i>
	Systems	SV-2	<i>Systems Communications Description</i>
	Systems	SV-4	<i>Systems Functionality Description</i>
	Systems	SV-5	<i>Operational Activity to System Function Traceability Matrix</i>
	Systems	SV-6	<i>Systems Data Exchange Matrix</i>
*	Systems	SV-11	<i>Physical Schema</i>
	Technical	TV-1	<i>Technical Standards Profile</i>
*	Technical	TV-2	<i>Technical Standards Profile</i>

*May not be required for CDD / CPD

The above chart is a list of JCIDS Mandated Integrated Architecture Products. CJCSI 6212.01D and DODI 4630.8 mandate that the NR-KPP and ISP to be prepared in compliance to the Information Assurance (IA) requirements set forth in the DOD 8500 and CJCS 6510 Series documents. The above chart reflects the integrated Architecture, a formal description of the enterprise, using formal engineering notations and matrices that are being used. The product and its interface dependencies determines the complexity of the architecture developed.

NR-KPP



The NR-KPP is the most important link between the JCIDS (capabilities) documentation (ICD, CDD, CPD) and the ISP (acquisition) function as depicted above.

Key Performance Parameters (KPPs)

- Those system attributes considered most essential for an effective military capability.
- Basis to achieve the overall desired capabilities for the system during the applicable increment.
- Failure to meet a CDD or CPD KPP threshold may result in a reevaluation, reassessment, or termination of the program, or a modification of the content of production increments.

CJCSI 6212.01E, Enclosure D, subparagraph 3 States:

The NR-KPP is used to assess information needs, information timeliness, information assurance, joint interoperability and supportability, and net-ready attributes required for both the technical exchange of information and the end-to-end operational effectiveness of that exchange. The NR-KPP consists of measurable, testable, or calculable characteristics and/or performance metrics required for the timely, accurate, and complete exchange and use of information.

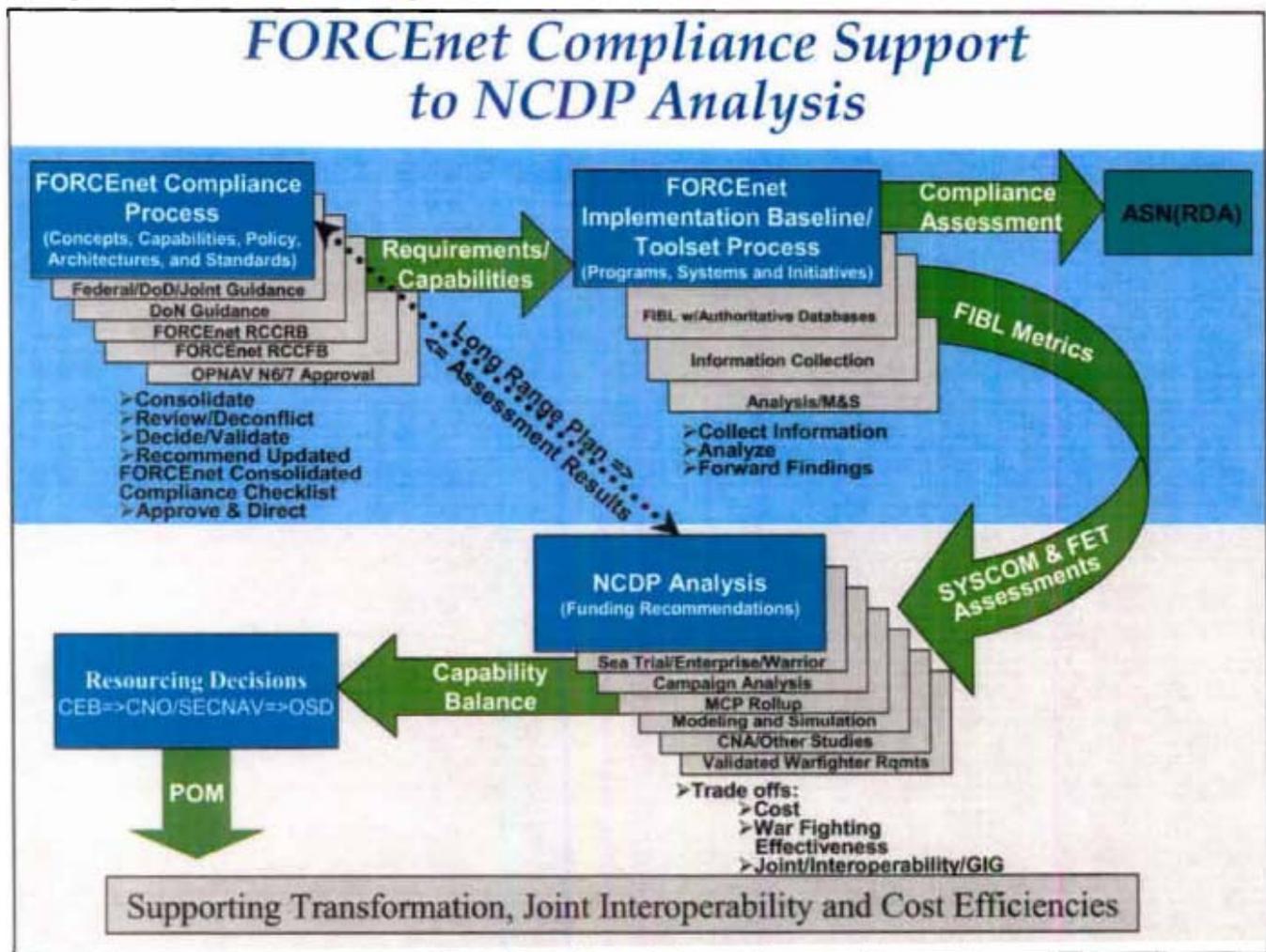
The **NR-KPP must be included in all CDDs, CPDs, and ISPs**, describing systems that send and/or receive information with external systems. This documented NR-KPP shall be used in analyzing, identifying and describing IT and NSS interoperability, and test strategies in the Test and Evaluation Master Plan (TEMP) in accordance with sound systems engineering practices. Programs should synchronize documentation from the capabilities documents down through acquisition documentation including the TEMP, Systems Engineering Plan (SEP) and the Acquisition Program Baseline (APB).

FORCEnet

Navy systems have the additional requirement to comply with FORCEnet requirements as outlined in N6-N7 FORCEnet Compliance Policy memo of 27 May 2005. The U.S. Navy's operational vision for the 21st Century is Sea Power 21. This vision is founded on three interrelated and complementary concepts: (1) Sea Strike, projecting precise and persistent naval offensive firepower; (2) Sea Shield, protecting United States national interests with layered global defensive power based on sustained forward presence, sea domination, and distributed and networked intelligence; and (3) Sea Basing, the foundation from which offensive and defensive power is projected making both Sea Strike and Sea Shield realities.

The three fundamental concepts of Sea Power 21 will be linked together and enabled by FORCEnet, the Navy's instantiation of Network Centric Warfare (NCW). It is architecture of warriors, weapons, sensors, networks, decision aids, and supporting systems designed to leverage military capabilities to achieve dominance across the battle space. FORCEnet will be a joint expeditionary, multi-tiered, multi-path sensor and weapons information network, featuring distributive pervasive Intelligence, Surveillance and Reconnaissance (ISR) and collaborative command and control, adaptive and automated decision aids and human-centric integration.

Interoperability of the FORCEnet process is as follows:



FORCEnet requirements are focused on and support JCIDS requirements and assist in further defining Naval implementation of the Net Ready Key Performance Parameter (NR-KPP). This is essential not only for development of effective war fighting capabilities, but also for the efficient management of Department resources. CNO (N6) shall assist program and resource sponsors by reviewing all Navy JCIDS documents against the current FCCC to ensure that applicable FORCEnet/NCOW requirements are being correctly and consistently incorporated into these documents.

Compliance of individual Navy programs, systems, and initiatives with joint interoperability guidance is critical to Navy transformation from platform-centric stand-alone systems to a capabilities-based NCO/W environment. The development and implementation of FORCEnet requirements is focused on supporting joint interoperability requirements of JCIDS and assists in further defining Naval implementation of the NetReady Key Performance Parameter (NR-KPP). This is essential not only for development of effective warfighting capabilities, but also for the efficient management of Department resources.

[Electromagnetic Environmental Effects/Spectrum Supportability Compliance Action List \(CAL 3.0\)](#) OPNAVINST 2400.20F, Enclosure 4 provides the framework for FORCEnet to ensure that Navy systems have met FORCEnet policy requirements for E3/Spectrum Supportability. FORCEnet policies require systems to have well-defined, E3 control performance and verification parameters, a spectrum supportability plan, as well as applications for the proper equipment frequency allocation.

The [FORCEnet Consolidated Compliance Checklist \(FCCC\)](#) is the primary vehicle at present to ensure all E3 and Spectrum Supportability requirements are addressed. It is the initial baseline for development of expanded FORCEnet requirements / capabilities and is the distillation of relevant DoD and DoN joint, net-centric, FORCEnet guidance. N6/N7 Division Directors shall use the FCCC as a guide and work with N71 when reviewing Navy JCIDS documents to ensure that Navy systems are FORCEnet compliant prior to submission to N8.

Program and resource sponsors shall use the current FORCEnet Consolidated Compliance Checklist (FCCC) to determine the Net-Centric Operations/Warfare (NCOW) and other applicable requirements for both tactical (war fighting) and non-tactical (business/support) IT systems, including NSS. The FCCC shall be validated, maintained, and updated by Deputy CNO (Communication Networks) (CNO (N6)).

Requests for reviews are requested by N6 and responses and comments are generated by the Point of Contacts or designated reviewers listed on the FCCC.

To obtain a current FORCEnet Consolidated Compliance Checklist (FCCC) or more information about FORCEnet contact:

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JOINT CAPABILITIES DOCUMENT (JCD)

Required by: CJCSI 3170.01G

Format: CJCSM 3170.01C

Milestone: Pre-MS A

- Captures the results of the FAA and FNA
- Defines capability gaps in terms of the functional area, the relevant range of military operations and the timeline under consideration.

The JCD identifies a set of capabilities that support a defined mission area utilizing associated Family of Joint Future Concepts, CONOPS or Unified Command Plan-assigned missions. The capabilities are identified by analyzing what is required across all functional areas to accomplish the mission. The gaps or redundancies are then identified by comparing the capability needs to the capabilities provided by existing or planned systems. The JCD will be used as a baseline for one or more functional solution analyses leading to the appropriate Initial Capabilities Document or joint doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) change recommendations, but cannot be used for the development of capability development or capability production documents. The JCD will be updated as changes are made to the supported Family of Joint Future Concepts, CONOPS or assigned missions. CJCSI 3170.01G deletes the Joint Capabilities Document (JCD) as an option resulting from a CBA. The function of the document has been incorporated into the Initial Capabilities Document (ICD).

General guidance:

The requirement for E3 control and Spectrum Supportability can be included in two separate areas, at the discretion of the document creator or reviewer:

Required Capability. Describe the capabilities required as identified during the FAA. These capabilities may require support from one or more functional areas. Describe the tasks and functions that are required for the capability to be successfully employed in accomplishing the mission.

Recommended Generic Statements:

For E3 Control: Resulting system operational performance or safety shall not be degraded by electromagnetic environmental effects (E³) effects.

For Spectrum Supportability: The XXXX capability shall comply with applicable DoD, Navy, Joint, National, and International spectrum management policies and regulations, as applicable.

Threat and Operational Environment.

Describe in general terms the operational environment in which the capability must be exercised and the manner in which the capability will be employed.

Recommended generic statement:

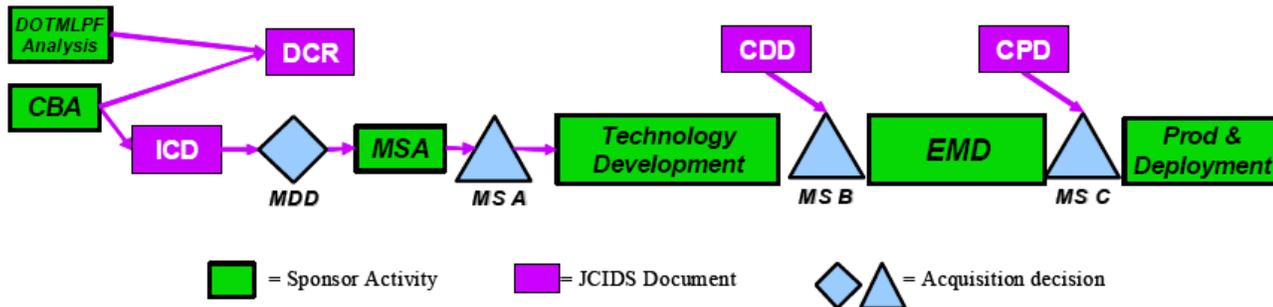
Systems and equipment developed and procured as a result of this Joint Capabilities Document must be electromagnetically self-compatible and compatible with all other systems and equipment operating in the intended operational electromagnetic environment (EME), both natural and man-made.

DOTMLPF CHANGE RECOMMENDATION (DCR)

Required by: CJCSI 3170.01G

Format: CJCSM 3170.01C

Milestone: Pre-MS A



As previously described, the JCIDS process is initiated through the execution of a CBA (capabilities-based assessment). The objective of the CBA is to validate capability gap(s) by providing: identification of the mission; the capabilities required and their associated operational characteristics and attributes; capability gaps and associated operational risks; an assessment of the viability of a non-materiel solution; and a potential recommendation on a type of solution (transformational, evolutionary, or information technology) to be pursued. The results of the CBA are documented in one of two documents. If **only non-materiel solutions are recommended or a non-materiel solution can be implemented** independent of proposed materiel needs, a joint doctrine, organization, training, materiel, leadership and education, personnel, or facilities (DOTMLPF) Change Recommendation (DCR) is produced. If materiel solutions are to be pursued, an ICD is produced.

No guidance on DCRs is provided in MIL-HDBK-237D. Note also that DCRs refer primarily to non-materiel changes, lessening issues related to E3 and spectrum supportability. The following is the description of the document from the CJCSI (emphasis added):

Joint DCRs are generated by combatant commands, Services or agencies when it is necessary to change joint DOTMLPF resources to meet a capability gap. The joint DCR focuses primarily on joint transformation efforts in the areas of doctrine, organization, training, materiel, leadership and education, personnel and facilities as well as policy. *The joint DCR process focuses on changes that are primarily non-materiel in nature, although there may be some associated materiel changes (commercial or nondevelopmental) required.* While it is recognized that DOTMLPF and policy changes are an integral part of any major acquisition program, those changes are addressed within the scope of the CDD/CPD and not through the joint DCR process. *Joint DCRs are normally referred to as “non-materiel” solutions,* while acquisition programs are referred to as “materiel” solutions. Joint DCRs may request additional numbers of existing commercial or non-developmental items.

Based on the description, it is unlikely that E3 or Spectrum considerations would be necessary in a DCR but since it's a possibility, there are a couple of areas in which possible E3 issues and/or spectrum compliance could be documented. From CJCSM 3170.01, Appendix A to Enclosure H:

CJCSM 3170.01C, Appendix A, Enclosure H States:

3. Description

Describe specifics of the proposal; address “who,” “what,” “when,” “how,” and “why.” Clearly state, in terms of major objectives, what the recommendation is intended to accomplish and how it could widen the qualitative superiority of joint forces over potential adversaries, close a capability gap (existing or projected) or otherwise enhance joint warfighting capabilities. Also include discussion of the following, as applicable:

c. Projected threat environment based on a DIA-validated threat.

8. Issues

a. Identify any issues (DOD treaties, protocols, agreements, legal issues, DOD roles, missions and functions, interagency, multinational, etc.) associated with implementing any element of the recommended findings in paragraph 5.

c. Identify interoperability implications.

RECOMMENDED GENERIC STATEMENT

For E3 Control: “Resulting system operational performance or safety shall not be degraded by electromagnetic environmental effects (E³) effects.”

For Spectrum Supportability: “Any resulting systems shall comply with applicable DoD, Navy, Joint, National, and International spectrum management policies and regulations, as applicable.”

INITIAL CAPABILITIES DOCUMENT (ICD)

Required by: CJCSI/CJCSM 3170.01/6212.01E

Milestone: Pre-MS A and MS A

An ICD summarizes a CBA and justifies the requirement for a materiel or non-materiel approach, or an approach that is a combination of materiel and non-materiel, to satisfy specific capability gap(s). It identifies required capabilities and defines the capability gap(s) in terms of the functional area, the relevant range of military operations, desired effects, time and doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) and policy implications and constraints. The ICD summarizes the results of the DOTMLPF and policy analysis and the DOTMLPF approaches (materiel and non-materiel) that may deliver the required capability. The outcome of an ICD could be one or more joint DCRs or recommendations to pursue materiel solutions.

The ICD is a tool that provides guidelines and performance standards to help services design, plan for, and budget for systems that function effectively in a Joint environment

- Initial Capabilities Document (ICD) (replaced MNS)
 - Captures results of JCIDS analysis
 - Identifies potential non-materiel and materiel approaches to addressing capability gaps
 - Supports Concept Decision, Analysis of Alternatives (AoA), Concept Refinement and Milestone A

Guidance From MIL-HDBK-237D

Mission Area ICDs typically address broad capability gaps in joint warfighting functions that, in most cases, do not directly translate into EM spectrum concerns such as E3 and SS functionality. However, it is appropriate to address E3 and SS functionality in the ICD when the operational capabilities, gaps, or shortcomings involve EM spectrum usage, access, or support areas such as cognitive radios that employ emerging spectrum technology waveforms, ultra-wideband systems, frequency management issues, and so forth.

When addressing E3 and SS in the ICD, shortcomings or technology gaps of existing capabilities that impact these requirements should be addressed. The ICD should explain how the deficiencies noted will be resolved or mitigated by the planned capability or technology. The ICD should also address regulatory compliance issues as applicable. For example, the Joint Tactical Radio System bridges a technology gap but at the same time it presents numerous SS concerns from EMI to HNA. These issues, in order to be effectively addressed, must be presented to decision-makers within the DoD, National, and International regulatory structure early in the requirement generation and acquisition process.

The following questions should be addressed when addressing E3 and SS in the ICD:

- Will the capability comply with the DoD, National, and International SM policies and regulations?
- Can sufficient HNA be obtained?
- Can operational frequency assignments be made when the capability is deployed?
- Will the capability be compatible with existing systems?

– Does the capability need to be hardened to withstand the EME?

It is suggested that the following verbiage, tailored as required for program specifics, be included in the noted ICD sections (Refer to OPNAVINST 2400.20F or MIL-HDBK-237D):

RECOMMENDED TEXT ADDITIONS (ICD)

Recommended Generic Statements:

Within Paragraph 3, Concept of Operations Summary OR **Paragraph 4**, Capability Gap, of the ICD, provide primary statements regarding the requirement for Spectrum Supportability and electromagnetic compatibility:

“The XXXX capability shall comply with applicable DoD, Navy, Joint, National, and International spectrum management policies and regulations.”

“Operational performance shall not be degraded by electromagnetic environmental effects (E³) effects.”

“Safety shall not be compromised by Hazards of Electromagnetic Radiation to Ordnance (HERO) or to Fuel (HERF) or to Personnel (HERP), or EMI or ESD.”

Within Paragraph 5, Threat/Operational Environment, provide a supporting statement such as:

“Systems and equipment developed and procured to achieve this capability must be electromagnetically self-compatible and compatible with all other systems and equipment operating in the intended operational electromagnetic environment (EME), both natural and man-made.”

CAPABILITY DEVELOPMENT DOCUMENT (CDD)

Required by: CJCSI/CJCSM 3170.01/6212.01E

Milestone: MS B

A CDD is a document that captures the information necessary to develop a proposed program(s), normally using an evolutionary acquisition strategy. The CDD outlines an affordable increment of militarily useful, logistically supportable, and technically mature capability. The CDD may define multiple increments if there is sufficient definition of the performance attributes (key performance parameters, key system attributes, and other attributes) to allow approval of multiple increments. (CJCS 3170.01G)

The CDD provides the operational performance attributes necessary for the acquisition community to design a proposed system(s) and establish a program baseline.

Capability Development Document (CDD) (replaced ORD at Milestone B)

- Identifies operational performance attributes of proposed system
- System specific, applies to single increment (in an evolutionary program)
- Results from Technology Development; supports Milestone B
- Updated or rewritten for subsequent increments

The JCS requirements in CJCSM 3170.01 (reiterated in MIL-HDBK-237D) specify the following format/content for a CDD:

*“10. **Electromagnetic Environmental Effects (E3) and Spectrum Supportability.** Describe the electromagnetic environment in which the system must operate and coexist with other US, allied, coalition, government and nongovernment systems. Identify potential issues regarding E3 interference from threat emitters. For systems that communicate via electromagnetic energy, spectrum certification is necessary to ensure adequate access to the electromagnetic spectrum.”*

*“14. **Other System Attributes** – includes:*

Address safety issues regarding hazards of electromagnetic radiation to ordnance (HERO). Define the expected mission capability (e.g., full, percent degraded) in the various environments. Include applicable safety parameters, such as those related to system, nuclear, explosive and flight safety”

MIL-HDBK-237D guidance:

“Threat Summary” paragraph of the CDD, Section 4, should include a definition of the EME, both friendly and hostile forces that the device may encounter such as specific high power emitters, EMP, directed energy weapons, and so forth. Further descriptions of some of these threats can be found in MIL-STD-464 and 461.

CJCSI 6212.01E establishes the assessment criteria for evaluating the CDD that will be employed during the Joint Staff review. The following **criteria should be addressed when preparing the CDD**:

- Does the CDD address E3?
- Does the CDD identify a requirement for SS?

In addition, CJCSI 6212.01E requires the Net-Ready Key Performance Parameter (NR-KPP) assessment to address the following:

- SS
- E3
- HNA

RECOMMENDED TEXT ADDITIONS (CDD)

It is suggested that the following verbiage, tailored as required for program specifics, be included in the noted CDD sections:

CDD Section 4, Threat Summary

“The equipment/subsystem/system/platform shall not be degraded by electromagnetic environmental effects and with other systems and platforms, including allied and coalition systems, from use in the operational electromagnetic environment, both natural and man-made. The minimum RF electromagnetic environments are defined in MIL-STD-464A and may be tailored to define the RF EME as required by the operational lifecycle profile of the system/platform.”

CDD Section 10, Electromagnetic Environmental Effects and Spectrum Supportability

“The XXX system (or equipment) shall be mutually compatible and operate compatibly in the electromagnetic environment. It shall not be operationally degraded or fail due to exposure to electromagnetic environmental effects, including high intensity radio frequency (HIRF) transmissions or high-altitude electromagnetic pulse (HEMP). Ordnance systems will be integrated into the platform to preclude unintentional detonation. Platform/system/subsystem EMC performance requirements are specified in MIL-STD-464A (platform level) and MIL-STD-461E (equipment and subsystem/system level) for all electromagnetic disciplines. (THRESHOLD)”

“Ships and shipboard systems shall be required to comply with DoN requirements for Topside Design and Ship EMC Certification in accordance with NAVSEA S9040-AA-GTP-00/SSCR Rev 4, change 1, Shipboard Systems Certification Requirements for Surface Ship Industrial Periods (Non-Nuclear) prior to operational use.”

“Equipment Spectrum Certification. The XXX equipment will comply with the applicable DoD, Navy, National, and International spectrum management policies and regulations and will obtain spectrum certification prior to operational deployment. DD Form 1494 will be submitted to the Military Communications Electronics Board Joint Frequency Panel. (THRESHOLD)”

CDD Section 14, Other System Attributes, as applicable, Hazards of Electromagnetic Radiation to Ordnance

“All ordnance items shall be integrated into the system in such a manner as to preclude all safety problems and performance degradation when exposed to its operational EME. (THRESHOLD)”

CAPABILITY PRODUCTION DOCUMENT (CPD)

Required by: CJCSI/CJCSM 3170.01/6212.01E
Format: CJCSM 3170.01
Milestone: MS C

The CPD captures the information necessary to support production, testing, and deployment of an affordable and supportable increment within an acquisition strategy.

It is a document that addresses the production elements specific to a single increment of an acquisition program. The CPD defines an increment of militarily useful, logistically supportable, and technically mature capability that is ready for a production decision. The CPD defines a single increment of the performance attributes (key performance parameters, key system attributes, and other attributes) to support a MS C decision. (From CJCS 3170.01G)

The JCS requirements in CJCSM 3170.01 (reiterated in MIL-HDBK-237D) specify the following format/content for a CPD:

1. Electromagnetic Environmental Effects (E3) and Spectrum Supportability. Describe the *electromagnetic environment in which the system must operate and coexist with other US, allied, coalition, government and nongovernment systems. Identify potential issues regarding E3 interference from threat emitters. For systems that communicate via electromagnetic energy, spectrum certification is necessary to ensure adequate access to the electromagnetic spectrum.*

14. *Other System Attributes – includes:*

- a. *Address safety issues regarding hazards of electromagnetic radiation to ordnance (HERO).*
- b. *Define the expected mission capability (e.g., full, percent degraded) in the various environments. Include applicable safety parameters, such as those related to system, nuclear, explosive and flight safety*

In addition, the “Threat Summary” paragraph of the CPD, Section 4, should include a definition of the EME, both friendly and hostile forces that the device may encounter such as specific high power emitters, EMP, directed energy weapons, and so forth. Further descriptions of some of these threats can be found in MIL-STD-464 and 461.

CJCSI 6212.01E establishes the assessment criteria for evaluating the CPD that will be employed during the Joint Staff review. The following criteria should be addressed when preparing the CPD:

- Does the CPD address E3?
- Does the CPD identify a requirement for SS?
- Does the CPD address HNA?

In addition, CJCSI 6212.01E requires the NR-KPP assessment to address the following:

- SS
- E3
- HNA

RECOMMENDED TEXT ADDITIONS (CPD)

It is suggested that the following verbiage, tailored as required for program specifics, be included in the noted CPD sections:

CPD Section 4, Threat Summary

“The equipment/subsystem/system/platform shall not be degraded by electromagnetic environmental effects and with other systems and platforms, including allied and coalition systems, from use in the operational electromagnetic environment, both natural and man-made. The minimum RF electromagnetic environments are defined in MIL-STD-464A and may be tailored to define the RF EME as required by the operational lifecycle profile of the system/platform.”

CPD Section 10, Electromagnetic Environmental Effects and Spectrum Supportability

“The XXX system (or equipment) shall be mutually compatible and operate compatibly in the electromagnetic environment. It shall not be operationally degraded or fail due to exposure to electromagnetic environmental effects, including high intensity radio frequency (HIRF) transmissions or high-altitude electromagnetic pulse (HEMP). Ordnance systems will be integrated into the platform to preclude unintentional detonation. Platform/system/subsystem EMC performance requirements are specified in MIL-STD-464A (platform level) and MIL-STD-461E (equipment and subsystem/system level) for all electromagnetic disciplines. (THRESHOLD)”

“Ship and systems shall be compliant with existing DoN requirements for Topside Design and Ship EMC Certification in accordance with NAVSEA S9040-AA-GTP-00/SSCR Rev 4, change 1, Shipboard Systems Certification Requirements for Surface Ship Industrial Periods (Non-Nuclear).”

Equipment Spectrum Certification. “The XXX equipment will comply with the applicable DoD, Navy, National, and International spectrum management policies and regulations and will obtain spectrum certification prior to permanent installment. DD Form 1494 will be submitted to the Navy Marine Spectrum Center to obtain spectrum certification. A releasing letter will be drafted by the Program Office and forwarded to NSMC to initiate Host Nation Authorization coordination.”

CPD Section 14, Other System Attributes, as applicable

“Hazards of Electromagnetic Radiation to Ordnance. All ordnance items shall be integrated into the system in such a manner as to preclude all safety problems and performance degradation when exposed to its operational EME. (THRESHOLD)”

ACQUISITION STRATEGY (AS) or ACQUISITION PLAN

Required by: SECNAVINST 5000.2D, IMPLEMENTATION AND OPERATION OF THE DEFENSE ACQUISITION SYSTEM AND THE JOINT CAPABILITIES INTEGRATION AND DEVELOPMENT SYSTEM

Milestone: MS A, B, C and IOC

The Acquisition Plan (AP) is a procurement document that is required prior to contract award, not an acquisition program milestone document.

SECNAVINST 5000.2D States:

3.4 Technology Development and Acquisition Strategies

The acquisition strategy shall describe how the PM plans to employ contract incentives to achieve required cost, schedule, and performance outcomes.

3.7 Electromagnetic Environmental Effects (E3) and Electromagnetic Spectrum Certification and Supportability

The following paragraphs contain policy and procedures for implementing E3 and electromagnetic spectrum certification and supportability for Navy and Marine Corps programs per references (r), (s), and (t). These policies and procedures ensure that communications and electronic systems are designed to be survivable and mutually compatible with other electronic equipment and the operational electromagnetic environment, and are spectrum certified. Additional information and guidance on the implementation of E3 and spectrum supportability requirements are available in both the Defense Acquisition Guidebook and the DON Acquisition and Capabilities Guidebook, and also MIL-HDBK-237D.

3.7.1 E3

E3 design requirements for communications and electronics systems and equipments shall be identified in performance specifications during the acquisition process and integrated into all developmental and operational tests per references (r) and (s). Tailorable platform level E3 performance requirements are specified in MIL-STD-464, and subsystem/equipment level electromagnetic interference performance requirements are documented in MIL-STD-461.

3.7.2 Electromagnetic Spectrum Certification and Supportability

Electromagnetic spectrum certification (i.e., equipment frequency allocation) and supportability shall be initiated as soon as possible in a program's life-cycle and shall be obtained not later than Milestone B (or Milestone C if there is no SECNAVINST 5000.2D). Currency of frequency allocation and supportability shall be confirmed at each subsequent milestone. Before Milestone B (or before the first milestone that authorizes contract award), if the system or equipment is spectrum-dependent and has not yet obtained certification of spectrum support from the National Telecommunication and Information Administration (NTIA) and the Military Communications-Electronics Board (MCEB) to proceed into the SDD phase, the PM shall develop a justification and a proposed plan to obtain spectrum support certification. Reference (r) requires the MDA and DoD CAE to provide such a justification and proposed plan to the USD (AT&L), the ASD(NII)/DoD

CIO, the Director, Operational Test and Evaluation (DOT&E), and the Chair, MCEB. Before Milestone C, if the system is spectrum-dependent and has not yet obtained the spectrum support certification required to allow the system to proceed into the Production and Deployment phase, the PM shall develop a justification and a proposed plan to obtain certification. Reference (r) requires the MDA and the CAE to provide such a justification and proposed plan to the USD (AT&L), ASD (NII)/DoD(CIO), the DOT&E, and the Chair, MCEB.

3.7.2.1 Electromagnetic Spectrum Certification Compliance

Spectrum certification requires coordination of the DD Form 1494 with CNO (N6) for Navy programs and with HQMC (C4) for Marine Corps programs. The DD Form 1494 is then submitted to the Navy and Marine Corps Spectrum Center for approval by the NTIA and the MCEB. PMs shall obtain approval of DD Form 1494 prior to Milestone B, and confirm currency of the frequency allocation at each subsequent milestone.

3.7.2.2 Electromagnetic Spectrum Supportability

Electromagnetic spectrum supportability is obtained via approval of Electromagnetic Spectrum Supportability Assessment Factors, listed in Table E3T4, by ASN(RD&A), or designee, for ACAT I, IA, and II programs, and by the MDA for ACAT III and IV programs. PMs shall ensure the items indicated in the table are completed prior to the appropriate milestone as noted in Table E3T1 under the "Spectrum Certification Compliance" row. Additionally, PMs shall complete supportability assessment factors of Table E3T4 prior to award of a contract for acquisition of any system that employs the electromagnetic spectrum.

Assessment Factors	Applicable Program Information
Confirm that the system has obtained electromagnetic spectrum certification	DD Form 1494
Confirm that the cost of electromagnetic spectrum supportability has been included in the program life-cycle cost estimate (PLCCE) and the economic analysis (EA) for MAIS	PLCCE EA for MAIS
Confirm that the proposed frequency allocation and its application have been addressed in the applicable program information and are in compliance with Global Information Grid policies, architecture, and interoperability standards	APB (NR KPP) IA Strategy C4I Support Plan/Information Support Plan (information exchange requirements (IERs)/NR requirements)
Specify the geographic location where the equipment will be deployed. Assess technical, cost, and schedule risk for any restrictions or barriers for use of the equipment in the specified geographic location	DD Form 1494 ICD/CDD/CPD Risk Assessment
Confirm that the system has been included in the DoD IT Portfolio Repository - DON (DITPR-DON)	DITPR-DON

7.1 Systems Engineering

7.1.13 Electromagnetic Environmental Effects (E3)

DOD Directive 4650.1 and DOD Directive 3222.3 provide guidance for E3 management and spectrum supportability.

RECOMMENDED TEXT ADDITIONS

“The equipment/subsystem/system/platform shall not be degraded by electromagnetic environmental effects and with other systems and platforms, including allied and coalition systems, from use in the operational electromagnetic environment, both natural and man-made.”

“All ordnance items shall be integrated into the system in such a manner as to preclude all safety problems and performance degradation when exposed to its operational EME.”

Electromagnetic Environmental Effects (E3)

“The XXX system (or equipment) shall be mutually compatible and operate compatibly in the electromagnetic environment. It shall not be operationally degraded or fail due to exposure to electromagnetic environmental effects.”

Electromagnetic Spectrum Certification and Supportability

“The XXX equipment will comply with the applicable DoD, Navy, National, and International spectrum management policies and regulations and will obtain spectrum certification prior to operational deployment.”

Note: Since there are no specific Acquisition Plan format and content requirements, it is up to the Program Manager to decide how to tailor and integrate the verbiage if applicable.

TEST AND EVALUATION MASTER PLAN (TEMP)

Required by: DODI 5000.2 and SECNAVINST 5000.2D
Format: Defense Acquisition Guidebook, chapter 9 (<https://acc.dau.mil/dag>)
DoD 5000.2-R , [Attachment 3](#),
Milestone: MS B, C and Production Decisions

Unfortunately, due to the complex and varied nature of weapon systems acquisition and test programs, it is not possible to provide generic E3 and SS T&E requirements guidance. Every program will have different performance requirements and different verification and validation methodologies. The most important thing the program manager can do is to ensure that E3 and SS program and performance requirements are properly developed and documented BEFORE any T&E program is executed. Then E3 and SS become performance items that require compliance verification during formal T&E evolutions. MIL-HDBK-237 is the best reference available, in addition to assistance from SYScom subject matter experts, to developing and executing a comprehensive E3 and SS related T&E program.

Some general guidance on TEMPs:

From DoDI 5000.2

2. T&E PLANNING, b

The PMs for MDAPs, MAIS Acquisition Programs, and programs on the OSD T&E Oversight List shall submit a TEMP to the USD (AT&L) and the DOT&E for approval to support Milestones B and C and the Full-Rate Production decision. The TEMP shall describe planned developmental, operational, and live fire testing; including measures to evaluate the performance of the system during these test periods; an integrated test schedule; and the resource requirements to accomplish the planned testing. The MDA or designee shall ensure that IOT&E entrance criteria, to be used to determine IOT&E readiness certification in support of each planned operational test, are developed and documented in the TEMP.

From SECNAVINST 5000.2D

5.4.7 Test and Evaluation Master Plan (TEMP)

All DON ACAT programs shall implement a TEMP for all developmental, operational, and live-fire testing in compliance with reference (b), enclosure 5. The TEMP may be a stand-alone document, or it may be included as the T&E management section of a single acquisition management plan (SAMP). If the TEMP is included in the SAMP, that T&E section must undergo the normal TEMP review and approval process. *Although the TEMP format is discretionary*, deviations from the standard DOT&E policy require concurrence from the TEMP approval authority. The TEMP for all ACAT programs shall specify entry criteria and resources required for each phase of testing. The TEMP shall identify anticipated use of M&S and the M&S proponent's verification, validation and accreditation (VV&A) strategy per reference (c). The TEMP documents the commitment between signatories to test events, schedules, and resources.

From MIL-HDBK-237D

7. E3/SS TEST STRATEGY

Information is required to make risk assessments, to validate M&S, to determine compliance with performance specifications, and to determine whether an item is operationally effective, suitable, and survivable for its intended use. A program must be structured to integrate all applicable verification

activities, including T&E and M&S, which will be conducted during an item's life cycle. Objectives for each phase of a program are to be designed to allow assessment of performance appropriate to each phase and milestone. However, until an item is actually tested, there is no assurance that it possesses the desired characteristics.

Developmental and operational E3 testing and evaluations are performed during the stages described above and should be conducted on all Defense acquisition items. In addition, verification of specialized E3 requirements, such as for p-static, lightning, EMP, HERP, HERF, and HERO may be required on a case-by-case basis, as discussed in 7.2.4 of this handbook.

It is intended that limitations of operational capabilities caused by E3 be minimized and that the limitations and vulnerabilities remaining after deployment are documented. Plans must be formulated as early as possible to ensure that during T&E potentially adverse E3 and SS problems are identified. Both developmental and operational testers must be involved early to ensure that the test program can support the acquisition strategy, the harmonization of objectives, thresholds, and MOEs/MOPs with appropriate quantitative criteria, and effective performance in the operational EME is demonstrated.

From DODI 4630.8. 6.2.2.4

“The TEMP shall document the overall structure and objectives of the tests that shall be performed to evaluate and verify IT and NSS interoperability. TEMPs address how key IT and NSS interfaces shall be tested. Test issues and measurable test parameters shall be derived from the NR-KPP, found in the CDD, CPD, and ISP, and operational performance requirements specified in doctrine and Tactics, Techniques, and Procedures (TTP).”

INFORMATION SUPPORT PLAN (ISP)

Required by: CJCSI 6212.01E, CJCSI 3170.01D, DODI 4630.8

Format: CJCSI 6212.01E, Policies & Procedures, Implementation Guidance
DoD Instruction 4630.8, Enclosure 4

Milestone: MS B, MS C

- Cornerstone acquisition document to identify information dependencies:
 - What intelligence and other information exterior to the system will be expected by the system?
 - What demands will the system make on the information environment?
 - Documents the program's interoperability, information, and support requirements over program lifecycle
- Focuses on Net-Ready KPP (NR-KPP)
NR-KPP assesses:
 - Net readiness
 - Information assurance requirements
 - Exchange of information
- Applicable to all ACAT, non-ACAT, and fielded systems
- The ISP is intended to explore information-related needs required to support operational & functional capabilities and provides a mechanism to identify and resolve implementation issues related to IT, including:
 - National Security Systems (NSS)
 - Infrastructure support
 - IT and NSS interface requirements
- Identifies IT needs, dependencies, and interfaces for programs in *all acquisition categories*, focusing attention on:
 - Interoperability
 - Supportability
 - Synchronization
 - Sufficiency and
 - Net-centricity
- The architecture documentation previously captured in the C4ISP is now required in the JCIDS documents.
- The ISP will use the architecture from JCIDS documentation and focus on analysis.

A completed ISP answers the following seven questions for information needed to support the operational/ functional capability(ies).

- What information is needed?
- How good must the information be?
- How much information? (needed or provided)
- How will the information be obtained (or provided)?
- How quickly must it be received in order to be useful?
- Is the information implementation net-centric?
- Does it comply with DoD information policies?

ISP Requirements Summary:

CJCSI 3170.01D states:

“CJCSI 3170.01D establishes the policies and procedures of the Joint Capabilities Integration and Development System (JCIDS).” It does not make any reference to ISP requirements. Refer to the Introduction of this document for a detailed description of the contents of CJCSI 3170.01D.

CJCSI 6212.01E states:

- “Establishes policies and procedures for the J-6 interoperability requirements and supportability certification and validation of Joint Capabilities Integration and Development Systems (JCIDS)”
- “All IT and NSS and major modifications to existing IT and NSS will be compliant with DOD regulations and policies.
- The NR-KPP is a mandatory element of Capability Development Documents (CDDs), Capability Production Documents (CPDs) and Information Support Plans (ISPs) except for those that do not communicate with external systems.” Refer to the introduction in this document for a detailed description and function of the NR-KPP.

DODI 4630.8 states:

- “Implements an approach that considers both materiel (acquisition or procurement) and non-materiel (doctrine, organizational, training, leadership, and personnel) aspects to ensure life-cycle interoperability and supportability of IT and NSS throughout the Department of Defense (DoD).
- “For all DoD Acquisition Category (ACAT) programs, a Command, Control, Communications, Computers, and Intelligence (C4I) Support Plan shall be used to document interoperability and supportability requirements.”

- “DISA shall also assist the DoD Components with developmental IT and NSS interoperability testing to implement solutions, minimize duplication of effort, facilitate maximum IT and NSS interoperability and supportability, and *ensure spectrum management responsibilities of reference (i) consider spectrum supportability, and control of Electromagnetic Environmental Effects (E3).*”

Bottom line for the ISP is that proof of Spectrum Certification is required but it only has to address E3 if there is NOT an approved CDD or CPD (which would have E3 in it).

Guidance from MIL-HDBK-237D

6.4 ISP

The ISP is discussed in Section C.3.6 of this handbook. According to DoDI 4630.8 and CJCSI 6212.01E, the ISP must address SS, including ESC, reasonable assurance of the availability of operational frequencies, and consideration of E3 control. Enclosure (4) of DoDI 4630.8 stipulates that when preparing the ISP, DoD Components shall ensure that SS requirements are addressed through:

- Submission of a DD Form 1494 by the acquiring activity.
- Consideration of supportability comments provided by the ESGPWG
- On-going reviews and assessments of ISPs within the SM community.

DoDI 4630.8 and CJCSI 6212.01E define the steps in the ISP information needs discovery and analysis process. The following is an excerpt from these instructions:

Step 9	Discuss RF Spectrum needs.
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The ISP should identify and address implementation issues related to E3 and SS support needs, dependencies, and interfaces related to net-readiness, interoperability, information supportability, and information sufficiency concerns. The ISP must also discuss actions, plans, or techniques to mitigate or resolve these issues. Specifically, the ISP should address the following EM spectrum issues:

- ESC problems
- Status of HNA
- Mitigation of known EMI problems

As noted in CJCSI 6212.01, in the Joint Staff’s review of the ISP, the following will be assessed:

- Under Chapter 2, has a requirement for SS and a status of the ESC process been provided?
- Has a separate Appendix that addresses E3, including the intended operational EME, SS, and HNA been prepared? For platforms that employ RF emitters developed by a separate acquisition program, spectrum documentation for those emitters may be cited here as evidence of compliance with SS regulations. In addition, if applicable, there should be a discussion of the impact of the loss of a planned spectrum-dependent command, control, or communication link as a result of an unresolved spectrum supportability issue.

C.3.6 Information Support Plan (ISP)

The ISP is used by program authorities to document the program's interoperability, information, and support requirements, IT and NSS needs, objectives, interface requirements for all non- CAT and fielded programs. ISPs should be kept current throughout the acquisition process and normally reviewed at each milestone, decision reviews and whenever the operational concepts, and IT and NSS support requirements change. The ISP addresses all ACAT, non-ACAT, and fielded systems. The ISP will contain sufficient detail, commensurate with the size of the program/effort, to permit an evaluation of the associated interoperability and supportability requirements. ISPs contain an Introduction (consisting of an overview and program data); an Analysis Chapter that consists of an incremental analysis process tailored to each program; and an Issues Chapter that details the information, interoperability and synchronization issues identified in the analysis section and the strategies to address or mitigate these issues. ISPs shall also include a number of mandatory appendices and other appendices, as necessary. The format within each chapter of an ISP may be tailored to include only those elements that apply to the subject program. DoDI 4630.8 provides additional information for completing each chapter and appendices in the ISP.

Suggested E3 and SS ISP Guidance for PMs

ISP Format/Content Requirements

The ISP Assessment Criteria includes:

#21: Has requirement for spectrum supportability and a status of Spectrum Certification process been provided? (Reference DODI 4630.8)

#27: Does the ISP address electromagnetic environmental effects (E3)? (DODI 4630.8)

Chapter 2 – Analysis

Step 9 (of Analysis) – Discuss RF Spectrum Needs

This section of the ISP should specifically identify and address implementation of and issues related to E3 and SS needs, dependencies, and interfaces related to net-readiness, interoperability, information supportability, and information sufficiency concerns. The ISP must also discuss actions, plans, or techniques to mitigate or resolve any identified issues. Specifically, the ISP should address the following EM spectrum issues:

- Status of Equipment Spectrum Certification (ESC), including status of DD Form 1494 approval and any associated problems. For platforms that employ RF emitters developed by a separate acquisition program, spectrum documentation for those emitters may be cited here as evidence of compliance with SS regulations. If applicable, there should be a discussion of the impact of the loss of a planned spectrum-dependent command, control, or communication link as a result of an unresolved spectrum supportability issue.
- Status of Host Nation Agreements (HNA) for spectrum approval to operate outside of CONUS
- Has a separate discussion that addresses E3, including the intended operational EME, mitigation of known EMI problems been prepared?

Chapter 3 – Issues – Any E3 or SC issues identified in Chapter 2 that affect platform or system functional capabilities must be presented in a table as follows:

Operational Issues					
Mission					
Functional Capabilities impacted					
Issue number	Supporting system	Issue	Issue Description	Issue Impact	Mitigation Strategy/Resolution Path (and Time-Frame)
Development Issues					
Testing Issues					
Training Issues					

Table I-A-2. Issue Summary

E3 and SS Requirements in Solicitation Documents

Combined Guidance for Performance Specification, Statement of Work and Contract Data Requirements List are all solicitation documents. Together, they represent the primary description of system performance and work desired by the government from a contractor. What are they? From MIL-HDBK-237D:

Performance Specifications (C.3.9.1)

Preparing an end item specification is a key part of the acquisition process. DoD policies emphasize that requirements should be stated in terms of performance or "what-is-necessary" rather than telling a contractor "how-to" perform a task. The performance specification is created from the CDD and CPD and should contain only performance-based requirements. It is the functional and technical description for the item being procured. It addresses what the item should do, the accuracy with which it should be done, the environment that it should do it in, and the required interfaces. Contracting to a performance specification allows a contractor to become more efficient in his operations, to incorporate product enhancements, and to reduce both direct and indirect costs associated with his effort. A performance specification should state the requirements in terms of results along with criteria for verifying compliance, but without stating the methods for achieving the required results. Performance specifications give a contractor the flexibility and freedom in his design process to incorporate innovative approaches without being constrained by the specifications or contractual issues, Government oversight, and contract administration.

Statement of Work (SOW) (C.3.9.2)

While specifications state the performance requirements for an item, the SOW establishes the work efforts that must be accomplished to successfully execute the contract, develop, and produce the desired product. This document is used as an input to detailed management tools used to establish program costs and schedules.

Contract Data Requirements List (CDRLs) (C.3.9.3)

The CDRL is the proper vehicle for describing and ordering non-hardware deliverables that result from work tasked in the SOW. The SOW should direct the performance of any non-hardware associated work necessary to create the data used in a deliverable item, if the information is not a by-product of tests and verifications from the requirements of the specification. CDRLs are displayed on a DD Form 1423. The DD Form 1423 provides a format that can be used to tailor the details of the data being ordered to the needs of the project. A DID utilizing DD Form 1664 is used to define each item on the CDRL. DIDs establish the content required for a data product. CDRL entries other than DIDs can be tailored on the DD Form 1423 as well as the DIDs themselves. When applicable, data items should be tailored to buy only what is actually needed for a project while at the same time requiring essential efforts be performed and critical data be delivered.

The most frequently ordered DIDs in subsystem or equipment procurements are associated with MIL-STD-461. These DIDs are:

- EMI Control Procedures DID No. DI-EMCS-80199B
- EMI Test Procedures DID No. DI-EMCS-80201B
- EMI Test Report DID No. DI-EMCS-80200B

The DIDs associated with platform or system procurements implementing MIL-STD-464 are:

- E3 Integration and Analysis Report DID No. DI-EMCS-81540A
- E3 Verification Procedures DID No. DI-EMCS-81541A
- E3 Verification Report DID No. DI-EMCS-81542A

Sample E3 and SS Performance Specification and SOW Verbiage:

Modified from MIL-HDBK-237D

[\(full 237D guidance click here\)](#)

I. PERFORMANCE SPECIFICATION

The following two paragraphs are examples of how to address E3 performance requirements in a subsystem or equipment specification:

1. “EMI Control. The equipment shall comply with the applicable requirements of MIL-STD-461.”
2. “EMI Test. The equipment shall be tested in accordance with the applicable test procedures of MIL-STD-461.”

As an alternative, the specific, applicable MIL-STD-461 conducted emission, radiated emission, conducted susceptibility, and radiated susceptibility requirements may be specified, along with modifications to the limits or applicable frequency ranges, as appropriate. Acceptable, equivalent commercial standards may also be invoked. A system or platform specification will call out the specific, applicable, E3 requirements of MILSTD-464 in a similar manner.

A more complete specification section that is based on MIL-STD-464 requirements but doesn't rely on calling out, and is tailorable (i.e., delete paragraphs that don't apply to that platform or system) for any particular application, is a follows:

1. Electromagnetic Environmental Effects (E³)

The system/equipment, as installed and operating, shall meet Electromagnetic Environmental Effects control performance requirements (E³) as specified herein. E³ control shall include but not be limited to Electromagnetic Interference (EMI), Electromagnetic Compatibility (EMC), Electromagnetic Environment (EME), Hazards of Electromagnetic Radiation to Ordnance (HERO), Personnel (HERP), and Fuels (HERF), Electrostatic Discharge Control, Emission Control (EMCON), Electromagnetic Pulse (EMP), and Lightning.

2. Electromagnetic Interference (EMI)

Individual subsystems and equipment of the SYSTEM shall meet the interference control requirements of MIL-STD-461E for Naval and Joint systems, equipment, and platform, (i.e. conducted & radiated emissions, conducted & radiated susceptibility) so that the overall platform/system/equipment complies with all applicable E³ requirements.

3. Electromagnetic Compatibility (EMC)

The SYSTEM/EQUIPMENT shall be electromagnetically self-compatible such that all of its performance requirements are met.

4. Electromagnetic Environment (EME)

The platform/system/equipment shall be electromagnetically compatible with its intended external EME such that its operational performance requirements and mission requirements are met. For systems capable of shipboard operations, Table 1A of MIL-STD-464A shall be used for operations on deck, and Table 1B of MIL-STD-464A shall be used for flight operations that can occur in the main beam of a ship's transmitter. Systems exposed to more than one of the EMEs shall use the worst-case composite of the applicable EMEs.

5. Hazards of Electromagnetic Radiation to Ordnance (HERO)

The ordnance/munition's electrically initiated devices (EIDs), as installed, shall not be inadvertently ignited during, or experience degraded performance characteristics after, exposure to the external radiated EME of Table IA of MIL-STD-464A for either direct RF induced actuation or coupling to the associated firing circuits.

6. Hazards of Electromagnetic Radiation to Personnel (HERP)

The platform shall comply with current national criteria for the protection of personnel against the effect of electromagnetic radiation. The criteria for controlled or uncontrolled environments as defined in DoDI 6055.11, *Protection of DoD Personnel from Exposure to Radiofrequency Radiation and Military Exempt Lasers*. This requirement shall apply to all contractor-furnished equipment (CFE), government-furnished equipment (GFE), non-developmental items (NDI), and commercial-of-the-shelf (COTS) items."

7. Hazards of Electromagnetic Radiation to Fuel (HERF)

Fuels and volatile materials shall not be inadvertently ignited by radiated EMEs.

8. Electrostatic Discharge Control

The platform/system/equipment shall control and dissipate the build-up of electrostatic charges caused by humans, particle impingement, fluid flow, air flow, and other triboelectric charge generating mechanisms to avoid fuel ignition, ordnance hazards, personnel shock hazards, and to prevent performance degradation, or damage to electronics.

9. Subsystem/Equipment Electrostatic Discharge (ESD).

In a static non-operational mode, the subsystems/equipment/components shall be designed to withstand an ESD pulse to a connector pin of 4000 volts from a source of 100 pF and 1500 ohms. A 25 kilovolt ESD pulse to the case shall not degrade the system/equipment.

10. Vertical lift and in-flight refueling

The system shall meet its operational performance requirements when subjected to a 300-kilovolt discharge. This requirement is applicable to vertical lift aircraft, in-flight refueling of any aircraft, and systems operated or transported externally by vertical lift aircraft. A 300kV ESD pulse to the cargo

hooks and refueling probes or during VERTREP operations shall not degrade the munitions and system.

11. Precipitation Static (P-Static)

The platform/system shall control p-static interference to antenna-connected receivers onboard the host platform such that system (i.e., COMM, NAV, EW) operational performance requirements are met.

12. Ordnance/Munition ESD

Ordnance subsystems shall not be inadvertently initiated or dudged by a 25-kilovolt electrostatic discharge caused by personnel handling.

13. Electromagnetic Emission Control (EMCON)

For Navy applications, and other systems applications capable of shipboard operation, unintentional electromagnetic radiated emissions shall not exceed -110 dBm/m^2 measured at one nautical mile (-105 dBm/m^2 at one kilometer) in any direction from the system over the frequency range of 500 kHz to 40 GHz; applicable for aircraft.

14. Electromagnetic Pulse

Performance/flight critical and mission essential equipment must be capable of surviving an EMP event per MIL-STD-464A. Hardening of components, if required, shall not degrade the functionality of the system or increase the gross system weight beyond the munitions or aircraft's maximum gross weight. Compliance shall be verified by platform/equipment/subsystem/unit level and system level tests.

15. Lightning Environment

The platform/system shall remain safe and/or flight worthy after experiencing a 200kA direct lightning strike. Ordnance/munitions shall remain safe during and after experiencing a direct strike to the platform, including ships and aircraft. MIL-STD-464A Figure 1 shall be used for the direct effects lightning environment; figure 2 and Table IIA shall be used for the indirect effects lightning environment. Table IIB shall be used for the near lightning strike environment. Compliance shall be verified by platform, system, subsystem, equipment, and component (such as structural coupons and radomes) level tests, analysis or a combination thereof.

16. TEMPEST

National security information shall not be compromised by emanations from classified information processing equipment. The requirement for TEMPEST is found in DoDD 5200.19 (classified). Baseline TEMPEST requirements are contained in NSTISSAM TEMPEST/1-92, NSTISSAM TEMPEST/1-93, NSTISSAM TEMPEST/2-95, CNNS Advisory Memorandum TEMPEST 01-02, and Navy publication IA PUB-5239-31.

17. Spectrum Management

Equipment that emit or receive electromagnetic waves shall comply with OMB Circular A-11 to determine spectrum supportability prior to initiating cost estimates for development or procurement. All DoD components shall obtain spectrum utilization guidance from the Military Communications-Electronics Board (MCEB) in accordance with DoDD 4650.1. Systems and equipment shall comply with applicable national and international spectrum management policies and regulations. Requirements for foreign spectrum support shall be forwarded to the MCEB for coordination with host nations where deployment of the system or equipment is planned. The standard Form DD Form 1494, Application for Frequency Authorization, shall be used to obtain radio frequency authorization.

II. STATEMENT OF WORK

Sample wording addressing the E3/SS area that might be included in a contract for a system for required services and/or data items follows:

“The contractor shall design, develop, integrate, and qualify the system such that it meets the E3/SS performance requirements of the system specification. The contractor shall perform analyses, studies, and testing to establish E3/SS controls and features to be implemented in the design of the item. The contractor shall perform inspections, analyses, and tests, as necessary, to verify that the system meets its E3/SS performance requirements. The contractor shall prepare and update the DD Form 1494 throughout the development of the system for spectrum-dependent equipment and shall perform analysis and testing to characterize the equipment, where necessary. The contractor shall establish and support an E3/SS WIPT to accomplish these tasks. MIL-HDBK-237 may be used for guidance.”

A more complete SOW section that is tailorable for any particular application is a follows:

Electromagnetic Environmental Effects. – The Contractor shall establish and execute an electromagnetic environmental effects (E³) and spectrum (when applicable) supportability plan for the platform and systems to ensure that the applicable requirements of MIL-STD-464A and national spectrum supportability requirements are complied with. The contractor shall establish and support an E³/Spectrum Supportability WIPT to accomplish these tasks.

The E³ control plan shall include design, development, integration and qualification/performance verification efforts in the areas of intra-system electromagnetic compatibility (EMC), subsystem/equipment electromagnetic interference (EMI), electromagnetic vulnerability (EMV), lightning protection, radio frequency (RF) compatibility, electrostatic discharge (ESD), precipitation static (P-static), emission control (EMCON), TEMPEST, and hazards of electromagnetic radiation to personnel (HERP), ordnance (HERO), and fuels (HERF). The contractor shall design and qualify the platform, systems and equipment/components in accordance with the requirements of the system performance specification. If Open Architecture is used, the Contractor shall evaluate the hardware changes and their accumulative effects for impact on the existing EMI Qualification and submit the EMI qualification plan or analysis report to the cognizant E³ Systems Engineering Team for review and approval. All activities conducting EMI qualification/performance verification testing must be

accredited for MIL-STD-461E testing under the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology (NIST) and that the E³ personnel are empowered appropriately in the design and configuration review process of the program. Accreditation of facilities administered by agencies that have a Mutual Recognition Agreement (MRA) with NIST to conduct EMI qualification testing to the requirements of MIL-STD-461E may be accepted if approved by cognizant E³ personnel. All test procedures, test reports, requests for waivers or deviations shall be submitted to the E³ Systems Engineering team for review and approval.

The Contractor shall conduct E³/EMI/EMC lab/ground tests. The Contractor shall provide the test assets, including computer programs/software, and support equipment properly configured to conduct the E³ performance verification tests.

The contractor shall prepare and update the DD Form 1494 throughout the development of the system for spectrum dependent equipment and shall perform analysis and testing to characterize the equipment, where necessary.

SYSCOM Required Systems Engineering Technical Reviews with Recommended E³/SM Actions

SETRs are an integral part of the systems engineering process and life cycle management, and are consistent with existing and emerging commercial/industrial standards. These reviews are not the place for problem solving, but to verify that problem solving has been accomplished. As a part of the overall systems engineering process, SETRs enable an independent assessment of emerging designs against plans, processes and key knowledge points in the development process. SETRs also apply to post-production, In-Service improvements and maintenance.

SETRs provide the PM with an integrated technical (i.e., logistics, engineering, test and evaluation, in-service support, etc.) recommendation with respect to proceeding to the next technical phase of the program. This is accomplished via a multi-disciplined, engineering assessment of the program's progress towards demonstrating and confirming completion of required accomplishments and their exit criteria as defined in program planning. These SETRs include an overall technical assessment of cost, schedule, and performance risk, which forms the basis for an independent cost estimate. End products of these SETRs include risk assessments and mitigation options, Mutual Recognition Agreement (MRA) forms, and minutes.

These SETRs bring to bear additional knowledge to the program design/development process in an effort to ensure program success. Overarching objectives of these reviews are a well-managed engineering effort leading to a satisfactory Technical Evaluation (TECHEVAL), which will meet all of the required technical and programmatic specifications. This in turn will ensure a satisfactory Operational Evaluation (OPEVAL), and the fielding of a suitable and effective system for the warfighter.

SETRs may be tailored to suit individual program scope and complexity. Tailoring or elimination of reviews should be coordinated with the APEOs for Engineering and Logistics and documented in the Program's SEP. Programs need not conduct SETRs that do not apply given the structure of the program, i.e. where in the acquisition cycle the program will enter. This tailoring may be updated as part of setting the review agenda and participants, in conjunction with the program APMSE, APLM, APEO(RDT&E), and APEO(L). Functional and/or subject matter experts, together with government and contractor IPT membership will participate in these SETRs. Customer representatives are invited to provide the war fighters perspective with a clear linkage to their requirements. Certain reviews may be performed incrementally by configuration item. The SETR process is also the logical setting to review a program's compliance with other technical initiatives.

Essential Systems Engineering Technical Reviews

1. **ITR—Initial Technical Review** – A multi-disciplined technical review to support a program's initial Program Objective Memorandum (POM) submission. This review is intended to ensure that a program's technical baseline is of sufficient rigor to support a valid (acceptable cost risk) cost estimate, and enable an independent E³/SM Office assessment of that estimate by cost, technical, and program management subject matter experts.

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Develop E³/SM inputs to the Initial Capabilities Document (ICD)

- Familiarize PM with E³/SM Requirements (e.g., E³ requirements (MIL-STDs 461E and 464A; National, International and Host Nation Spectrum Management Rules/Regulations)
- Submit Stage 1 Conceptual Frequency Allocation request (DD Form 1494) for any new RF spectrum dependent equipment
- Ensure cost estimate for E³, EMC, SM and Integrated Topside Design (ITD) is included in program estimates
- Obtain DON CIO Spectrum Supportability approval for MS A

2. **ASR—Alternative Systems Review** – A review conducted to demonstrate the preferred system concept(s) to take forward into the Technology Development (TD) (formerly Component Advanced Development (CAD)) phase. Validates program cost, schedule, and performance for the purpose of supporting Milestone approvals. *Use a tailored version of the ITR E³, EMC and SM checklist.*

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Establish E³/SM IPT or participate in Systems Engineering (SE) IPT
- Budget for E³ Program/Control Plans
- Submit Stage 1 Conceptual Frequency Allocation request (DD Form 1494) for any new RF spectrum dependent equipment
- Obtain DON CIO Spectrum Supportability approval for MS A
- Incorporate all “Lessons Learned”
- Ensure ITD Topside analysis is being considered if required. (Required for addition of new antenna or aperture on a Naval ship)
- Refine cost estimate for E³, SM and ITD support

3. **SRR—System Requirements Review** – A system-level review conducted to ensure that system requirements have been completely and properly identified and that there is a mutual understanding between the government and contractor. Captures systems requirements that go with the Concept Exploration and Technical Development phases, and generally conducted just prior to Milestone B. Validates program cost, schedule, and performance for the purpose of supporting Milestone approvals.

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Continue E³/SM IPT and/or support to SE IPT
- Review initial E³ Program Plan
- Review initial E³ Control Plan and include testing requirements
- Develop E³/SM inputs to the Capability Development Document (CDD)
- Review/Update Budget for E³ Program/Control Plans
- Define Operational Electromagnetic Environment (EME)
- Establish initial E³ design requirements
- Develop and include E³ and SM design requirements in Statement of Work SOW, CDRLs, System Specification and TEMP as needed
- Submit Stage 2 Frequency Allocation (DD Form 1494) request
- Include E³/SM test requirements in plan for DT/OT
- Ensure ITD Topside analysis is being considered if required. (Required for addition of new antenna or aperture on a Naval ship)

- Obtain DON CIO Spectrum Supportability approval for MS B
- Refine cost estimate for E³, SM and ITD support

4. **SFR—System Functional Review** – A review of the conceptual design of the system to establish its capability to satisfy requirements. It establishes the functional baseline as the governing technical description, which is required before proceeding with further technical development. Validates program cost, schedule, and performance for the purpose of supporting Milestone approvals. *Use a tailored version of the SRR E³, EMC and SM checklist.*

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Continue E3/SM IPT and/or support to SE IPT
- Update E³ Program Plan
- Update E³ Control Plan and include testing requirements
- Develop E³/SM inputs to the Capability Production Document (CPD)
- Update Operational EME
- Ensure E³ and SM design requirements addressed in Statement of Work SOW, CDRLs, System Specification and TEMP as needed
- Prepare/Submit Stage 3 Frequency Allocation (DD Form 1494) request
- Include E³/SM test requirements in plan for DT/OT
- Ensure ITD Topside analysis has been initiated if required. (Required for addition of new antenna or aperture on a Naval ship)
- Obtain DON CIO Spectrum Supportability approval for MS C
- Refine cost estimate for E³, SM and ITD support

5. **PDR—Preliminary Design Review** – A review that confirms that the preliminary design logically follows the SFR findings and meets the requirements. It normally includes heavy emphasis on software specifications, and results in approval to begin detailed design. Establishes the allocated baseline. Also validates program cost, schedule, and performance for the purpose of supporting Milestone approvals.

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Continue E3/SM IPT and/or support to SE IPT
- Update E³ Program Plan
- Update E³ Control Plan and include testing requirements
- Prepare E³ Test Plan
- Develop E³/SM test and analysis program
- Ensure E³ and SM design requirements addressed in Statement of Work SOW, CDRLs, System Specification and TEMP as needed
- Include E³/SM test requirements in plan for DT/OT
- Develop E³/SM inputs to the Capability Production Document (CPD)
- Update Operational EME
- Prepare/Submit Stage 3 Frequency Allocation (DD Form 1494) request
- Submit frequency assignment request(s) for specific test frequencies and locations
- Ensure Host Nation Coordination has been initiated for use of RF spectrum dependent equipment overseas and in foreign countries

- Ensure ITD Topside analysis has been initiated if required. (Required for addition of new antenna or aperture on a Naval ship)
- Obtain DON CIO Spectrum Supportability approval for MS C
- Review ECPs and requests for waivers
- Refine cost estimate for E³, SM and ITD support

6. **CDR—Critical Design Review** – A review conducted to evaluate the completeness of the design, its interfaces, and its suitability to start initial manufacturing. Establishes the product baseline. Also validates program cost, schedule, and performance for the purpose of supporting Milestone approvals.

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Continue E3/SM IPT and/or support to SE IPT
- Update E³ Program Plan and/or E³ Control Plan and include testing requirements
- Update E³ Test Plan
- Implement E³/SM test and analysis program
- Ensure E³ and SM design requirements addressed in Statement of Work SOW, CDRLs, System Specification and TEMP as needed
- Include E³/SM test requirements in plan for DT/OT
- Develop E³/SM inputs to the Capability Production Document (CPD)
- Update Operational EME
- Update/Submit Stage 3 Frequency Allocation (DD Form 1494) request
- Submit frequency assignment request(s) for specific test frequencies and locations
- Review status of Host Nation Coordination efforts for authorization of RF spectrum dependent equipment overseas and in foreign countries
- Ensure the system design has taken into account any limitations or restrictions on system use contained in the approved Military Communications-Electronic Board (MCEB) DD Form 1494 design guidance recommendations.
- Ensure ITD Topside analysis is near completion or completed if required. (Required for addition of new antenna or aperture on a Naval ship)
- Obtain DON CIO Spectrum Supportability approval for MS C
- Review ECPs and requests for waivers
- Refine cost estimate for E³, SM and ITD support

7. **TRR—Test Readiness Review** - A review of the systems/programs readiness to begin testing at any level, by either the contractor or government. Determines the completeness of test procedures, and their compliance with test plans and descriptions. *Use a tailored version of the PDR and CDR E³. EMC and SM checklists.*

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Continue E3/SM IPT and/or support to SE IPT
- Update E³ Program Plan and/or E³ Control Plan and include testing requirements
- Update E³ Test Plan
- Ensure completeness of E³/SM test procedures, and their compliance with test plans and descriptions

- Ensure E³/SM inputs have been submitted for Capability Production Document (CPD)
- Update Operational EME
- Update/Submit Stage 3 Frequency Allocation (DD Form 1494) request
- Submit frequency assignment request(s) for specific test frequencies and locations
- Ensure ITD Topside analysis is near completion or completed if required. (Required for addition of new antenna or aperture on a Naval ship)
- Obtain DON CIO Spectrum Supportability approval for MS C
- Review ECPs and requests for waivers
- Ensure DT&E Yellow Sheets are provided to the ASEMICAP program office for entering and tracking in the ASEMICAP problem management system.
- Refine cost estimate for E³, SM and ITD support

8. **FRR—Flight Readiness Review** – A review to ensure the proper people, planning, equipment, materials, training, configuration, flight clearance (or defined flight clearance process, with plans to get an initial flight clearance at FRR), ranges, instrumentation, safety controls, and risk assessments/mitigations are in place prior to flight. **Use a tailored version of the PDR and CDR E³, EMC and SM checklists.**

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Continue E3/SM IPT and/or support to SE IPT
- Update E³ Program Plan and/or E³ Control Plan and include testing requirements
- Update E³ Test Plan
- Ensure completeness of E³/SM test procedures, and their compliance with test plans and descriptions
- Ensure E³/SM inputs have been submitted for Capability Production Document (CPD)
- Update Operational EME
- Update/Submit Stage 3 Frequency Allocation (DD Form 1494) request
- Submit frequency assignment request(s) for specific test frequencies and locations
- Ensure that the E³ development (Flight Worthiness) testing and the EMI qualification demonstration (EMC SOFT) has been successfully completed in accordance with NAVAIRINST 13034.1
- Review ECPs and requests for waivers
- Refine cost estimate for E³, SM and ITD support

8.a **FRR – Fleet Readiness Review** – A review to verify proper coordination between the developing agency and all applicable Fleet E3/SM disciplines. The developing agency and the Fleet E3/SM disciplines need to understand and concur with the scope of the E3/SM test effort, how it will be executed and what results are desired. There needs to be a joint developing agency/Fleet review for approval of the E3/SM test results and to correct deficiencies. **Use a tailored version of the PDR and CDR E3, EMC and SM checklists.**

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

As in paragraph 8, but without the NAVAIR specifics.

8.b **OTRR – Operational Test Readiness Review** – A review to ready for test in the actual EME.

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Request requisite frequency assignment(s)
- Verify the E3/SM operational test plan and test scenarios
- Review the E3/SM operational effectiveness and suitability thresholds in the TEMP
- Validate all corrections to E3/SM deficiencies discovered during previous testing
- Ensure adequate organic support is in place

8.c **TECHEVAL**

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Request requisite frequency assignment(s)
- Verify attainment of E3/SM performance specifications and objectives
- Demonstrate that E3/SM design risks have been minimized
- Evaluate E3/SM compatibility and interoperability with existing or planned equipment/systems
- Provide assurance the equipment/system is ready for testing in the operational EME

8.d **OPEVAL**

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Request requisite frequency assignment(s)
- Estimate the equipment/system E3/SM operational effectiveness and operational suitability
- Test in the operational EME
- Identify needed E3/SM modifications
- Provide information of the equipment/system E3/SM operational performance – tactics, doctrine organizational and personnel requirements, etc.
- Verify the adequacy of supporting E3/SM documentation – manuals, handbooks, support plans, etc.
- Correct and retest all significant E3/SM deficiencies

9. **SVR/PRR—System Verification Review/Production Readiness Review** – SVR is a review conducted to verify that the actual item (which represents the production configuration) complies with the performance specification. PRR is a review conducted incrementally prior to any rate production decision to validate design readiness, resolution of production engineering problems, and accomplishment of production phase planning. Validates program cost, schedule, and performance for the purpose of supporting Milestone approvals. *Use a tailored version of the PDR and CDR E³, EMC and SM checklists.*

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Continue E3/SM IPT and/or support to SE IPT
- Update E³ Program Plan and/or E³ Control Plan
- Ensure E³ /SM inputs have been submitted for Capability Production Document (CPD)
- Update Operational EME
- Update/Submit Stage 4 Frequency Allocation (DD Form 1494) request
- Submit frequency assignment request(s) for specific test frequencies and locations
- Review status of Host Nation Coordination efforts for authorization of RF spectrum dependent equipment overseas and in foreign countries

- Ensure the system design has taken into account any limitations or restrictions on system use contained in the approved Military Communications-Electronic Board (MCEB) DD Form 1494 design guidance recommendations.
- Ensure ITD Topside analysis is complete if required and necessary ITD certifications are in work or in place. (Required for addition of new antenna or aperture on a Naval ship)
- Validate all corrections to E³/SM deficiencies discovered during previous testing
- Review ECPs and requests for waivers
- Review and approve E³/SM test reports
- Ensure that subsequent procurements and replacement parts meet original E³ program requirements
- Refine cost estimate for E³, SM and ITD support

10. **PCR—Physical Configuration Review** – A SETR that verifies the product baseline as reflected in the early production configuration item. The PCR formalizes the product baseline, including specifications and the Technical Data Package (TDP), so that future changes can only be made through full Configuration Management (CM) procedures. *Use a tailored version of the CDR E³, EMC and SM checklist.*

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Continue E³/SM IPT and/or support to SE IPT
- Update E³ Program Plan and/or E³ Control Plan
- Update Operational EME
- Update/Submit Stage 4 Frequency Allocation (DD Form 1494) request
- Ensure the system design has taken into account any limitations or restrictions on system use contained in the approved Military Communications-Electronic Board (MCEB) DD Form 1494 design guidance recommendations.
- Ensure ITD Topside analysis is complete if required and necessary ITD certifications are in work or in place. (Required for addition of new antenna or aperture on a Naval ship)
- Validate all corrections to E³/SM deficiencies discovered during previous testing
- Review ECPs and requests for waivers
- Ensure that subsequent procurements and replacement parts meet original E³ program requirements
- Refine cost estimate for E³, SM and ITD support

11. **ECPR—Engineering Change Proposal Review** – A Systems Engineering Technical Review of proposed engineering changes to the fielded system. *Use a tailored version of the CDR E³, EMC and SM checklist.*

RECOMMENDED E³/SM ACTIONS/FOCUS/REVIEW AREAS:

- Review program E³ and SM history, lessons learned, and Frequency Allocation and Host Nation Coordination status (DD Form 1494)
- Develop E³ Program Plan and/or E³ Control Plan for ECP
- Update Operational EME
- Update/Submit Stage 4 Frequency Allocation (DD Form 1494) request as required based on proposed engineering changes

- Ensure the system design has taken into account any limitations or restrictions on system use contained in the approved Military Communications-Electronic Board (MCEB) DD Form 1494 design guidance recommendations.
- Validate all corrections to E³/SM deficiencies discovered during previous testing
- Review ECPs and requests for waivers
- Ensure that subsequent procurements and replacement parts meet original E³ program requirements
- Refine cost estimate for E³, SM and ITD support

ATTACHMENT 1

TEMP FORMAT AND CONTENT GUIDANCE FROM DoD 5000.2-R Shortened version of Appendix 2

1. PART I--SYSTEM INTRODUCTION

a. Mission Description.

b. System Description. Briefly describe the system design, to include the following items:

- (1) Key features and subsystems,
- (2) Interfaces with existing or planned systems that are required for mission accomplishment. Address relative maturity and integration and modification requirements for non-developmental items. **Include interoperability with existing and/or planned systems** of other DoD Components or allies. Provide a diagram of the system architecture.
- (3) Critical system characteristics or unique support concepts resulting in special test and analysis requirements (e.g., post deployment software support, **hardness against nuclear effects**; resistance to countermeasures; resistance to reverse engineering/exploitation efforts (Anti- Tamper); development of new threat simulation, simulators, or targets).

c. System Threat Assessment.

d. Measures of Effectiveness and Suitability. List (see example matrix below) the performance (operational effectiveness and suitability) capabilities identified as required in the ORD. The critical operational effectiveness and suitability parameters and constraints must crosswalk to those used in the Analysis of Alternatives, and include manpower, personnel, training, software, computer resources, transportation (lift), compatibility, interoperability and integration, Information Assurance (IA), **Electromagnetic Environmental Effects and Spectrum Supportability**, etc.

Measures of Effectiveness and Suitability

Operational Requirement	Parameter	ORD Threshold	ORD Objective	ORD Reference
Mobility	Land Speed** Miles per hour on secondary roads	xx miles per hour	xx miles per hour	Paragraph xxx
Firepower	Accuracy Main Gun Probability of hit/stationary platform/ stationary target	xxx probability of hit @ xxx range	xxx probability of hit @ xxx range	Paragraph xxx
Supportability	Reliability Mean Time Between Operational Failure	xxx hours	xxx hours	Paragraph xxx

** Key Performance Parameter

e. Critical Technical Parameters

- (1) List in a matrix format (see example below) the critical technical parameters of the system (including software maturity and performance measures) that will be evaluated (or reconfirmed if previously evaluated) during the remaining phases of developmental testing. The system specification is usually a good reference for the identification of critical technical parameters.
- (2) Next to each technical parameter, list a threshold for each stage of development.
- (3) Ensure technical parameters are included for technical interoperability.

Critical Technical Parameters

Supported Operational Requirement (Include ORD reference)	Technical Parameter	Developmental Stage Event	Threshold Value	DecisionSupported
In most cases a measure of effectiveness or suitability from paragraph 1d	Technical measure(s) derived to support operational requirement	Developmental stage events (Described in TEMP Part III) designed to measure system performance against technical parameters.	Minimum value required at each developmental event. Most parameters will show growth as the system progress through testing. Final value should reflect level of performance necessary to satisfy the operational requirement.	May be any decision marking the entrance into a new acquisition phase or may be a readiness for operational test decision.
Example: Main Gun Probability of Hit, 94 % at 1,500 meters (ORD para. xxx.x)	Example: Auxiliary sight Boresight accuracy	Example: System Demo Test-Accuracy Test Prod Readiness Test-Accuracy Prod Qual Test	Example +/- 5 mils +/- 3 mils +/- 1 mil	Example Milestone B MS C (Low Rate Initial Production Decision) FRP DR

2. PART II--INTEGRATED TEST PROGRAM SUMMARY

a. Integrated Test Program Schedule

- (1) Display on a chart (see Figure 1) the integrated time sequencing of the major test and evaluation phases and events, related activities, and planned cumulative funding expenditures by appropriation.
- (2) Include event dates such as major decision points as defined in DoDI 5000.2; operational assessments, preliminary and critical design reviews, test article availability; software version releases; appropriate phases of developmental test and evaluation; live fire test and evaluation, JITC interoperability testing and certification date to support FRP Decision Review, and operational test and evaluation; low rate initial production deliveries; Initial Operational Capability; Full Operational Capability; and statutorily required reports, such as the Live-Fire T&E Report and Beyond-LRIP Report.
- (3) A single schedule shall be provided for multi-Service or Joint and Capstone TEMPs showing all DoD Component system event dates.
- (4) Provide the date (fiscal quarter) when the decision to proceed beyond low-rate initial production is planned. (LRIP quantities required for initial operational test must be identified for approval by the DOT&E prior to entry into System Development and Demonstration Phase for ACAT I programs and other programs designated for DOT&E oversight).

b. Management

- (1) Discuss the test and evaluation responsibility of all participating organizations (developers, testers, evaluators, users).
- (2) Identify the T&E IPT structure

3. PART III--DEVELOPMENTAL TEST AND EVALUATION OUTLINE

a. Developmental Test and Evaluation Overview. Explain how developmental test and evaluation will: verify the status of engineering and manufacturing development progress; verify that design risks have been minimized; and that anti-tamper

provisions have been implemented; substantiate achievement of contract technical performance requirements; and be used to certify readiness for dedicated operational test.

b. Future Developmental Test and Evaluation. Discuss all remaining developmental test and evaluation that is planned, beginning with the date of the current TEMP revision and extending through completion of production. Place emphasis on the next phase of testing. For each phase, include:

(1) *Configuration Description*. Summarize the functional capabilities of the system's developmental configuration and how they differ from the production model.

(2) *Developmental Test and Evaluation Objectives*. State the test objectives for this phase in terms of the critical technical parameters to be confirmed, to include anti-tamper characteristics. Identify any specific technical parameters that the milestone decision authority has designated as exit criteria and/or directed to be demonstrated in a given phase of testing.

(3) *Developmental Test and Evaluation Events, Scope of Testing, and Basic Scenarios*.

Summarize the test events, test scenarios and the test design concept. Quantify the testing (e.g., number of test hours, test events, test firings). List the specific threat systems, surrogates, countermeasures, component or subsystem testing, and testbeds which are critical to determine whether or not developmental test objectives are achieved. As appropriate, particularly if an agency separate from the test agency will be doing a significant part of the evaluation, describe the methods of evaluation. List all models and simulations to be used to evaluate the system's performance, explain the rationale for their credible use and provide their source of verification, validation and accreditation (VV&A). Describe how performance in natural environmental conditions representative of the intended area of operations (e.g., temperature, pressure, humidity, fog, precipitation, clouds, **electromagnetic environment**, blowing dust and sand, icing, wind conditions, steep terrain, wet soil conditions, high sea state, storm surge and tides, etc.) and interoperability with other weapon and support systems, as applicable, to include insensitive munitions, will be tested. Describe the developmental test and evaluation plans and procedures that will support the JITC/DISA interoperability certification recommendation to the Director, Joint Staff (J-6) in time to support the FRP Decision Review.

(4) *Limitations*. Discuss the test limitations that may significantly affect the evaluator's ability to draw conclusions, the impact of these limitations, and resolution approaches.

4. PART IV--OPERATIONAL TEST AND EVALUATION OUTLINE

a. Operational Test and Evaluation Overview

(1) The primary purpose of operational test and evaluation is to determine whether systems are operationally effective and suitable for the intended use by representative users in a realistic environment before production or deployment.

(2) The TEMP shall show how program schedule, test management structure, and required resources are related to operational requirements documented in the certified CRD (if applicable) and ORD, and derived requirements from the C4ISP; critical operational issues; test objectives; and major decision points. Testing shall evaluate the system (operated by typical users) in an environment as operationally realistic as possible, including threat representative hostile forces and the **expected range of natural environmental conditions**.

b. Critical Operational Issues

(1) List in this section the critical operational issues.

(2) A critical operational issue is typically phrased as a question that must be answered in order to properly evaluate operational effectiveness (e.g., "Will the system detect the threat in a combat environment at adequate range to allow successful engagement?") and operational suitability (e.g., "Will the system be safe to operate in a combat environment?")

(3) Some critical operational issues will have critical technical parameters and thresholds

(4) State the measures of effectiveness (MOEs) and measures of performance (MOPs). Define the evaluation criteria and data requirements for each MOE/MOP.

(5) If every critical operational issue is resolved favorably, the system should be operationally effective and operationally suitable when employed in its intended environment by typical users.

c. Future Operational Test and Evaluation. For each remaining phase of operational test and evaluation, separately address the following:

(1) *Configuration Description*. Identify the system to be tested during each phase, and describe any differences between the tested system and the system that will be fielded including, where applicable, software maturity performance and criticality to mission performance, and the extent of integration with other systems with which it must be interoperable or compatible. Characterize the system (e.g., prototype, engineering development model, production representative or production configuration).

(2) *Operational Test and Evaluation Objectives*. State the test objectives including the objectives and thresholds and critical operational issues to be addressed by each phase of operational test and evaluation and the decision points supported

(3) *Operational Test and Evaluation Events, Scope of Testing, and Scenarios*. Summarize the scenarios and identify the events to be conducted, type of resources to be used, the threat simulators and the simulation(s) to be employed, the type of representative personnel who will operate and maintain the system, the status of the logistic support, the operational and maintenance documentation that will be used, **the environment under which the system is to be employed and supported during testing**, the plans for interoperability and **compatibility testing** with other United States/Allied weapon, the anti-tamper characteristics to be assessed in an operational environment and support systems as applicable, etc. Identify planned sources of information (e.g., developmental testing, testing of related systems, modeling, simulation, etc.) that may be used by the operational test agency to supplement this phase of operational test and evaluation. Whenever models and simulations are to be used: identify the planned models and simulations; explain how they are proposed to be used; and provide the source and methodology of the verification, validation, and accreditation underlying their credible application for the proposed use.

(4) *Limitations*. Discuss the test and evaluation limitations including threat realism, resource availability, **limited operational (military, climatic, nuclear, etc.) environments**, limited support environment, maturity of tested system, safety, etc., that may impact the resolution of affected critical operational issues.

d. Live Fire Test and Evaluation

5. PART V--TEST AND EVALUATION RESOURCE SUMMARY

a. Provide a summary (preferably in a table or matrix format) of all key test and evaluation resources, both government and contractor, that will be used during the course of the acquisition program. Specifically, identify the following test resources:

(1) *Test Articles*. Identify the actual number of and timing requirements for all test articles, including key support equipment and technical information required for testing in each phase by major type of developmental test and evaluation and operational test and evaluation.

(2) *Test Sites and Instrumentation*. Identify the specific test ranges/facilities to be used for each type of testing.

(3) *Test Support Equipment*. Identify test support equipment that must be acquired specifically to conduct the test program.

(4) *Threat Representation*. Identify the type, number, availability, and fidelity requirements for all representations of the threat to be used in testing. Compare the requirements for threat representations with available and projected assets and their capabilities. Highlight any major shortfalls. Each representation of the threat (target, simulator, model, simulation or virtual simulation) shall be subjected to validation procedures to establish and document a baseline comparison with its associated threat and to determine the extent of the operational and technical performance differences between the two throughout the life cycle of the threat representation.

(5) *Test Targets and Expendables*.

(6) *Operational Force Test Support*. For each test and evaluation phase, identify the type and timing of aircraft flying hours, ship steaming days, and on-orbit satellite contacts/coverage, and other critical operating force support required.

(7) *Simulations, Models and Testbeds*. For each test and evaluation phase, identify the models and simulations to be used, including computer-driven simulation models and hardware/software-in-the-loop testbeds. Identify the resources required to accredit their usage.

(8) *Special Requirements*. Discuss requirements for any significant non-instrumentation capabilities and resources such as: special data processing/data bases, unique mapping/charting/geodesy products, extreme physical environmental conditions or restricted/special use air/sea/landscapes.

(9) *Test and Evaluation Funding Requirements*. Estimate, by Fiscal Year and appropriation line number (program element), the funding required to pay direct costs of planned testing. State, by fiscal year, the funding currently appearing in those lines (program elements). Identify any major shortfalls.

(10) *Manpower/Personnel Training*. Identify manpower/personnel and training requirements and limitations that affect test and evaluation execution.

b. The TEMP shall project the time-phased test and test support resources necessary to accomplish development, integration and demonstration testing and early operational assessment. The TEMP shall estimate, to the degree known, the key resources necessary to accomplish developmental test and evaluation, operational assessment, live fire test and evaluation, and operational test and evaluation. These shall include test and training ranges of the Major Range and Test Facility Base (MRTFB), test equipment and facilities of the MRTFB, capabilities designated by industry and academia, unique instrumentation, threat simulators, targets, and modeling and simulation. As system acquisition progresses, the preliminary test resource requirements shall be reassessed and refined and subsequent TEMP updates shall reflect any

changed system concepts, resource requirements, or updated threat assessment. Any resource shortfalls which introduce significant test limitations shall be discussed with planned corrective action outlined.

6. Annex A--BIBLIOGRAPHY

- a. Cite in this section all documents referred to in the TEMP.
- b. Cite all reports documenting technical, live fire, and operational testing and evaluation.

7. Annex B-ACRONYMS

List and define acronyms used in the TEMP.

8. Annex C-POINTS OF CONTACT

Provide a list of points of contact as illustrated by Figure 2.

9. ATTACHMENTS

Provide as appropriate.

FIGURE 1 - INTEGRATED TEST PROGRAM SCHEDULE

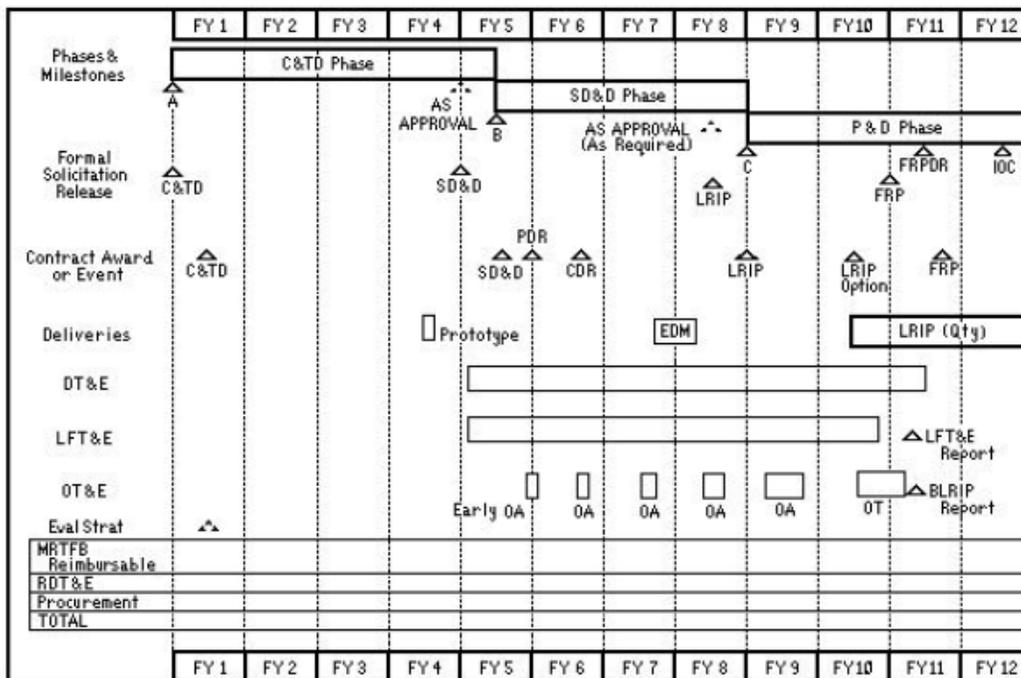


FIGURE 1 – Integrated Test Program Schedule

FIGURE 2 - PROGRAM POINTS OF CONTACT

- NAME ORGANIZATION TELEPHONE (COMM/DSN) E-MAIL ADDRESS
- Service Secretary/Agency Director/Monitor/Coordinator
- User Representative
- Program Manager
- Developmental Test Director/Coordinator
- Operational Test Director/Coordinator
- OUSD(AT&L)/DT Action Officer
- OSD/DOT&E Action Officer

ATTACHMENT 2

FORCEnet Consolidated Compliance Checklist

(Validated by the 2006 FRCC Flag Board, 13 July 2006, with POC updates 1 June 2008)

	<u>Meets</u>	<u>Meets w/ Comment</u>	<u>Does Not Meet</u>	<u>Signature / Date</u>
<input type="checkbox"/> FORCEnet Integrated Architecture, Operational Views - <i>Ref:</i> DoDAF Ver 1.5, DoD Architecture Registry System - <i>OPNAV POC:</i> Ms. Ann Gisch (703) 604-7715				
<input type="checkbox"/> FORCEnet Capabilities - <i>Ref:</i> CNO/CMC FORCEnet Functional Concept - <i>OPNAV POC:</i> Ms. Anne Wierzba (703) 604-7704				
FORCEnet Integrated Architecture, System Technical Views - <i>Ref:</i> DoDAF Ver 1.5, DoD Architecture Registry System - <i>OPNAV POC:</i> Ms. Ann Gisch (703) 604-7715				
<input type="checkbox"/> Naval Open Architecture Criteria, as contained in Open Architecture Assessment Tool (OAAT) - <i>Ref:</i> DCNO OA Requirement Memo of 23 Dec 05, ASN(RD&A) OA Policy Memo of 5 Aug 04 (See attached OA Compliance Action List) - <i>OPNAV POC:</i> Ms. Anne Wierzba (703) 604-7704				
<input type="checkbox"/> DoD Information Technology Standards Registry (DISR) - <i>Ref:</i> OSD Memo 22 Dec 04, CJCSI 6212.01D - <i>OPNAV POC:</i> Ms. Anne Wierzba (703) 604-7704				
<input type="checkbox"/> Internet Protocol (IP) based, with transition to IPv6 planned - <i>Ref:</i> OSD Memo 22 Aug 96 - <i>OPNAV POC:</i> Ms. Anne Wierzba (703) 604-7704				
<input type="checkbox"/> Global Information Grid (GIG) Mission Area Capabilities - <i>Ref:</i> Initial Capabilities Document for Global Information Grid Mission Area, JROCM 202-02 of 22 Nov 02 - <i>OPNAV POC:</i> Mr. Dave Markley (703) 601-1431				
<input type="checkbox"/> Global Information Grid (GIG) Enterprise Services (ES) - <i>Ref:</i> Initial Capabilities Document for Global Information Grid Enterprise Services, JROCM 051-04 of 22 Mar 04 - <i>OPNAV POC:</i> Mr Bill Martin (703) 601-1212				
<input type="checkbox"/> Net-Centric Operations & Warfare Ref Model - <i>Ref:</i> CJCSI 6212.01E - <i>OPNAV POC:</i> Ms. Anne Wierzba (703) 604-7704				
<input type="checkbox"/> Net-Centric Enterprise Services (NCES) - <i>Ref:</i> DEPSECDEF Memorandum, Global Information Grid Enterprise Services (GIG ES), Core Enterprise Services, U18556-03 of 10 Nov 03 - <i>OPNAV POC:</i> Mr. Bill Martin (703) 601-1212				
<input type="checkbox"/> Net-Centric Enterprise Solutions for Interoperability (NESI) - <i>Ref:</i> Net-Centric Implementation Framework - <i>OPNAV POC:</i> Mr. Dave Markley (703) 601-1431				
<input type="checkbox"/> Net Ready Key Performance Parameters (NR KPP) - <i>Ref:</i> CJCSI 6212.01 Series - <i>OPNAV POC:</i> Mr. Dave Markley (703) 601-1431				

FORCEnet System / Technical Criteria

FORCEnet Consolidated Compliance Checklist

(Validated by the 2006 FRCC Flag Board, 13 July 2006, with POC updates 1 June 2008)

	<u>Meets</u>	<u>Meets w/ Comment</u>	<u>Does Not Meet</u>	<u>Signature / Date</u>	
FORCEnet Policy Criteria	<input type="checkbox"/> ASD(NII) Net-Centric Checklist (NCC) - <i>Ref:</i> OASD/NII Net-Centric Checklist (NCC) - <i>OPNAV POC:</i> Mr. Dave Markley (703) 601-1431				
	<input type="checkbox"/> Transformational Communications Architecture (TCA) - <i>Ref:</i> TCA 2.0 - <i>OPNAV POC:</i> Richard Michaux (703) 601-1235				
	<input type="checkbox"/> Joint Tactical Radio System (JTRS) Software Compliant Architecture (SCA) - <i>Ref:</i> ASD(C3I) 28 Aug 98, 17 Jun 03 - <i>OPNAV POC:</i> Mr Joe Trainor (703) 601-1233				
	<input type="checkbox"/> Teleports - <i>Ref:</i> DoD Teleport Gen 2 ORD, 04 May 05 - <i>OPNAV POC:</i> Mr. John Royal, (703) 601-1225				
	<input type="checkbox"/> Joint Battle Management Command and Control Roadmap - <i>Ref:</i> JBMC2 Roadmap - <i>OPNAV POC:</i> Mr. Milton Prell (703) 601-1490				
FORCEnet Policy Criteria	<input type="checkbox"/> Human Systems Integration (HSI) - <i>Ref:</i> (See attached HSI Compliance Action List) - <i>OPNAV POC:</i> Ms. Erika Colon, OPNAV N1, (703) 695-3057				
	<input type="checkbox"/> Electromagnetic Environmental Effects (E3) / Spectrum Supportability (SS) - <i>Ref:</i> (See attached E3/SS Compliance Action List) - <i>OPNAV POC:</i> Mr. Scott Hoschar (301) 672-5455				
	<input type="checkbox"/> Information Assurance (IA) - <i>Ref:</i> (See attached IA Compliance Action List) - <i>OPNAV POC:</i> Mr. John Sirotniak (703) 604-7046				
	<input type="checkbox"/> Data Strategy (DS) - <i>Ref:</i> (See attached DS Compliance Action List) - <i>OPNAV POC:</i> Mr. Dave Markley (703) 604-7704				
	<input type="checkbox"/> Geospatial, Time Standards, Meteorology, and Oceanography (GTSMO) - <i>Ref:</i> (See attached GTSMO Compliance Action List) - <i>OPNAV POC:</i> Mr Phil Vinson, N84, (202) 762-0601				
Implementation Criteria	<input type="checkbox"/> DCNO Memorandum of 27 May 05, Subj: <i>FORCEnet Requirements / Capabilities & Compliance Policy</i> - <i>OPNAV POC:</i> Mr Pete Blackledge (703) 601-1476				
	<input type="checkbox"/> ASN(RD&A) Memorandum of 14 Jul 05, Subj: <i>DoN Acquisition Policy for Implementing FORCEnet Capabilities</i> - <i>OPNAV POC:</i> Mr Pete Blackledge (703) 601-1476				

Refer all FORCEnet Consolidated Compliance Checklist comments, inquiries, and requests to:
peter.blackledge@navy.mil

Electromagnetic Environmental Effects/Spectrum Supportability

Compliance Action List

(CAL 3.0)

Domain Owner: Mr. Scott Hoschar, OPNAV N6F131

Domain Executive Agent: Mr. David "Mark" Johnson, NAVSEA (SEA05W43)

OPNAV POC: Mr. Scott Hoschar (shoschar@sentel.com; (703) 601-1445)

TA POC : Mr. David "Mark" Johnson (david.m.johnson4@navy.mil; (202) 781-3140)

Date CAL approved: Pending

3.0 Electromagnetic Environmental Effects/Spectrum Supportability

Overview: The focus of the Electromagnetic Environmental Effects (E3) and Spectrum Supportability (SS) Compliance Action List is to ensure systems have met FORCENet policy requirements for E3/Spectrum Supportability. FORCENet policies require systems to have well defined performance and verification parameters, spectrum supportability plan, as well as applications for the proper equipment frequency allocation.

- 3.1 Development of a spectrum dependent system shall have an established Spectrum Supportability and Electromagnetic Environmental Effects Working Level Integrated Process Team. *(Ref17, 37)*
 - 3.1.1 Does the program have an established Spectrum Supportability and E3/SS Working Level Integrated Process Team?
- 3.2 Development of a spectrum dependent system shall have an established E3 performance and verification requirements. *(Ref17, 39)*
 - 3.2.1 Does the program have an established set of E3 performance and verification requirements?
- 3.3 Development of a spectrum dependent system shall result in the definition of the intended operating Electromagnetic Environment. *(Ref17, 37, 38)*
 - 3.3.1 Does the system have a definition for the intended operating Electromagnetic Environment?
- 3.4 Development of a spectrum dependent system shall result in the definition of the Test & Evaluation strategy for a system and a platform, which addresses Electromagnetic Compatibility/Electromagnetic Vulnerability. *(Ref17, 28, 45)*
 - 3.4.1 Does the program have a Test & Evaluation strategy, which addresses Electromagnetic Compatibility/Electromagnetic Vulnerability?
- 3.5 Development of frequency dependent systems shall have an approved DD Form 1494 (Application for Equipment Frequency Allocation). In addition, no spectrum dependent system shall proceed to the System Development and Demonstration Phase without a Spectrum Supportability determination unless granted by the Milestone Decision Authority. *(Ref17, 40, 41)*
 - 3.5.1 Does the program have an approved DD Form 1494?
 - 3.5.1.1 If the program has an approved DD Form 1494, provide the JF-12 number assigned.
 - 3.5.1.2 Has the system completed and submit an initial Stage 1 (Conceptual) DD Form 1494 for coordination prior to

- 3.8.3 Does the System meet the requirements of Spectrum Supportability by considering by ensuring Electromagnetic Compatibility (EMC) with other installed systems and equipments?
- 3.9 Program/System Documentation: Program/system documentation addresses E3 and SS requirements and compliance criteria. *(Ref17,22, 30, 39, 42,37)*
 - 3.9.1 Does the System have an Initial Capabilities Document (ICD)?
 - 3.9.1.1 Does the System ICD address E3 and SS requirements and compliance criteria?
 - 3.9.2 Does the System have a Capability Development Document (CDD)?
 - 3.9.2.1 Does the System CDD address E3 and SS requirements and compliance criteria?
 - 3.9.3 Does the System have a Capability Production Document (CPD)?
 - 3.9.3.1 Does the System CPD address E3 and SS requirements and compliance criteria?
 - 3.9.4 Does the System have a Test and Evaluation Master Plan (TEMP)?
 - 3.9.4.1 Does the System TEMP address E3 and SS requirements and compliance criteria?
- 3.10 Hazards of Electromagnetic Radiation to Ordinance: A Hazards of Electromagnetic Radiation to Ordinance (HERO) Assessment and/or Survey is funded. *(Ref17, 30, 42, 46, 47)*
 - 3.10.1 Does the System have a Hazards of Electromagnetic Radiation to Ordinance (HERO) Assessment and/or Survey funded?
- 3.11 Hazards of Electromagnetic Radiation to Personnel and Fuels: A Hazards of Electromagnetic Radiation to Personnel and Fuels (HERP/HERF) Assessment and/or Survey is funded. *(Ref17, 42, 43, 48)*
 - 3.11.1 Does the System have a Hazards of Electromagnetic Radiation to Personnel and Fuels (HERP/HERF) Survey funded?
- 3.12 System Electromagnetic Compatibility Certification: A System Electromagnetic Compatibility (EMC) Certification Survey funded. *(Ref17, 37, 49)*
 - 3.12.1 Does the System have a System Electromagnetic Compatibility (EMC) Certification Survey funded?
- 3.13 Other E3/Spectrum Supportability Analysis: Other requisite E3/SS Analysis is funded as appropriate to include: Electromagnetic Emission Control (EMCON), Emissions Security (EMSEC) (compromising emanations, formerly called TEMPEST), Electromagnetic Pulse (EMP), Lightning Protection, Precipitation Static (P-Static), and / or Electrostatic Discharge (ESD). *(Ref17, 37, 38, 45, 47, 50, 51)*
 - 3.13.1 Does the System have an Electromagnetic Emission Control (EMCON) analysis/survey funded?
 - 3.13.2 Does the System have an Emissions Security (EMSEC) (compromising emanations, formerly called TEMPEST) analysis/survey funded?
 - 3.13.3 Does the System have an Electromagnetic Pulse (EMP) analysis/survey funded?
 - 3.13.4 Does the System have a Lightning Protection analysis/survey funded?
 - 3.13.5 Does the System have a Precipitation Static (P-Static) analysis/survey funded?
 - 3.13.6 Does the System have an Electrostatic Discharge (ESD) analysis/survey funded?

- 3.14 Commercial Item /Non-Developmental Item Determination: Determination made regarding feasibility and impact of Commercial Item (CI)/Non-Developmental Item (NDI). *(Ref17, 39, 40, 37)*
 - 3.14.1 Does the system utilize Commercial Item (CI) and/or Non-Developmental Item (NDI) sub-components?
 - 3.14.1.1 Has a determination been regarding feasibility and impact of using Commercial Item (CI) and/or Non-Developmental Item (NDI)?
- 3.15 Integrated Topside Design Analysis: Integrated Topside Design analysis funded on all intended platforms. *(Ref17, 39, 52)*
 - 3.15.1 Does the System have an Integrated Topside Design analysis (which includes placement) funded on all intended platforms?
- 3.16 Shore Site E3/Spectrum Supportability: Shore site E3/SS analysis is funded and performed in support of new equipment/system installations at all shore sites. Shore site E3/SS analysis includes: Ashore Electromagnetic Environmental Effects Analysis and Certification, Ashore HERP/HERF/HERO Certification, and Ashore Spectrum Supportability Analysis and Certification. *(Ref 17, 41, 42, 43, 44, 53)*
 - 3.16.1 Does the program have plans to install the system at any ashore location?
 - 3.16.1.1 Does the System have an Ashore Spectrum Supportability Analysis and Certification survey funded?
 - 3.16.1.2 Does the System have an Ashore HERP/HERF/HERO Certification Survey funded?
 - 3.16.1.3 Does the System have an Ashore Electromagnetic Environmental Effects Analysis and Certification Survey funded?

ATTACHMENT 3

Suggested E3 & SS

TEMP FORMAT AND CONTENT GUIDANCE FROM DoD 5000.2-R Shortened version of Appendix 2

1. PART I--SYSTEM INTRODUCTION

a. Mission Description.

b. System Description. Briefly describe the system design, to include the following items:

(1) Key features and subsystems,

(2) Interfaces with existing or planned systems that are required for mission accomplishment. Address relative maturity and integration and modification requirements for non-developmental items. **Include interoperability with existing and/or planned systems** of other DoD Components or allies. Provide a diagram of the system architecture.

(3) Critical system characteristics or unique support concepts resulting in special test and analysis requirements (e.g., post deployment software support, **hardness against nuclear effects**; resistance to countermeasures; resistance to reverse engineering/exploitation efforts (Anti- Tamper); development of new threat simulation, simulators, or targets).

c. System Threat Assessment.

d. Measures of Effectiveness and Suitability. List (see example matrix below) the performance (operational effectiveness and suitability) capabilities identified as required in the ORD. The critical operational effectiveness and suitability parameters and constraints must crosswalk to those used in the Analysis of Alternatives, and include manpower, personnel, training, software, computer resources, transportation (lift), compatibility, interoperability and integration, Information Assurance (IA), **Electromagnetic Environmental Effects and Spectrum Supportability**, etc.

Measures of Effectiveness and Suitability

Operational Requirement	Parameter	ORD Threshold	ORD Objective	ORD Reference
Mobility	Land Speed** Miles per hour on secondary roads	xx miles per hour	xx miles per hour	Paragraph xxx
Firepower	Accuracy Main Gun Probability of hit/stationary platform/ stationary target	xxx probability of hit @ xxx range	xxx probability of hit @ xxx range	Paragraph xxx
Supportability	Reliability Mean Time Between Operational Failure	xxx hours	xxx hours	Paragraph xxx

** Key Performance Parameter

e. Critical Technical Parameters

(1) List in a matrix format (see example below) the critical technical parameters of the system (including software maturity and performance measures) that will be evaluated (or reconfirmed if previously evaluated) during the remaining phases of developmental testing. The system specification is usually a good reference for the identification of critical technical parameters.

(2) Next to each technical parameter, list a threshold for each stage of development.

(3) Ensure technical parameters are included for technical interoperability.

Critical Technical Parameters

Supported Operational Requirement (Include ORD reference)	Technical Parameter	Developmental Stage Event	Threshold Value	DecisionSupported
In most cases a measure of effectiveness or suitability from paragraph 1d	Technical measure(s) derived to support operational requirement	Developmental stage events (Described in TEMP Part III) designed to measure system performance against technical parameters.	Minimum value required at each developmental event. Most parameters will show growth as the system progress through testing. Final value should reflect level of performance necessary to satisfy the operational requirement.	May be any decision marking the entrance into a new acquisition phase or may be a readiness for operational test decision.
Example: Main Gun Probability of Hit, 94 % at 1,500 meters (ORD para. xxx.x)	Example: Auxiliary sight Boresight accuracy	Example: System Demo Test-Accuracy Test Prod Readiness Test-Accuracy Prod Qual Test	Example +/- 5 mils +/- 3 mils +/- 1 mil	Example Milestone B MS C (Low Rate Initial Production Decision) FRP DR

2. PART II--INTEGRATED TEST PROGRAM SUMMARY

a. Integrated Test Program Schedule

(1) Display on a chart (see Figure 1) the integrated time sequencing of the major test and evaluation phases and events, related activities, and planned cumulative funding expenditures by appropriation.

(2) Include event dates such as major decision points as defined in DoDI 5000.2; operational assessments, preliminary and critical design reviews, test article availability; software version releases; appropriate phases of developmental test and evaluation; live fire test and evaluation, JITC interoperability testing and certification date to support FRP Decision Review, and operational test and evaluation; low rate initial production deliveries; Initial Operational Capability; Full Operational Capability; and statutorily required reports, such as the Live-Fire T&E Report and Beyond-LRIP Report.

(3) A single schedule shall be provided for multi-Service or Joint and Capstone TEMPs showing all DoD Component system event dates.

(4) Provide the date (fiscal quarter) when the decision to proceed beyond low-rate initial production is planned. (LRIP quantities required for initial operational test must be identified for approval by the DOT&E prior to entry into System Development and Demonstration Phase for ACAT I programs and other programs designated for DOT&E oversight).

b. Management

(1) Discuss the test and evaluation responsibility of all participating organizations (developers, testers, evaluators, users).

(2) Identify the T&E IPT structure

3. PART III--DEVELOPMENTAL TEST AND EVALUATION OUTLINE

a. Developmental Test and Evaluation Overview. Explain how developmental test and evaluation will: verify the status of engineering and manufacturing development progress; verify that design risks have been minimized; and that anti-tamper provisions have been implemented; substantiate achievement of contract technical performance requirements; and be used to certify readiness for dedicated operational test.

b. Future Developmental Test and Evaluation. Discuss all remaining developmental test and evaluation that is planned, beginning with the date of the current TEMP revision and extending through completion of production. Place emphasis on the next phase of testing. For each phase, include:

(1) *Configuration Description*. Summarize the functional capabilities of the system's developmental configuration and how they differ from the production model.

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Summarize the test events, test scenarios and the test design concept. Quantify the testing (e.g., number of test hours, test events, test firings). List the specific threat systems, surrogates, countermeasures, component or subsystem testing, and testbeds which are critical to determine whether or not developmental test objectives are achieved. As appropriate, particularly if an agency separate from the test agency will be doing a significant part of the evaluation, describe the methods of evaluation. List all models and simulations to be used to evaluate the system's performance, explain the rationale for their credible use and provide their source of verification, validation and accreditation (VV&A). Describe how performance in natural environmental conditions representative of the intended area of operations (e.g., temperature, pressure, humidity, fog, precipitation, clouds, **electromagnetic environment**, blowing dust and sand, icing, wind conditions, steep terrain, wet soil conditions, high sea state, storm surge and tides, etc.) and interoperability with other weapon and support systems, as applicable, to include insensitive munitions, will be tested. Describe the developmental test and evaluation plans and procedures that will support the JITC/DISA interoperability certification recommendation to the Director, Joint Staff (J-6) in time to support the FRP Decision Review.

(4) *Limitations*. Discuss the test limitations that may significantly affect the evaluator's ability to draw conclusions, the impact of these limitations, and resolution approaches.

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(2) The TEMP shall show how program schedule, test management structure, and required resources are related to operational requirements documented in the certified CRD (if applicable) and ORD, and derived requirements from the C4ISP; critical operational issues; test objectives; and major decision points. Testing shall evaluate the system (operated by typical users) in an environment as operationally realistic as possible, including threat representative hostile forces and the **expected range of natural environmental conditions**.

b. Critical Operational Issues

(1) List in this section the critical operational issues.

(2) A critical operational issue is typically phrased as a question that must be answered in order to properly evaluate operational effectiveness (e.g., "Will the system detect the threat in a combat environment at adequate range to allow successful engagement?") and operational suitability (e.g., "Will the system be safe to operate in a combat environment?")

(3) Some critical operational issues will have critical technical parameters and thresholds

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(5) If every critical operational issue is resolved favorably, the system should be operationally effective and operationally suitable when employed in its intended environment by typical users.

c. Future Operational Test and Evaluation. For each remaining phase of operational test and evaluation, separately address the following:

(1) *Configuration Description*. Identify the system to be tested during each phase, and describe any differences between the tested system and the system that will be fielded including, where applicable, software maturity performance and criticality to mission performance, and the extent of integration with other systems with which it must be interoperable or compatible.

Characterize the system (e.g., prototype, engineering development model, production representative or production configuration).

(2) *Operational Test and Evaluation Objectives*. State the test objectives including the objectives and thresholds and critical operational issues to be addressed by each phase of operational test and evaluation and the decision points supported

(3) *Operational Test and Evaluation Events, Scope of Testing, and Scenarios*. Summarize the scenarios and identify the events to be conducted, type of resources to be used, the threat simulators and the simulation(s) to be employed, the type of representative personnel who will operate and maintain the system, the status of the logistic support, the operational and maintenance documentation that will be used, **the environment under which the system is to be employed and supported during testing**, the plans for interoperability and **compatibility testing** with other United States/Allied weapon, the anti-tamper characteristics to be assessed in an operational environment and support systems as applicable, etc. Identify planned sources of information (e.g., developmental testing, testing of related systems, modeling, simulation, etc.) that may be used by the operational test agency to supplement this phase of operational test and evaluation. Whenever models and simulations are to be used: identify the planned models and simulations; explain how they are proposed to be used; and provide the source and methodology of the verification, validation, and accreditation underlying their credible application for the proposed use.

(4) *Limitations*. Discuss the test and evaluation limitations including threat realism, resource availability, **limited operational (military, climatic, nuclear, etc.) environments**, limited support environment, maturity of tested system, safety, etc., that may impact the resolution of affected critical operational issues.

d. Live Fire Test and Evaluation

5. PART V--TEST AND EVALUATION RESOURCE SUMMARY

a. Provide a summary (preferably in a table or matrix format) of all key test and evaluation resources, both government and contractor, that will be used during the course of the acquisition program. Specifically, identify the following test resources:

(1) *Test Articles*. Identify the actual number of and timing requirements for all test articles, including key support equipment and technical information required for testing in each phase by major type of developmental test and evaluation and operational test and evaluation.

(2) *Test Sites and Instrumentation*. Identify the specific test ranges/facilities to be used for each type of testing.

(3) *Test Support Equipment*. Identify test support equipment that must be acquired specifically to conduct the test program.

(4) *Threat Representation*. Identify the type, number, availability, and fidelity requirements for all representations of the threat to be used in testing. Compare the requirements for threat representations with available and projected assets and their capabilities. Highlight any major shortfalls. Each representation of the threat (target, simulator, model, simulation or virtual simulation) shall be subjected to validation procedures to establish and document a baseline comparison with its associated threat and to determine the extent of the operational and technical performance differences between the two throughout the life cycle of the threat representation.

(5) *Test Targets and Expendables*.

(6) *Operational Force Test Support*. For each test and evaluation phase, identify the type and timing of aircraft flying hours, ship steaming days, and on-orbit satellite contacts/coverage, and other critical operating force support required.

(7) *Simulations, Models and Testbeds*. For each test and evaluation phase, identify the models and simulations to be used, including computer-driven simulation models and hardware/software-in-the-loop testbeds. Identify the resources required to accredit their usage.

(8) *Special Requirements*. Discuss requirements for any significant non-instrumentation capabilities and resources such as: special data processing/data bases, unique mapping/charting/geodesy products, extreme physical environmental conditions or restricted/special use air/sea/landscapes.

(9) *Test and Evaluation Funding Requirements*. Estimate, by Fiscal Year and appropriation line number (program element), the funding required to pay direct costs of planned testing. State, by fiscal year, the funding currently appearing in those lines (program elements). Identify any major shortfalls.

(10) *Manpower/Personnel Training*. Identify manpower/personnel and training requirements and limitations that affect test and evaluation execution.

b. The TEMP shall project the time-phased test and test support resources necessary to accomplish development, integration and demonstration testing and early operational assessment. The TEMP shall estimate, to the degree known, the key resources necessary to accomplish developmental test and evaluation, operational assessment, live fire test and evaluation, and operational test and evaluation. These shall include test and training ranges of the Major Range and Test Facility Base (MRTFB), test equipment and facilities of the MRTFB, capabilities designated by industry and academia,

unique instrumentation, threat simulators, targets, and modeling and simulation. As system acquisition progresses, the preliminary test resource requirements shall be reassessed and refined and subsequent TEMP updates shall reflect any changed system concepts, resource requirements, or updated threat assessment. Any resource shortfalls which introduce significant test limitations shall be discussed with planned corrective action outlined.

6. Annex A--BIBLIOGRAPHY

- a. Cite in this section all documents referred to in the TEMP.
- b. Cite all reports documenting technical, live fire, and operational testing and evaluation.

7. Annex B-ACRONYMS

List and define acronyms used in the TEMP.

8. Annex C-POINTS OF CONTACT

Provide a list of points of contact as illustrated by Figure 2.

9. ATTACHMENTS

Provide as appropriate.

FIGURE 1 - INTEGRATED TEST PROGRAM SCHEDULE

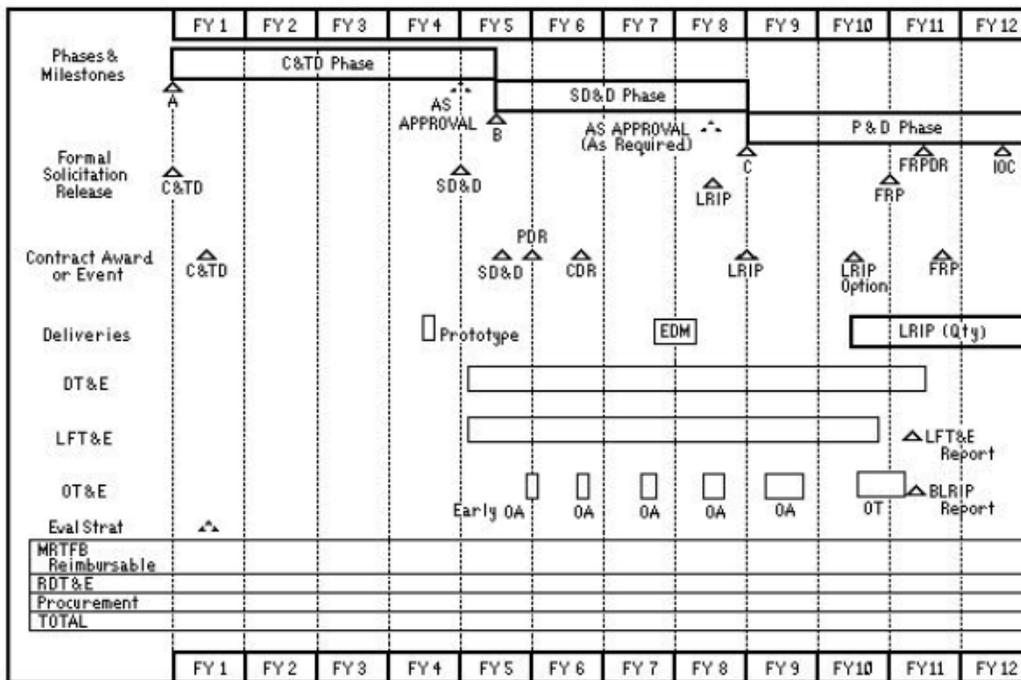


FIGURE 1 – Integrated Test Program Schedule

FIGURE 2 - PROGRAM POINTS OF CONTACT

- NAME ORGANIZATION TELEPHONE (COMM/DSN) E-MAIL ADDRESS
- Service Secretary/Agency Director/Monitor/Coordinator
- User Representative
- Program Manager
- Developmental Test Director/Coordinator
- Operational Test Director/Coordinator
- OUSD(AT&L)/DT Action Officer
- OSD/DOT&E Action Officer

6.6.3 Specifying Requirements in Solicitation Documents

6.6.3.1 General

As discussed in C.3.9 of this handbook, performance specifications, SOWs, CDRLs, and Data Item Descriptions (DIDs) are documents used in solicitations that become part of a contract. It is essential that requirements be clearly articulated during the preparation of these documents. As detailed below, E3 and SS requirements are to be included in each of these documents

6.6.3.2 Performance Specifications

6.6.3.2.1 General

This section discusses the applicable military standards that are to be invoked in the performance specification. It also contains guidance for tailoring the requirements in the standards. (See Appendix A of this handbook for additional applicable E3 and SS documents).

6.6.3.2.2 Subsystem/Equipment Military E3 Standards

Subsystems and equipment should not be susceptible to conducted or radiated EM emissions that could degrade or render them ineffective. Likewise, they should not be sources of EMI to other equipment within the platform or system. Developmental EMI requirements for subsystems and equipment, that is, conducted and radiated, emission and susceptibility (immunity) requirements are defined in MIL-STD-461. Many of the requirements in the standard are universally applicable to all subsystems and equipment, regardless of end use, whereas a limited number of requirements are structured to address specific concerns associated with the end platform or system. Tables in the standard define the applicability of the requirements. The requirements contained therein are not to be applied to subassemblies of equipment such as modules or circuit cards, nor are they intended for platforms. The requirements in the standard are to be used as a baseline and should be tailored to the specific item being procured. Verification of the EMI requirements is demonstrated by tests based on those also in MIL-STD-461. The Appendix of the standard provides rationale and guidance for implementing and tailoring the requirements contained therein. In addition, the Appendix should be consulted for detailed guidance on tailoring and performing the required tests. Compliance with the equipment or subsystem EMI requirements does not relieve the developing or integrating activity of the responsibility for providing overall platform or system compatibility.

6.6.3.2.3 Platform/System Military E3 Standards

Developmental E3 requirements for airborne, sea, space, and ground platforms and systems, including associated ordnance, are defined in MIL-STD-464. Ordnance includes weapons, rockets, explosives, EIDs, EEDs, squibs, flares, igniters, explosive bolts, electric primed cartridges, destructive devices, and jet-assisted take-off bottles. The standard applies to complete platforms or systems, both new and modified. The platform or system E3 specification, although based on MILSTD- 464, must be tailored for the specific acquisition and to the expected operational environment.

Verification of the tailored E3 requirements is done by test, analysis, inspection, or some combination thereof, depending upon the degree of confidence in the particular method, the technical appropriateness, associated costs, and availability of assets. The Appendix to the standard provides rationale and guidance for implementing the requirements and verification procedures contained therein. The basic requirements in MIL-STD-464 are at the platform or system level and deal with both the integration and operation of subsystems and equipment in the platform or system and with the

operation of the platform or system in its operational EME. The requirements for intra-platform/system EMC, inter-subsystem/equipment EMC, and EMV are universally applicable.

Additional, specialized E3 assessments, such as lightning, p-static, HERP, HERF, HERO, and EMP, may also be required, depending on the type of item being procured, its mission, and its intended operational EME. Appendix A of this handbook lists other documents that could be referenced for an acquisition.

6.6.3.2.4 Tailoring

E3 requirements should be tailored to the specific needs of the mission and should be considered in conjunction with program risks and costs when related to performance trade-offs. Tailoring is the process by which the requirements of a standard are adapted to the characteristics or operational requirements of an item under development. Since each platform, system, subsystem, or equipment has its own requirements and characteristics, the general E3 performance requirements in MIL-STD-461 or 464, for example, may not be adequate. Quite often the requirements for items that operate in critical EME need to be made more stringent.

Tailoring involves modifying, deleting, or adding to the requirements in a basic military standard.

Tailoring the requirements of a standard should either result in improved performance of the item or reduce the item's development or life cycle costs without compromising the item's operational capabilities. Tailoring the requirements of a standard does not constitute a waiver or deviation from the document. Tailored E3 performance requirements should be reflected in the solicitation documents. The depth of detail, level of effort required, and the data expected should be defined when tailoring the requirements. Subsequent tailoring of performance requirements may be requested or recommended by a contractor but should be subject to Government approval.

Tailoring is an important step in preparing the SOW, CDRLs, and the requirement documents.

First, there should be an orderly process of reviewing all of the available specifications and standards and selecting those that are considered pertinent to the particular item. Then, the individual requirements from the sections and paragraphs of the selected standards, specifications, or related documents should be evaluated to determine their suitability for an item's acquisition. As required, individual requirements should be tailored for the specific application and use of the item to ensure an optimal balance between the item's operational needs and acquisition costs.

The following two paragraphs are examples of how to address E3 performance requirements in a subsystem or equipment specification:

“EMI Control. The equipment shall comply with the applicable requirements of MIL-STD-461.”

“EMI Test. The equipment shall be tested in accordance with the applicable test procedures of MIL-STD-461.”

As an alternative, the specific, applicable MIL-STD-461 conducted emission, radiated emission, conducted susceptibility, and radiated susceptibility requirements may be specified, along with modifications to the limits or applicable frequency ranges, as appropriate. Acceptable, equivalent commercial standards may also be invoked. A system or platform specification will call out the specific, applicable, E3 requirements of MILSTD-464 in a similar manner.

6.6.3.3 Statement of Work (SOW)

The SOW is described in C.3.9.2. Sample wording addressing the E3/SS area that might be included in a contract for a system follows:

“The contractor shall design, develop, integrate, and qualify the system such that it meets the E3/SS performance requirements of the system specification. The contractor shall perform analyses, studies, and testing to establish E3/SS controls and features to be implemented in the design of the item. The contractor shall perform inspections, analyses, and tests, as necessary, to verify that the system meets its E3/SS performance requirements. The contractor shall prepare and update the DD Form 1494 throughout the development of the system for spectrum-dependent equipment and shall perform analysis and testing to characterize the equipment, where necessary. The contractor shall establish and support an E3/SS WIPT to accomplish these tasks. MIL-HDBK-237 may be used for guidance.”

6.6.3.4 Contract Data Requirements List (CDRL)

The CDRL and its relationship to the SOW and the Data Item Descriptions (DIDs) are discussed in C.3.9.3. See 6.6.3.4.1 for applicable DIDs.

6.6.3.4.1 Applicable E3 Data Item Descriptions (DIDs)

DIDs are used for ordering data products associated with hardware development. The most frequently ordered DIDs in subsystem or equipment procurements are associated with MIL-STD-461. These DIDs are:

- EMI Control Procedures DID No. DI-EMCS-80199B
- EMI Test Procedures DID No. DI-EMCS-80201B
- EMI Test Report DID No. DI-EMCS-80200B

The DIDs associated with platform or system procurements implementing MIL-STD-464 are:

- E3 Integration and Analysis Report DID No. DI-EMCS-81540A
- E3 Verification Procedures DID No. DI-EMCS-81541A
- E3 Verification Report DID No. DI-EMCS-81542A

Appendix A of this handbook lists other possible data that may be ordered.

REFERENCES

CJCSI 3010.02B	Joint Operations Concepts Development Process,(JOpsC-DP),27 January 2006
CJCSI 3170.01G	Joint Capabilities Integration and Development System
CJCSM 3170.01C	Chairman of the Joint Chiefs of Staff Manual
CJCSI 6212.01E	Interoperability and Supportability of Information Technology and Security Systems
National	
DoDD 5000.1	The Defense Acquisition System, November 20, 2007
DoDI 5000.02	Operation of the Defense Acquisition System, December 8, 2008
DoD 5000.2-R	Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information System (MAIS) Acquisition Programs
SECNAVINST 5000.2D	Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System
DoDD 3222.3	Defense (DoD) Joint Electromagnetic Environmental Effects (E3) Program
DoDD 4650.01	Management and Use of Radio Frequency Spectrum
DODI 4630.8	Procedures for Interoperability and Supportability of Information, June 2004
OPNAVINST 2400.20F	Electromagnetic Environmental Effects (E3) and Spectrum Supportability Policy and Procedures
OPNAVINST 2450.2	Electromagnetic Compatibility Program Within the Department of the Navy
FORCEnet	Integrated Architecture Governance, Version 3.0 14 Nov 2007
N6-N7 FORCEnet	Compliance Policy memo of 27 May 2005

Functional Area Analysis (FAA)

Identify operational task, conditions, and standards needed to accomplish military objectives

Result: Prioritized list of tasks to achieve military objectives

Functional Needs Analysis (FNA)

Assess ability of current and programmed war fighting systems to deliver capabilities to accomplish required tasks

Result: List of capability gaps and time frame solutions needed (a JCD may be result of FAA and FNA)

Functional Solutions Analysis (FSA)

Operational based assessment of doctrine, organization, training, materiel, leadership/education, personnel, and facilities (DOTMLPF) approaches to solving capability gaps

Result: Integrated DOTMLPF approaches to solving capability gaps

Post Independent Analysis (PIA)

Independent review to ensure FSA was thorough and recommendations are reasonable

Result: ICD/Joint DCR/Policy Change

LINKS

CJCS Directives

<http://www.dtic.mil/cjcs/directives>

Defense Acquisition Resource Center

<http://akss.dau.mil/darc/darc.html>

Joint Staff's Future Joint Warfare Web Site

<http://www.dtic.mil/futurejointwarfare/>

FORCEnet, Navy Network Warfare Command

<http://forcenet.navy.mil/>

T & E MANAGEMENT GUIDE

<http://www.dau.mil/pubs/gdbks>

Defense Acquisition Guidebook

<https://acc.dau.mil/dag>

ACRONYMS

ACAT	Acquisition Category
APB	Acquisition Program Baseline
ASR	Alternative Systems Review
C4I	Command, Control, Communications, Computers, and Intelligence
CBA	Capabilities-Based Assessment
CDD	Capability Development Document
CDR	Critical Design Review
CDRL	Contract Data Requirements List
C-E	Communications and Electronics
CFE	Contractor-Furnished Equipment
CJCSI	Chairman, Joint Chiefs of Staff Instruction
CJCSM	Chairman, Joint Chiefs of Staff Manual
CM	Configuration Management
COTS	Commercial-Off-the-Shelf
CPD	Capability Production Document
DCR	DOTMLPF Change Request
DID	Data Item Description
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities
E3	Electromagnetic Environmental Effects
ECPR	Engineering Change Proposal Review
EMC	Electromagnetic Compatibility
EMCON	Emission Control
EME	Electromagnetic Environment
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
ESC	Equipment Spectrum Certification
FAA	Functional Area Analysis
FCCC	FORCEnet Consolidated Compliance Checklist
FNA	Functional Needs Analysis (FNA)
FRCC	FORCEnet Requirements / Capabilities
FSA	Functional Solutions Analysis (FSA)
FRR	Flight Readiness Review
GFE	Government-Furnished Equipment
GPS	Global Positioning System
HEMP	High-Altitude Electromagnetic Pulse
HERF	Hazards of Electromagnetic Radiation to Fuels
HERO	Hazards of Electromagnetic Radiation to Ordnance
HERP	Hazards of Electromagnetic Radiation to Personnel
HIRF	High Intensity Radio Frequency
HNA	Host Nation Agreement
IA	Information Assurance
ICD	Initial Capabilities Document
IIP	Interoperability and Interconnectivity Profile

IPT	Integrated Product Team
ISP	Information Support Plan
ITD	Integrated Topside Design
ITR	Initial Technical Review
JCD	Joint Capabilities Document
JCIDS	Joint Capabilities Integration and Development System
LRIP	Low Rate Initial Production
KPP	Key Performance Parameters
MCEB	Military Communications-Electronics Board
MOE	Measure of Effectiveness
MOP	Measure of Performance
MRA	Mutual Recognition Agreement
MRTFB	Major Range and Test Facility Base
NCDP	Naval Capabilities Development Process
NCO/W	Net-Centric Operations/Warfare
NDI	Non-Developmental Item
NIST	National Institute of Standards and Technology
NMSC	Navy and Marine Corps Spectrum Center
NR-KPP	Net Ready Key Performance Parameter
NVLAP	National Voluntary Laboratory Accreditation Program
OPEVAL	Operational Evaluation
ORD	Operational Requirements Document
OTRR	Operational Test Readiness Review
PCR	Physical Configuration Review
PDR	Preliminary Design Review
PIA	Post Independent Analysis
PPS	Precise Positioning Service
P-Static	Precipitation Static
RF	Radio Frequency
SAMP	System Acquisition Master Plan
SE	Systems Engineering
SETR	Systems Engineering Technical Review
SFR	System Functional Review
SOFT	Safety of Flight Test
SOW	Statement of Work
SRR	System Requirements Review
SS	Spectrum Supportability
SVR/PRR	System Verification Review/Production Readiness
TDP	Technical Data Package
TECHEVAL	Technical Evaluation
TEMP	Test and Evaluation Master Plan
TRR	Test Readiness Review
VERTREP	Vertical Replenishment
VV&A	Verification, Validation and Accreditation