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CJCSM 3170.01C
1 May 2007

OPERATION OF THE JOINT CAPABILITIES INTEGRATION AND DEVELOPMENT SYSTEM

References: See Enclosure I.

1. Purpose. This manual sets forth guidelines and procedures for operation of the Joint Capabilities Integration and Development System (JCIDS) regarding the development and staffing of JCIDS documents in support of reference a.

2. Cancellation. CJCSM 3170.01B, 11 May 2005, "Operation of the Joint Capabilities Integration and Development System," is canceled.

3. Applicability. In accordance with references a and b, this manual applies to the Joint Staff, Services, combatant commands, Defense agencies, Department of Defense (DOD) field activities and joint and combined activities. It also applies to other agencies preparing and submitting JCIDS documents in accordance with references a, b, and c.

4. Summary. Guidance on the conduct of JCIDS analyses, the development of key performance parameters, and the JCIDS staffing process are provided in this manual. It also contains procedures and instructions regarding the staffing and development of joint capabilities documents (JCDs), initial capabilities documents (ICDs), capability development documents (CDDs), capability production documents (CPDs), and joint doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) change recommendations (DCRs).

5. Summary of Changes

a. Provides additional guidance on the capabilities-based assessment (CBA) process and provides guidelines for use in determining the adequacy of the analysis.

b. Per reference d, implements streamlining changes to the staffing process.

c. Per reference e, provides new guidance on the incorporation of the safe weapons endorsement.

d. Per reference f, incorporates the mandatory force protection and survivability key performance parameters (KPP).

e. Per reference g, incorporates various changes to include: incorporation of joint capability areas (JCA); defining a more rapid process for updating KPPs; deleting the post independent analysis as a requirement; adding the requirement for a CBA study plan for Joint Requirements Oversight Council (JROC)-directed CBAs; including an alternate CONOPs in the FSA; requiring a more complete description of the threats and mitigation strategy; and permitting the use of CONOPs to initiate a CBA.

f. Per reference h, provides new guidance on implementation of a mandatory sustainment KPP and selectively applied system training and energy efficiency KPPs; additional guidance on a process to identify appropriate KPPs and key system attributes (KSA) for each CDD; and direction to identify the timeframe when capabilities are required.

g. Per reference i, implements new guidance on timelines for comment resolution and the process for ensuring critical comments are resolved in a timely manner.

h. Removes the requirement for functional process owners (FPOs) to provide an endorsement statement.

i. Removes the requirement for an insensitive munitions certification or waiver per JROC direction.

6. Releasability. This manual is approved for public release; distribution is unlimited. DOD components (to include the combatant commands), other federal agencies, and the public may obtain copies of this manual through the Internet from the CJCS Directives Home Page--http://www.dtic.mil/cjcs_directives.

7. Effective Date. This manual is effective upon receipt.

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Enclosures:
A -- Capabilities-Based Assesment Process
B -- Performance Attributes and Key Performance Parameters
C – JCIDS Staffing Process
D -- Joint Capabilities Document
E -- Initial Capabilities Document
F -- Capability Development Document
G -- Capability Production Document
H -- Joint DOTMLPF Change Recommendation
I -- References
GL -- Glossary

ENCLOSURE B

PERFORMANCE ATTRIBUTES AND KEY PERFORMANCE PARAMETERS

1. Performance Attributes and Key Performance Parameters. The CDD and CPD state the operational and sustainment-related performance attributes of a system(s) that provides the capabilities required by the warfighter -- attributes so significant they must be verified by testing and evaluation or analysis. KPPs are those attributes or characteristics of a system that are considered critical or essential to the development of an effective military capability and those attributes that make a significant contribution to the characteristics of the future joint force as defined in the CCJO. The CDD and CPD identify the attributes that contribute most significantly to the desired operational capability in threshold-objective format. Whenever possible, attributes should be stated in terms that reflect the range of military operations that the capabilities must support and the joint operating environment intended for the system (family of systems (FoS) or system of systems (SoS)). There are compatibility and interoperability attributes (e.g., databases, fuel, transportability, ammunition) that might need to be identified for a capability to ensure its effectiveness. These statements will guide the acquisition community in making tradeoff decisions between the threshold and objective values of the stated attributes. Because operational testing will assess the ability of the system(s) to meet the production threshold values as defined by the KPPs, KSAs, and other performance attributes, these attributes must be testable.

a. Each attribute will be supported by an operationally oriented analysis that takes into account technology maturity, fiscal constraints, and the timeframe the capability is required before determining threshold and objective values. Given these constraints, an evolutionary acquisition approach may be necessary, delivering the capability in achievable increments that allow management of the risks, ensuring delivery of the complete capability within the timeframe required. Below the threshold value, the military utility of the system(s) becomes questionable. In an evolutionary acquisition, it is expected that threshold values will generally improve between increments. Different attributes may come into play as follow-on increments deliver additional capability. An attribute may apply to more than one increment. The threshold and objective values of an attribute may differ in each increment. DOD components will, at a minimum, budget to achieve all stated thresholds.

b. The threshold value for an attribute is the minimum acceptable value considered achievable within the available cost, schedule, and technology at low-to-moderate risk. Performance below the threshold value is not operationally effective or suitable. The objective value for an attribute is the

desired operational goal achievable but at higher risk in cost, schedule, and technology. Performance above the objective does not justify additional expense. The difference between threshold and objective values sets the trade space for meeting the thresholds of multiple KPPs. Advances in technology or changes in JOpsC may result in changes to threshold and objective values in future increments.

c. The attributes and their supporting rationale should reflect analytical insights identified by the CBA used to develop an ICD. The attributes should be directly related to the measures of effectiveness related to the capability as defined in the ICD. As a minimum, supporting analyses must include: the AoA for potential ACAT I programs and other programs as directed by the milestone decision authority (MDA); the cost-schedule-performance tradeoffs analysis; the capability cost tradeoffs analysis; the results of experimentation; testing and evaluation; sustainment, system training, and energy efficiency analysis; lessons learned during the system development and demonstration (SDD) phase; life-cycle/total ownership cost analysis; and user feedback on fielded production increments.

d. KPPs are those system attributes considered most critical or essential for an effective military capability. The CDD and the CPD must contain sufficient KPPs to capture the minimum operational effectiveness, suitability, and sustainment attributes needed to achieve the overall desired capabilities for the system (or systems if the CDD/CPD describes an SoS) during the applicable increment. Failure to meet a CDD or CPD KPP threshold may result in a reevaluation or reassessment of the program or a modification of the production increments.

e. KSAs are those system attributes considered most critical or essential for an effective military capability but not selected as a KPP. KSAs provide decision makers with an additional level of capability prioritization below the KPP but with senior sponsor leadership control (generally 4-star level, Defense agency commander, or Principal Staff Assistant). In the case of the mandated Sustainment KPP (Materiel Availability), the supporting Materiel Reliability and Ownership Cost KSAs require any changes to be documented in the subsequent update to the acquisition program baseline. KSAs do not apply to the net-ready KPP (NR-KPP).

2. Required KPPs

a. Mandatory KPPs for Force Protection and Survivability. All staffed systems and systems designed to enhance personnel survivability will identify KPPs for force protection and survivability when those systems may be employed in an asymmetric threat environment. The Protection FCB, in coordination with the lead FCB, will assess these KPPs and their applicability for JROC Interest CDDs and CPDs and make a recommendation to the JROC

on validation. The sponsoring component will validate the KPPs for non-JROC Interest CDDs and CPDs. A single KPP can be developed provided it complies with the congressional direction pertaining to force protection and survivability.

(1) Survivability KPP. Survivability attributes are those that contribute to the survivability of a manned system. This includes attributes such as speed, maneuverability, detectability, and countermeasures that reduce a system's likelihood of being engaged by hostile fire, as well as attributes such as armor and redundancy or critical components that reduce the system's vulnerability if it is hit by hostile fire.

(2) Force Protection KPP. Force protection attributes are those that contribute to the protection of personnel by preventing or mitigating hostile actions against friendly personnel, military and civilian. This may include the same attributes as those that contribute to survivability, but the emphasis is on protecting the system operator or other personnel rather than protecting the system itself. Attributes that are offensive in nature and primarily intended to defeat enemy forces before they can engage friendly forces are not considered force protection attributes. Attributes that protect against accidents, weather, natural environmental hazards, or disease (except when related to a biological attack) are also not part of force protection.

(3) Exemptions. Document sponsors who determine that the survivability and/or force protection KPPs do not apply will include rationale in the CDD/CPD explaining why they are not appropriate. The JROC must concur in this recommendation for JROC Interest documents.

b. Sustainment KPP. A Sustainment KPP (Materiel Availability) and two mandatory supporting KSAs (Materiel Reliability and Ownership Cost) will be developed for all JROC Interest programs involving materiel solutions. For non-JROC Interest programs, the sponsor will determine the applicability of this KPP. During the CBA, the relevant sustainment criteria and alternatives will be evaluated to provide the analytical foundation for the establishment of the sustainment KPP and KSAs.

(1) Mandatory KPP. Materiel Availability is a measure of the percentage of the total inventory of a system operationally capable (ready for tasking) of performing an assigned mission at a given time, based on materiel condition. This can be expressed mathematically as (number of operational end items/total population). Materiel Availability also indicates the percentage of time that a system is operationally capable of performing an assigned mission and can be expressed as (uptime/(uptime + downtime)). Determining the optimum value for Materiel Availability requires a comprehensive analysis of the system and its planned use, including the planned operating environment, operating tempo, reliability alternatives, maintenance approaches, and supply chain solutions. Materiel Availability is primarily determined by system

downtime, both planned and unplanned, requiring the early examination and determination of critical factors such as the total number of end items to be fielded and the major categories and drivers of system downtime. The Materiel Availability KPP must address the total population of end items planned for operational use, including those temporarily in a non-operational status once placed into service (such as for depot-level maintenance). The total life-cycle timeframe, from placement into operational service through the planned end of service life, must be included.

(a) Mandatory KSA (Materiel Reliability): Materiel Reliability is a measure of the probability that the system will perform without failure over a specific interval. Reliability must be sufficient to support the warfighting capability needed. Materiel Reliability is generally expressed in terms of a mean time between failures (MTBF), and once operational can be measured by dividing actual operating hours by the number of failures experienced during a specific interval. Reliability may initially be expressed as a desired failure-free interval that can be converted to MTBF for use as a KSA (e.g., 95 percent probability of completing a 12-hour mission free from mission-degrading failure; 90 percent probability of completing 5 sorties without failure). Specific criteria for defining operating hours and failure criteria must be provided together with the KSA. Single-shot systems and systems for which other units of measure are appropriate must provide supporting analysis and rationale.

(b) Mandatory KSA (Ownership Cost): Ownership Cost provides balance to the sustainment solution by ensuring that the operations and support (O&S) costs associated with materiel readiness are considered in making decisions. For consistency and to capitalize on existing efforts in this area, the Cost Analysis Improvement Group O&S Cost Estimating Structure will be used in support of this KSA. Only the following cost elements are required: 2.0 Unit Operations (2.1.1 (only) Energy (fuel, petroleum, oil, lubricants, electricity)); 3.0 Maintenance (All); 4.0 Sustaining Support (All except 4.1, System Specific Training); 5.0 Continuing System Improvements (All). Fuel costs will be based on the fully burdened cost of fuel. Costs are to be included regardless of funding source. The KSA value should cover the planned lifecycle timeframe, consistent with the timeframe used in the Materiel Availability KPP. Sources of reference data, cost models, parametric cost estimating relationships, and other estimating techniques or tools must be identified in supporting analysis. Programs must plan for maintaining the traceability of costs incurred to estimates and must plan for testing and evaluation. The planned approach to monitoring, collecting, and validating operating and support cost data to supporting the KSA must be provided.

(2) Exemptions. Document sponsors who determine the materiel availability KPP does not apply will include rationale in the CDD/CPD explaining why it is not appropriate. Joint Staff/J-4 must concur in this recommendation for JROC Interest documents.

c. Net-Ready KPP (NR-KPP). A NR-KPP will be developed for all IT and NSS used to enter, process, store, display, or transmit DOD information, regardless of classification or sensitivity. Exceptions are those systems that do not communicate with external ones, including IT systems in accordance with references r, s, and t.

(1) IT and NSS interoperability is defined in reference r as the ability of systems, units, or forces to provide data, information, materiel, and services to and accept the same from other systems, units, or forces and to use the data, information, materiel, and services so exchanged to enable them to operate effectively together. IT and NSS interoperability includes the technical exchange of information and the end-to-end operational effectiveness of that exchange as required for mission accomplishment. An NR-KPP is based on the information exchange of the proposed system(s) and is derived from integrated architectures, whenever possible, as defined in references r and u.

(2) The NR-KPP should reflect the information needs of the capability under consideration and the needs of appropriate supported systems. It should cover all communication, computing, and electromagnetic spectrum (reference v) requirements involving the exchange of products and services between producer, sender, receiver, and consumer for the successful completion of the warfighter mission, business process, or transaction. It will also identify all applicable standards the system will use to make data visible, accessible, and understandable to other information producers and consumers on the Global Information Grid (GIG). Embedded training will be considered as the first alternative for operators and maintainers to optimize use of the operational systems and interface with the distributed networks. Systems will be able to operate and train in peacetime within national and regional radio spectrum regulations. These products and services include any geospatial intelligence and environmental support the system(s) needs to meet operational capabilities. The NR-KPP identified in CDDs and CPDs will be used in the information support plan (ISP) (see references s and t) to identify support required from outside the program.

(3) Information assurance (IA) capabilities must be developed and integrated with capabilities for interoperability for any system considered an asset of the GIG. Reference w provides the guiding policy for the GIG and systems that use it. IA is defined as the information operation that protects and defends information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation. It includes restoration through protection, detection, and reaction capabilities. IA capabilities apply to all DOD systems that are used to enter, process, store, display, or transmit DOD information, regardless of classification or sensitivity, except those that do not communicate with external systems.

(4) Document sponsors who determine the NR-KPP does not apply will include rationale in the CDD/CPD explaining why it is not appropriate. Joint Staff/J-6 must concur in this determination for JROC Interest and Joint Integration documents.

d. Selectively Applied KPPs. The JROC has defined two KPPs to be selectively applied to programs, system training, and energy efficiency. The sponsor will perform an analysis on the use of these parameters as KPPs. If the analysis determines that they should not be KPPs, a summary of the analysis will be provided.

(1) System Training KPP. Ensure system training is addressed in the AoA and supporting analysis for subsequent acquisition phases and ensure projected training requirements and associated costs are appropriately addressed across the program life cycle.

(2) Energy Efficiency KPP. Include fuel efficiency considerations for fleet purchases and operational plans consistent with mission accomplishment. Life-cycle cost analysis will include the fully burdened cost of fuel during the AoA and subsequent analyses and acquisition program design trades. The fully burdened cost of fuel includes the price of the fuel delivery chain (to include force protection requirements).

e. KPPs Traceable to the CCJO. All systems will have KPPs that can be traced back through the ICD to those characteristics of the future joint force as defined in the CCJO to which the proposed system makes a significant contribution. These attributes will be designated as KPPs and have threshold and objective values defining the system's contribution to those key characteristics of the joint force. Guidelines for identifying the CCJO-derived KPPs are:

(1) Based on the primary mission of the system, does it contribute to one or more of the CCJO characteristics of the future joint force? For example, a bomber could contribute to multiple key characteristics: expeditionary, adaptable, and enduring/persistent; and an unmanned aerial vehicle could contribute to knowledge empowered, networked, and enduring/persistent.

(2) Does the system have other attributes that contribute significantly to any of the CCJO characteristics of the future joint force? For example, the tactical data link on a fighter may contribute to the overall networked characteristic in addition to the primary mission of the fighter.

(3) If the answer is yes to either of the above, designate at least one (if not more) attributes as a KPP for each relevant characteristic. It is not necessary to designate as a KPP every attribute associated with a particular characteristic, only those most essential to the capability. In the case of the

bomber, while it may have attributes related to range, payload, etc., range may be the one most essential to the expeditionary characteristic.

3. Development of KPPs

a. The following questions should be answered in the affirmative before a performance attribute is selected as a KPP:

(1) Is the attribute a necessary component of the mandatory KPPs (statutory, sustainment, or net-ready) or is it essential for providing the required capabilities?

(2) Does it contribute to significant improvement in warfighting capabilities, operational effectiveness, and/or operational suitability?

(3) Is it achievable and affordable (total life-cycle costs)?

(4) Is it measurable and testable?

(5) Are the definition of the attribute and the recommended threshold and objective values reflective of fiscal constraints, applicable technology maturity, timeframe the capability is required, and supported by analysis?

(6) Is the sponsor willing to consider restructuring the program if the attribute is not met?

(7) Did the analysis determine the need for the system training KPP. If not, did the analysis provide quantifiable justification for not having system training as a KPP?

(8) Did the life-cycle analysis determine the applicability of the energy efficiency KPP (utilizing the fully burdened cost of fuel)? If not, ensure the analysis is available for review.

b. A KPP will normally be a rollup of a number of supporting attributes or KSAs that may be traded off to deliver the overall performance required. The following is one methodology for developing KPPs:

(1) Step 1: List required capabilities for each mission or function as described in the proposed CDD or CPD. This review should include all requirements that the system described in the CDD/CPD is projected to meet, including those related to other systems in an FoS or SoS context. It shall also include all relevant performance metrics identified in ICDs for which the CDD/CPD is providing a capability.

(2) Step 2: Prioritize these capabilities.

(3) Step 3: Review for applicability the list of attributes associated with each of the CCJO characteristics of the future joint force in Appendix A to this Enclosure. Compile a list of potential attributes using Appendix A as a starting point and include any other performance attributes that are essential to the delivery of the capability. Cross walk this list with the capabilities in Step 2 to assist in identifying potential performance attributes to be considered for designation as KPPs.

(4) Step 4: For each mission or function, build at least one measurable performance attribute using the list from Step 3 as a starting point.

(5) Step 5: Determine the attributes that are most critical or essential to the system(s) and designate them as KPPs. (Note: A KPP need not be created for all missions and functions for the system(s). In contrast, certain missions and functions may require two or more KPPs.)

(6) Step 6: Document how the KPPs are responsive to the capability performance attributes identified in the ICDs.

c. Threshold and objective values of an attribute may change between the CDD and the CPD. The CDD attribute values are used to guide the acquisition community during SDD (see reference c for acquisition phases for DOD space programs). Threshold values should be based on what is achievable through the current state of technology as a minimum. The objective values may be defined based on a goal for the end-state of the system. During SDD, tradeoffs are made between the threshold and objective values to optimize performance, given the available technology for the increment and the competing demands introduced by combining subsystems into the overall system. A deeper review of trade-offs at and around threshold values may be beneficial to explore incremental return on investment where particular thresholds are insensitive to small deviation at great advantage in cost, performance, and schedule reviews. After the design readiness review, these tradeoff decisions are essentially completed and a more precise determination of acceptable performance can be stated in the CPD.

(1) Figure B-1 (a) shows an attribute (A) of a system with threshold and objective values (1 and 10, respectively) determined during technology development and presented in the CDD. During SDD, optimum performance values may be developed for each attribute (or some attributes) on the basis of cost, performance, or other considerations, as shown in Figure B-1 (b).

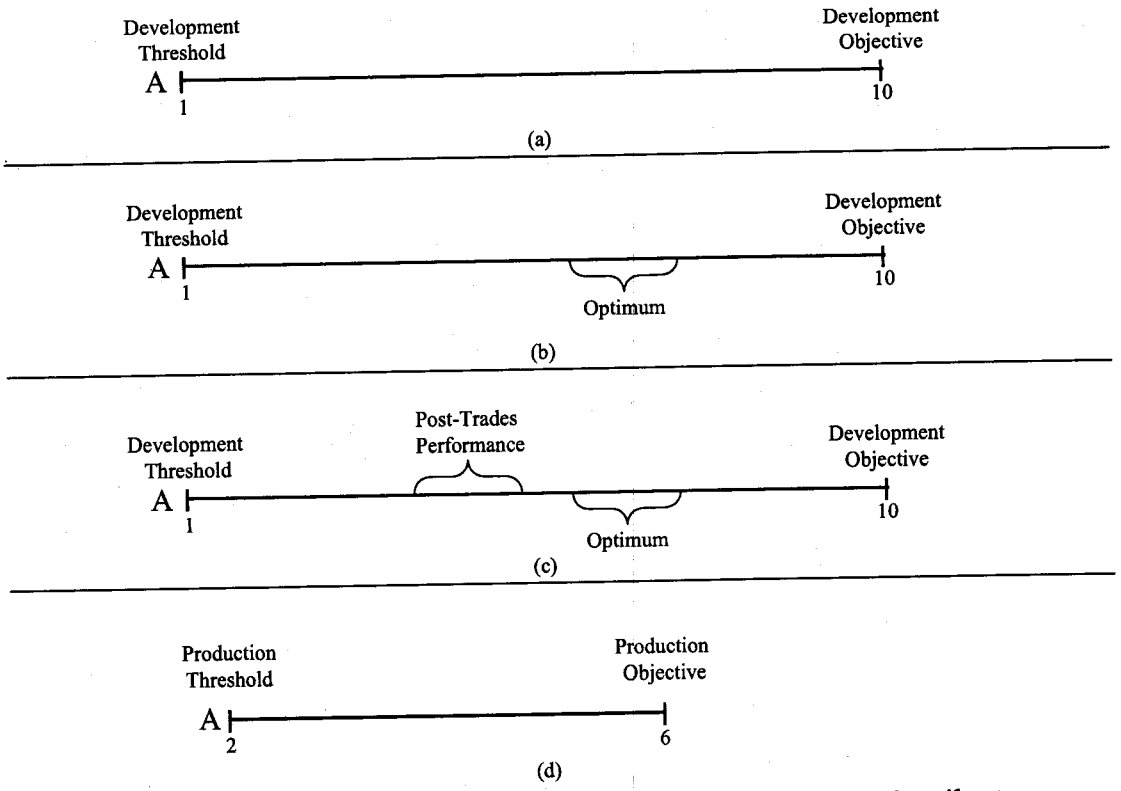

Figure B-1 (a), (b), (c), and (d). CDD and CPD Attributes

(2) Further design tradeoffs among the collective attributes may necessitate settling for design performance values different from the optimum values for the individual attributes. The design performance values may be higher or lower than the optimum values. Figure B-1 (c) shows an example in which optimum performance was traded off because of other considerations, resulting in reduced performance within attribute A.

(3) The production threshold and objective values specified for the attribute in the CPD will be a refined version of the development threshold and objective values documented in the CDD. Figure B-1 (d) shows an example of the revised performance attributes that would be included in the CPD. Each production threshold value should be determined on the basis of manufacturing risk and risk imposed by other related attributes. KPP and non-KPP threshold values in the CPD should be equal to or better than the corresponding CDD threshold values. There may be cases, however, where CDD KPP and/or non-KPP threshold values are reduced in a CPD. When this occurs, the following questions must be answered in the CPD:

(a) Will the capability still provide sufficient military utility?

(b) If the new capability will replace a fielded capability, will it still provide more overall military utility than the fielded capability?

(c) Is this capability still a good way to close the capability gap or should another materiel or non-materiel alternative approach be pursued?

(d) Is the reduced capability worth the costs incurred to-date and any additional investments required?

(4) For an early increment in an evolutionary acquisition, the production objective value for the increment could be less than the development objective value.

4. Changing KPPs. There may be circumstances where it is necessary to change the previously approved KPPs. These include cost, technology, production, development, or other issues that prevent meeting the threshold of the KPP. For KPPs in JROC Interest documents, where the change is not substantive in terms of the delivered capability, a streamlined process has been developed for rapid approval. The sponsor may request to bypass the JCIDS staffing and proceed directly to the JROC for validation of the change. The process is as follows:

a. The sponsor will submit the document to the Knowledge Management/ Decision Support (KM/DS) tool as an FCB draft document, and identify in the "purpose" section that this is a KPP update only and request direct consideration by the FCB without staffing.

b. The Lead FCB and the Joint Staff/J-8 Capabilities and Acquisition Division (CAD) action officer will evaluate the change and determine if staffing is required.

c. If additional staffing is required, the change will go through the normal process.

d. If the update is to the NR-KPP only, the document will be staffed to Joint Staff/J-6 for recertification via KM/DS.

e. If additional staffing is not required, the lead FCB will work with the sponsor to prepare a briefing for the JROC to obtain approval.

f. The lead FCB will schedule the briefing on the JCB and JROC calendars as required.

APPENDIX A TO ENCLOSURE B

ATTRIBUTES FOR POTENTIAL KEY PERFORMANCE PARAMETER DESIGNATION

1. The following information is provided to assist in identifying potential performance attributes for a system based on the contribution to the characteristics of the future joint force as identified in the CCJO. For each characteristic, a definition from the CCJO is provided as well as a list of potential performance attributes. The list of potential KPP attributes represent an iterative consolidation of more than 400 KPPs historically used across the ACAT I programs, and serves as a useful aid in quickly generating potential KPP options. These should be used as part of the process delineated in Enclosure B.

a. Knowledge Empowered -- Better decisions made faster; understanding environment, adversaries, and cultures; enhanced collaborative decision-making.

(1) Coded message error probability

(2) Contact – detect/discriminate/classify type/identify friendly

(3) Coverage/focus areas

(4) Frequency range

(5) Initial report accuracy

(6) Onboard platform range of surveillance systems/sensors/communications

(7) Sensor collection performance parameters

(8) Tracking -- number/altitudes/depths/velocities

(9) Training

(10) Transmitted data accuracy

(11) Geophysics/atmospherics

(a) Atmospheric vertical moisture profile

(b) Global sea surface winds

(c) Atmospheric vertical temperature profile

(d) Imagery

(e) Sea surface temperature horizontal resolution

(f) Soil moisture (surface) sensing depth

b. Networked -- connected and synchronized in time and purpose.

(1) Access and control

(2) Communication throughput while mobile/non-mobile

(3) Interoperable/net ready

(4) Multi-channel routing/retransmission/operation on the same net

(5) Networked with specific sensors/units

(6) Paired time slot relay capability

c. Interoperable -- Able to share and exchange knowledge and services; allows the joint force to act in an integrated and interdependent way; systems, capabilities, and organizations working in harmony.

(1) Air vehicles -- land-takeoff distance/ship launch-recover parameters/deck spot factor

(2) Compatible on aircraft/aircraft carriers/ships

(3) Physically interoperable with other platforms/systems/subsystems/ warheads/launchers

(4) Water vehicles -- land-launch spots/compatibility with other water vehicles

(5) Waveform compatibility

(6) Weapon -- launch envelope/weight/number on launchers

(7) Weight/volume to fit expected carrying platforms

(8) Works with legacy systems

d. Expeditionary -- organized, postured, and capable of rapid and simultaneous deployment, employment, and sustainment; converges mission-tailored capabilities at desired point of action; capable of transitioning to sustained operations.

(1) Ability to transport aircraft/vehicles/cargo/fuel/passengers/troops/crew

(2) Lift capacity

(3) Logistics footprint

(4) Platform transportability

(5) Self-deployment capability

e. Adaptable/Tailorable -- can handle disparate missions; scalable in applying appropriate mass and weight.

(1) Air vehicles -- vertical-short take-off and landing/aerial refueling/classes of airspace/altitude (max-min-on station-intercept)

(2) Ground vehicle -- fording

(3) Information -- ability to create, store, modify, or reconfigure

(4) Internal growth

(5) Platform -- weapons systems/launchers/firing-storing capacity

(6) Platform range -- maximum/minimum/combat-mission radius

(7) Types of broadcast supported/scalability

(8) Water vehicles -- draft/weight/stability/electrical generating capacity/test depth

(9) Weapon -- off axis launch angle, off bore sight angle, all weather, day-night

f. Enduring/Persistent -- depth and capacity to sustain operations over time.

(1) Operational availability (down-time versus up-time)

(2) Platform -- weapons systems/launchers/firing-storage capacity

(3) Sustained operations

(4) Time

(5) Various reliability measures

g. Precise -- exact application of force to achieve greater success at less risk.

(1) Accurate engagement decision/engagement sequence

(2) Intercept/circular error probable

(3) Threat challenges -- countermeasures/radar cross section-size/ multiple numbers

h. Fast -- speed of action across domains.

(1) Acceptable engagement sequence time

(2) Cargo transfer rate

(3) Data -- transfer-distribution rate/update rate

(4) Mission response time

(5) Platform speed -- maximum/minimum/cruise/flank/sustained/ acceleration/land-sea-air

(6) Power-up/fire/re-fire/weapon launch rate

(7) Sortie rate -- generated/sustained/surge

(8) Speed of initial report

i. Resilient -- able to protect and sustain capabilities from adversaries or adverse conditions; able to withstand pressure or absorb punishment.

(1) Ability to withstand hit/blast/flood/shock

(2) Assured communications to national, missile defense, and nuclear forces

(3) Covertness -- radiated noise/active target strength/radar cross section/electro magnetic quieting/radio frequency signature

(4) Information assurance

(5) Jam resistance

(6) Tactics, techniques, and procedures/countermeasures

j. Agile -- move quickly and seamlessly; timeliness.

(1) Air vehicle -- climb rate-gradient/G-load capability

(2) Automated mission planning

(3) Data variable rate capability

(4) Ground vehicles -- fording

(5) Platform specified timelines

(6) Weapon in-flight re-targeting

k. Lethal -- Ability to destroy adversary and/or systems in all conditions.

(1) Detect to engage scenarios

(2) Expected fractional damage

(3) Jamming capability

(4) Probability of kill/mission kill

(5) Weapon range

ENCLOSURE F

CAPABILITY DEVELOPMENT DOCUMENT

1. General

a. The CDD is the sponsor's primary means of defining authoritative, measurable, and testable capabilities needed by the warfighters to support the SDD phase of an acquisition program. Table F-1 lists the types of documents that precede or depend on the CDD. Integrated architectures, applicable JCDs, the ICD, the AoA (unless waived by the MDA), and the technology development strategy guide development of the CDD. The CDD captures the information necessary to deliver an affordable and supportable capability using mature technology within one or more increments of an acquisition strategy. The CDD must include a description of the DOTMLPF and policy impacts and constraints. The CDD will be validated and approved before Milestone B. The CDD will be validated and approved prior to program initiation for shipbuilding programs.

b. For DOD space programs, reference c will guide the development of the appropriate documentation. The initial CDD will be used to support key decision point (KDP)-A. It is not sufficient to support a KDP-B decision. For the KDP-B, a full CDD will be developed and approved by the JROC. The initial CDD required by reference c for DOD space programs will differ from a full CDD in that the operational view architecture products will be complete, but the systems and technical view products may be incomplete. Because the architecture products are not complete, an NR-KPP certification will not be received on initial CDDs. In addition, the potential KPPs are identified, but the thresholds and objectives may not be finalized.

c. In an evolutionary acquisition program, the capabilities delivered by a specific increment may provide only a part of the ultimate desired capability; therefore, the first increment's CDD must provide information regarding the strategy for achieving the full capability. Subsequent increments leading to the full capability are also described to give an overall understanding of the program preliminary approach. If sufficient information is available to define the attributes and applicable KPPs for subsequent increments, the CDD may describe multiple increments for validation and approval. Updates to the CDD will be required if there are changes to the validated KPPs due to lessons learned from previous increments, changes in the JOpsC, CONOPs, or integrated architectures, and other pertinent information. Additionally, the AoA should be reviewed for its relevance for each program to each CDD increment and, if necessary, should be updated or a new AoA initiated.

d. The CDD provides the operational performance attributes necessary for the acquisition community to design a proposed system(s) and establish a program baseline. It identifies the performance attributes, including KPPs, that will guide the development and demonstration of the proposed increment(s). Guidance for the development of KPPs is provided in Enclosure B. The performance attributes and KPPs will apply only to the designated increment(s). If the plan requires a single step to deliver the full capability, the KPPs will apply to the entire system(s). Each increment must provide a safe, operationally effective, suitable, and useful capability in the intended mission environment that is commensurate with the investment and independent of any subsequent increment.

Table F-1. CDD Linkage to Program Documents

Predecessor Documents and Information
JOpsC and CONOPs
JCDs and ICDs
Technology Development Strategy
System Threat Assessment
AoA Report
Integrated Architectures
Complete Automated Standards Profile as Required in reference t
Capability Roadmap
MUAs/final demonstration report for JCTD/ACTDs and qualified prototype projects

Dependent Documents
Acquisition Program Baseline (APB) for Milestone B of the Current Increment
Cost Analysis Requirements Description
Clinger-Cohen Certification (Updated for Milestone B for MAIS)
Acquisition Strategy
Test and Evaluation Master Plan
DD Form 1494 (Required to Obtain Spectrum Certification)
ISP
Capability Roadmap
System Engineering Plan
Manpower Estimate
CPD

e. The CDD articulates the attributes that may be further refined in the CPD. It states the essential attributes of a program, including affordability and supportability, from the warfighter's perspective. The CDD shall be updated or appended for each Milestone B decision. If the validated CDD specified

multiple increments, revalidation is not required prior to each Milestone B unless there are changes to the validated KPPs.

f. The CDD addresses a single system or SoS only, although it may refer to any related systems needed in an FoS or an SoS approach necessary to provide the required capability. When the ICD recommends a materiel approach consisting of an FoS, each individual system will have its own CDD. An SoS will normally be treated as if it were a single system using a single CDD to describe highly interdependent systems that provide the capability using an SoS. When the CDD is being used to describe an SoS approach, it must address both the SoS KPPs and attributes and any unique KPPs and other attributes for each of the constituent systems. There may be cases where an individual system that is part of an SoS will be part of a separate acquisition. A CDD describing this system with linkages to the complete SoS will be developed. When it is necessary to synchronize development of systems to ensure delivery of a capability, the CDD will identify the source ICDs and the related CDDs and CPDs. For example, a program addressing a capability gap may require two unique or separate systems to provide the required capability (e.g., a bomb and an unmanned aerial vehicle). Conversely, there are also cases where related but different capabilities can be included in one CDD. For example, the development of a multi-mission aircraft could be captured in a single CDD. A CDD may also describe multiple increments of a program to deliver the required capabilities. The CDD will clearly describe the KPPs, KSAs, and other attributes, and their thresholds and objectives that apply to each increment.

g. When the sponsor of a JCTD/ACTD, qualified prototype project, or quick-reaction technology project determines that the demonstration is complete but additional development is required before fielding, a CDD will be developed to guide the development process. The MUA (completed at the end of the JCTD/ACTD, qualified prototype project, or quick-reaction technology project) will be used to support the development of the CDD. The CDD with the supporting MUA will then be submitted for staffing and approval prior to the Milestone B decision.

h. Care must be taken to stabilize and not overspecify attributes. Those attributes that contribute to the characteristics of the future joint force identified in the CCJO will be designated as KPPs. To supply the necessary performance attributes, the program manager (PM) will develop system-level details in technical documentation.

i. For IT systems with a development cost exceeding $15 million, the sponsor will develop a CDD. The spiral development approach for IT systems requires a variation to the application of the JCIDS documentation. The CDD will be developed describing the objective of up to 5 years of software releases.

The CDD will be validated and approved once for all of the software releases over that time.

2. CDD Focus. The CDD specifies the attributes of a system in development. These will provide or contribute to the operational capabilities that are inserted into the performance section of the acquisition strategy and the APB. All CDD KPPs (and KSAs supporting the sustainment KPP) are inserted verbatim into the APB. MOE and suitability, developed for the initial Test and Evaluation Master Plan (TEMP) at Milestone B, are based on the performance attributes and KPPs identified in the CDD.

3. CDD Development and Documentation

a. The CDD is generated prior to Milestone B of the acquisition process. The CDD is an entrance criteria item that is necessary to proceed to each Milestone B acquisition decision. It describes a technologically mature and affordable increment(s) of a militarily useful capability that was demonstrated in an operationally relevant environment. The CDD will support entry into SDD and refinement of integrated architectures (see reference c for DOD space programs).

b. The CDD sponsor will apply lessons learned during the Technology Development phase, plus any other appropriate risk reduction activities, MUAs, JCTD/ACTDs, qualified prototype projects, quick-reaction technology projects, market research, experimentation, test and evaluation, capability and schedule tradeoffs, and affordability and supportability analysis in the development of the CDD.

c. The CDD sponsor, in coordination and collaboration with the appropriate DOD components (including the MDA-designated developer), agencies, FCB working groups, and applicable ICD and JCD leads, will prepare the CDD. The CDD sponsor also will collaborate with sponsors of other CDDs and CPDs that are required in FoS or SoS solutions, particularly those generated from a common ICD. In some of these cases it may be appropriate to develop annexes for the CDD. The annexes would describe excursions from the CDD to meet other sponsors' specific capability gaps. The annexes do not repeat information already contained in the CDD but only describe the changes. The CDD will include a description of the operational capability; threat; links to all applicable integrated architectures; US-ratified materiel international standardization agreements (reference bb); required capabilities; program support; sustainment; force structure; DOTMLPF and policy impacts and constraints; and schedule and program affordability for the system.

d. CDD development should leverage off related analysis and development with the associated ISP required by reference s. As required capabilities are developed, the output from the information needs discovery process (reference

s) should help update the required architecture products and identify the elements of required program support for inclusion in the CDD.

e. Draft and approved CDDs, both classified and unclassified, should be carefully marked to indicate whether the document is releasable to allies, industry, or the public.

f. The CDD format and detailed content instructions are provided at Appendix A of this enclosure.

4. CDD Validation and Approval. The determination of the validation and approval authorities for the CDD depends on the JPD assigned by the Gatekeeper (as described in Enclosure C).

a. The JROC will review, validate, and approve JROC Interest CDDs. In addition, the JROC may, at its discretion, review CDDs at any time deemed appropriate.

(1) The JROC may retain complete approval authority over JROC Interest CDDs (i.e., no changes of any kind allowed without consent of the JROC) or may delegate approval authority for non-KPP changes to a component. JROC approval of JROC Interest CDDs is required any time a recommendation is made to change a KPP.

(2) Delegation of approval authority for JROC Interest CDDs allows the designated lead component, in coordination with other appropriate DOD components, to make non-KPP tradeoffs between acquisition milestones for the specific increment without JROC approval. Delegation of approval authority will not usually be granted beyond the increment(s) described in the CDD in an evolutionary acquisition.

5. Certifications and Weapon Safety Endorsement. JROC Interest CDDs will receive applicable intelligence and IT and NSS interoperability and supportability certifications prior to JROC validation. Joint Integration CDDs also will receive these certifications as required and may be assessed by the FCB working group and reviewed by the FCB before they are returned to the sponsoring component for validation and approval. Joint Information and Independent CDDs do not require certification and may be assessed by the FCB working group, reviewed by the FCB, and returned to the sponsor for validation and approval. All weapon-related CDDS will receive a weapon safety endorsement.

6. Formal CDD Staffing. The first step in obtaining validation and approval is the formal review of the document. The staffing process is described in Enclosure C. Supporting documentation, such as AoA results, ICDs, and any additional previously approved documents, should be made available electronically for inclusion in the package. The CDD should not be submitted

until the AoA or other supporting analysis is completed. If an AoA has not been conducted, an explanation and an electronic copy of whatever alternative analysis has been performed (or planned) will be made available or attached.

7. CDD Review and Revalidation. The CDD is refined and updated when necessary and before the Milestone B decision for each increment. This update will incorporate the results of the activities during the acquisition phase (i.e., cost, schedule and performance tradeoffs, testing, and lessons learned from previous increments). Two options are available for second (and follow-on) increment CDDs. If the follow-on increment is consistent with the description and strategy described in previous CDDs and the only changes are to the capabilities provided by the new increment (described in paragraph 5 of the CDD), an addendum to the previous CDD may be developed for validation and approval, as appropriate. If the increment contains significant revisions to the overall strategy, the capabilities provided by the next or future increments, or changes to the KPPs, an appropriately revised CDD should be submitted. For space programs, an additional update is required to support the KDP-C decision (reference c). If the CDD for a space program has not changed between KDP-B and KDP-C, the JROC does not need to reapprove it, but a new J-6 certification may be required if there are changes to the NR-KPP.

8. CDD Publication and Archiving. Approved CDDs (SECRET and below), regardless of JPD designation, will be posted to the KM/DS tool so that all approved JCIDS documents are maintained in a single location.

9. System Capabilities. The CDD identifies, in threshold-objective format, the attributes that contribute most significantly to the desired operational capability as discussed in Enclosure B. These attributes will be used to guide the acquisition community in making tradeoffs between the threshold and the objective levels of the stated attributes. Tradeoffs must be assessed for their impact on the capability gaps identified in the source ICDs or other JROC validated source documents. When an attribute's values change in follow-on increments, the CDD should include the values for previous increments for reference purposes.

10. Key Performance Parameters. The KPP threshold and objective values are based on results of efforts and studies that occur prior to Milestone B, including the Technology Development phase (if applicable). Each selected KPP should be directly traceable to the most critically needed attributes of capabilities defined in the ICD or other JROC-validated JROC source documents and to the characteristics of the future joint force identified in the CCJO. Guidance for the development of KPPs is provided in Enclosure B. In selecting KPPs and their values, the sponsor will leverage the expertise of the operational users and the acquisition community and consider technology maturity, fiscal constraints, and the timeframe when the capability is required. The CDD will contain all of the KPPs that capture the attributes needed to

achieve the overall desired capabilities for the system(s). Failure to meet a CDD KPP threshold can be cause for re-evaluation of the system selection, reassessment of the program, or modification of the content of production increments.

a. CDD KPPs are inserted verbatim into the performance section of the APB. KPPs will be developed relating to each of the characteristics of the future joint force in the CCJO when the system contributes to those capabilities. A NR-KPP will be a mandatory KPP in every increment for programs that exchange information. Force protection and survivability KPPs are mandatory for any manned system or system designed to enhance personnel survivability when the system may be employed in an asymmetric threat environment. A sustainment KPP is mandatory for all JROC Interest CDDs. System training and energy efficiency should be considered as KPPs if the analysis supports their inclusion. If the analysis does not support the need for these KPPs, the analysis will provide the justification. If the sponsor determines that any of the mandatory KPPs do not apply, the sponsor will provide justification in the CDD.

b. The CDD should document how its KPPs are responsive to applicable JCD capabilities and key characteristics and/or metrics. For JCDs to be effective, it is essential that all JCD sponsors review all related JROC Interest and Joint Integration CDDs and CPDs for applicability to their JCD. This support is important because CDD and CPD authors cannot in all cases be expected to understand the full impact and scope of every JCD.