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ENCLOSURE 6

Test and Evaluation (T&E)

1. OVERVIEW

- a. The fundamental purpose of T&E is to help acquire systems that work. To that end, T&E provides knowledge: to assist in managing risks, to measure technical progress, and to characterize system effectiveness, suitability, and survivability (ESS).
- b. T&E expertise is required early (pre-MS-A) and throughout the system lifecycle.
- c. The PM is responsible for the system's T&E program. The PM, in concert with the T&E and system stakeholders designs robust, rigorous, and efficient T&E activities to be conducted for the program throughout the program lifecycle. The PM documents the planned objectives, measures, activities, and resources in the Test and Evaluation Master Plan (TEMP), which requires approval by the Component and by the cognizant T&E authorities. The PM is responsible for resourcing and coordinating all T&E activities documented in the approved TEMP.
- d. For programs on OSD DT&E oversight, DASD(DT&E) will provide USD(AT&L) with an assessment of system maturity and program completion of the exit and entrance criteria for each major T&E phase and acquisition milestone. For programs on OSD OT&E or LFT&E oversight, DOT&E will also provide USD(AT&L) with milestone assessments and DOT&E must provide Congress and the Secretary of Defense with a written assessment (as detailed in Enclosure 2, subparagraph 7.c.(2)) before the program may proceed into Full-Rate Production (FRP) (or, for MAIS programs, the Full Deployment Decision (FDD)).
- e. Components shall implement similar procedures for all programs. Component implementation instructions shall be provided to OSD.

2. FIRST PRINCIPLES

- a. **COGNIZANT T&E AUTHORITIES.** The cognizant OT&E authority is DOT&E for programs on OSD OT&E or LFT&E oversight. The cognizant DT&E authority is DASD(DT&E) for programs on OSD DT&E oversight. For all other programs, the Component shall designate appropriate T&E authorities who will approve TEMPs, monitor test execution, and report test results to the MDA.
- b. **EARLY ENGAGEMENT.** PMs for all programs on any OSD T&E oversight shall designate a T&E Key Leadership Position (KLP). PMs for all programs on OSD DT&E oversight shall designate a Lead Government DT&E organization. These designations

47 shall be made prior to Milestone A or when the program is placed on oversight. They
48 shall be maintained throughout the life of the program or until the program is removed
49 from oversight. The T&E KLP may serve other program roles.
50

- 51 c. T&E OBJECTIVES. Robust, rigorous, and efficient T&E provides the MDA, PEO, PM,
52 operational sponsor, and warfighter with information including but not limited to: risk
53 and risk mitigation related to developing, producing, operating, and sustaining systems
54 and capabilities; evaluation of technical performance and system maturity against the
55 CDD, CPD, and CTPs in the Systems Engineering Plan (SEP); and support for forecasts
56 and projections from models and simulations. OT&E provides a statutorily mandated
57 independent system evaluation. Specifically, OT&E determines whether the system,
58 when used by typical operators to accomplish operational missions, is operationally
59 effective, operationally suitable, interoperable in its joint mission environment, and
60 secure against threats detailed in the System Threat Assessment, System Threat
61 Assessment Report, or other DIA validated sources. LFT&E provides the statutorily
62 mandated evaluation of lethality and operational survivability against the detailed threats.
63 DT&E (paragraph 12) provides early evaluations of system capabilities and limitations so
64 that design and development deficiencies can be identified and fixed when the cost is
65 more manageable.
66
- 67 d. TEMP. A TEMP is a signed agreement that identifies the program's T&E objectives and
68 how the PM will achieve those objectives throughout all lifecycle phases of the program
69 from the current time forward. The primary focus of the TEMP is next phase of
70 development. However, the TEMP must describe the overall T&E program in sufficient
71 detail for a reviewer to determine if the planned activities will be adequate and the
72 resource estimates are reasonable.
73
- 74 e. EFFICIENCY. An efficient T&E program uses an integrated continuum of DT&E
75 (contractor and government), LFT&E (when required), and OT&E. Methods to achieve
76 efficiency include but are not limited to: sequential test design in which initial test
77 outcomes help determine issues addressed in subsequent tests; individual test events with
78 multiple objectives (including testing for interoperability, information assurance, and
79 other C&A activities, per paragraph 9); integrated test (as per Reference(DAG)); policy
80 tailoring; modeling and simulation (M&S) that achieves verification, validation, or OTA
81 accreditation in conjunction with other testing; use of accredited M&S to refine testing or
82 to analyze test results; and engaging in multiple parallel test and engineering activities,
83 which help prevent discovered system deficiencies and corrective action periods in any
84 one activity from imposing unnecessary delays on the program.
85
- 86 f. POLICY TAILORING PMs should recommend alternative approaches to any aspects of
87 this policy that appear inapplicable, excessive, or counter-productive to their program.
88 Only the Deputy Assistant Secretary of Defense for Developmental Test and Evaluation
89 (DASD(DT&E)) and the Director, Operational Test and Evaluation (DOT&E) can tailor
90 the policies in this enclosure as necessary on a case-by-case basis to achieve these
91 fundamental goals for programs on OSD T&E oversight. For all other programs, tailored
92 T&E policy can only be approved by the Component T&E Executive.

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3. T&E PROGRAM PLANNING

a. Planning Considerations

- (1) For programs on OSD T&E oversight, the OTAs for the program shall provide DOT&E, DASD(DT&E) and system stakeholders with draft Critical Operational Issues (COIs) after MDD and the issuance of the AoA study guidance.
- (2) For programs on OSD T&E oversight, the OTAs for the program shall provide DOT&E, DASD(DT&E) and system stakeholders with an independent assessment of the testability and completeness of the requirements in the CDD (or equivalent document) for the pre-EMD review. The assessment shall begin with the user's rationale for requirements (as documented in the Capabilities-Based Assessment) and the user's understanding of the operational mission environment or architecture (as documented in the CDD) to derive the methods and measures by which the requirements can be evaluated to assess operational mission performance.
- (3) The PMs, in concert with T&E and other stakeholders, shall prepare and then update the TEMP to support the acquisition Milestones (A, pre-EMD/B, and C); the FRP/FDD review; and major program or system changes. All TEMPs shall:
 - a. Address T&E activity during the upcoming acquisition phase in accordance with paragraph 3.d.
 - b. Address the strategic/conceptual plans for T&E activity in the subsequent acquisition phase, to include initial evaluation planning for required T&E events specified in paragraph 3.b.
Routine T&E activities during sustainment facilitate upgrades to rapidly changing technologies in software and hardware components.
 - c. Contain an (updated) integrated test program summary and master schedule of all major test events or test periods. The TEMP shall also include or link to the program master schedule from the Acquisition Strategy (AS) so as to confirm schedule alignment.
 - d. Identify resources needed to execute testing and evaluation. Resource estimates shall be matched against the schedule and justified by analysis.
- (4) Testing requirements in the RFPs shall be consistent with the T&E program documented in the associated TEMPs. In each phase, the TEMP shall be fully approved prior to RFP release. Testing requirements in the RFPs include but are not limited to: T&E data rights; government access to the Failure Reporting, Analysis and Corrective Action System (FRACAS) and other test outcome repositories; built-in test and embedded instrumentation (including software log files); government use of contractor-conducted T&E; government review and approval of contractor T&E plans; government witness of contractor test events; and government review and approval of contractor evaluations.

- 139 (5) The testing schedule shall be event-driven and allow adequate time to support pre-
140 test predictions; testing; post-test analysis, evaluation, and reporting; reconciliation of
141 predictive models; and a reasonable estimate of sufficient time for corrective actions
142 in response to discovered deficiencies. T&E and systems engineering (SE) activities
143 shall be planned collaboratively and in parallel so each provides key information to
144 the other to ensure efficient program development.
145
- 146 (6) For programs on DT&E oversight, the PM shall identify each test event in the TEMP
147 as a contractor or government DT&E. All programs shall plan for the conduct of
148 dedicated Government DT&E or integrated test (led by Government personnel) to
149 provide confidence that the system design solution is on track to satisfy the desired
150 capabilities.
151
- 152 (7) Multinational programs shall document all requirements and testing in the TEMP
153 regardless of the requirements' countries of the origin.
154

155 b. Required T&E Activities
156

- 157 (1) All programs have T&E requirements at all milestones with respect to these common
158 issues:
- 159 a. The TEMP shall identify entrance and exit criteria for each major test period
160 or phase.
 - 161 b. Reliability growth shall be monitored and reported throughout the acquisition
162 process. This translates into TEMP requirements for design for reliability
163 T&E activities; contractual reliability specifications in EMD and P&D RFPs;
164 and a reliability growth program that continues after fielding.
 - 165 c. Commercial and non-developmental items (NDIs), including but not limited
166 to Commercial Off the Shelf, Government Furnished Equipment, and Open
167 Source Software shall be assessed for compliance with system integration and
168 operational requirements
 - 169 d. M&S used in OT&E or LFT&E must be verified and validated. Each M&S
170 use must also be accredited by the OTA for that use.
 - 171 e. Interoperability (IOP) testing and Information Assurance (IA) of critical
172 interfaces is required. In addition to applicable certification and authorization
173 (C&A) policy requirements (see paragraph 9), the program must address
174 operational aspects of IOP and IA.
175
- 176 (2) If the program enters at MS-A, the Lead OTA shall report results of Early
177 Operational Assessments (EOA) in support of the MS-B decision. If the program
178 enters at MS-B, the Lead OTA shall prepare and report EOA results after program
179 initiation and prior to the CDR. The Lead OTA shall conduct, observe, and report
180 results of at least one Operational Assessment (OA) in support of the MS-C decision.
181 If the program enters at MS-C and if required by the cognizant OT&E authority, the
182 Lead OTA shall conduct, observe, and report results of an OA in support of the
183 earliest of the IOT&E assessments (AOTR) and reviews (OTRR). An OA is an
184 assessment of a DT&E effort that includes operational realism and intended

185 operational users. The cognizant OT&E authority may require additional OAs for
186 programs that are initially assessed/reviewed as not ready for IOT&E.

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189 (3) The cognizant DT&E authority shall provide the MDA with a report at each
190 milestone review on the program's satisfactory completion of the DT&E events
191 identified in the approved TEMP.
192
193 (4) For programs on DT&E oversight, the DASD(DT&E) shall conduct an AOTR to
194 determine program readiness to enter independent, dedicated IOT&E in accordance
195 with paragraph 6. AOTRs shall be supported by the OA and by one or more full-up
196 system level DT or DT/OT test event(s) before MS-C. Test plans for such events
197 shall be approved by DASD(DT&E). If such events are not possible before MS-C,
198 the MS-B TEMP shall identify compensatory DT events for major components.
199
200 (5) For programs on OT&E oversight, the Lead OTA shall conduct an independent,
201 dedicated phase of IOT&E before FRP/FDD, as required by section 2399 of
202 Reference (k).
203

204 c. Resources
205

- 206 (1) The PM, in coordination with T&E oversight authorities and other T&E stakeholders,
207 shall identify and plan for all T&E resources (to include M&S, test resources, and
208 direct costs of T&E infrastructure) needed to support DT&E, OT&E, and LFT&E
209 throughout the system lifecycle.
210
211 (2) Programs shall use DoD Government T&E capabilities and invest in Government
212 T&E infrastructure unless an exception can be justified as cost-effective to the
213 Government. PMs shall conduct a cost-benefit analysis for exceptions to this policy
214 and document the assumptions and results of the CBA in an approved TEMP before
215 proceeding.
216
217 (3) The PM shall allocate resources for all T&E activities (and interoperability C&A
218 activities IAW DODI 4630.08) documented in the TEMP. Each TEMP update shall
219 include an updated T&E resource estimate; the required resources may change as the
220 understanding of the program matures.
221
222

223 d. Documenting the Evaluation Strategy in the TEMP
224

- 225 (1) The PM shall identify the purpose/objective/rationale that motivates each test
226 event or test period in the TEMP. Test objectives include but are not limited to:
227 evaluation of material properties, reliability tests, process optimization, screening for
228 important causal factors, testing for deficiencies, system or process characterization,
229 and regression testing.
230

231 (2) The TEMP shall include evaluation concepts that identify the criteria or standards
 232 for test completion (what data are required) and a synopsis of the intended analysis
 233 (how the data will support the test objective). The criteria for test completion shall be
 234 cross-referenced to standard measures of program progress (defined in
 235 Reference(DAG)) that include but are not limited to:

- 236 a. COIs or Critical Operational Issues and Criteria (COIC)
- 237 b. Key Performance Parameters (KPP), including NR-KPP compliance
- 238 c. Critical Technical Parameters (CTP)
- 239 d. Key System Attributes (KSA)
- 240 e. Measure Of Performance (MOP)
- 241 f. Measure Of Effectiveness (MOE)
- 242 g. Measure Of Suitability (MOS)

245 4. THE TEST AND EVALUATION MASTER PLAN

247 a. The Milestone A TEMP shall describe the initial understanding of the overall T&E resource
 248 requirements and general approach for integrating DT&E, OT&E, and LFT&E throughout
 249 the system lifecycle. The MS-A TEMP shall:

250 (1) Address T&E activity during the Technology Development (TD) Phase, to include:

- 251 a. Identification of T&E activities supporting management of TD phase
 252 technology risks and maturation of critical technologies. By statute¹, all critical
 253 technologies shall be demonstrated in an operationally relevant (and joint where
 254 applicable) environment (as per Reference(XX)² before MS-B. Critical
 255 commercial and NDI system components shall also undergo operationally
 256 relevant testing when their military use will be distinct from previous use.
- 257 b. Identification of T&E activities informing the development of the CDD. This
 258 includes but is not limited to: testing in support of trade space M&S, testing to
 259 fix important design parameters or parameter ranges, evaluation of material
 260 properties, characterization of anticipated operational environment, process
 261 characterization for human systems integration, and stress testing of potential
 262 commercial/NDI components.
- 263 c. T&E MS A exit and MS B entrance criteria, to include evaluation plans for
 264 characterizing whether the goals and exit criteria of the TD phase (documented
 265 in the Technology Development Strategy (TDS)) have been met
- 266 d. How TD phase T&E objectives, measures, or activities will be addressed in the
 267 TD RFP and in competitive prototypes
- 268 e. List the failure modes identified or expected with the anticipated technologies,
 269 integration challenges, and proposed design features. The list shall include the
 270 method of failure mode discovery (i.e., engineering- or physics-based model,
 271 analysis of user/maintainer error, analysis of manufacturing error or variation,
 272 analysis of software failure modes, test event, or field data).

273 (2) Address T&E activity for remainder of program lifecycle, to include:

¹ USC 10; 2366b.a.(3).(D)

² DoD Technology Readiness Assessment Deskbook; July 2009; prepared by DDR&E

- 274 a. The T&E approach to the assessment of technical progress and maturity against
 275 critical technical parameters identified in the SEP
 276 b. T&E aspects of engineering prototyping anticipated in EMD.
 277 c. Reliability design and growth testing activities anticipated in EMD, to include
 278 initial reliability requirements for all critical hardware and software components
 279 d. An initial listing of independent variables (or “factors”). These are conditions
 280 (environmental, operational, network, other) that are likely to affect system
 281 operational ESS and provide a basis on which reviewers can evaluate adequacy
 282 of testing scope and resourcing.
 283 e. An initial list of anticipated M&S efforts and their purpose
 284 f. Identification of the Lead Government DT&E organization
 285 (3) Address the detailed test program schedule for TD phase and the alignment of
 286 estimated lifecycle T&E program schedule against integrated program schedule in the
 287 AS.
 288 (4) Address the detailed test program resource requirements for TD phase and the initial
 289 estimated lifecycle T&E program resources
 290
 291 b. The Milestone B TEMP (a DoD Component-approved final draft will be submitted for the
 292 Pre-EMD Review) may be an update to the MS-A TEMP. The MS-B TEMP shall describe
 293 planned developmental, operational, and live-fire T&E; contain an integrated test program
 294 schedule; and document the resource requirements to accomplish the planned T&E. The
 295 Pre-EMD/MS-B TEMP shall:
 296 (1) Address T&E activity during the EMD Phase, to include:
 297 a. How technological maturity and integration risks of critical technologies will be
 298 demonstrated and mitigated through testing. Critical technologies must be
 299 demonstrated in an operational environment with operational users and with
 300 operational interfaces before MS-C.
 301 b. How EMD T&E objectives, measures, or activities will be addressed in the
 302 EMD RFP specifications and in engineering prototypes.
 303 c. Determination of any long-term government rights to contractor T&E data
 304 d. The T&E MS B exit and MS C entrance criteria
 305 e. A list of supporting interfaces, consistent with the (Tailored) Information
 306 Support Plan (ISP or TISP). Specifically, the SV-1 and SV-2 shall be included,
 307 with each interface cross-referenced to any planned EMD-phase T&E or C&A
 308 activities utilizing each interface.
 309 f. At least one full-up system level DoD DT&E event and at least one operational
 310 assessment (OA) with intended operational users prior to MS-C. In some
 311 instances it may be possible for the DT&E event to meet the data needs of the
 312 OA.
 313 g. Identification of all contractor system level reliability testing needed to achieve
 314 initial reliability
 315 h. The PM shall test and grow reliability of components and subcomponents
 316 (“sub/components”) with high reliability risk, as appropriate. To this end, the
 317 PM shall list the failure modes identified or expected, the impacted
 318 sub/components, and the method of failure mode discovery. The PM shall
 319 document the EMD-phase plan to allocate top-level reliability requirements

- 320 down to the hardware/software sub/components (including commercial and
 321 NDIs). The PM shall characterize the environmental stresses (force loads,
 322 impacts, temperature, chemical, use cases, etc) expected from the Operational
 323 Mode Summary/Mission Profile on the sub/components that will be critical to
 324 top-level reliability, as determined by the allocations. High risk
 325 sub/components will have many anticipated failure modes, high allocated
 326 reliability, or challenging operating environments. The PM shall identify test
 327 events designed to determine if the high risk sub/components meet the allocated
 328 requirements by stressing the sub/components at and beyond the characterized
 329 limits of the operating environment.
- 330 i. Reliability Growth Curves (RGCs) reflecting the reliability growth plans,
 331 analysis, and test results. One or more curves will be provided for at the
 332 appropriate level of analysis for the program (top-level system, critical sub-
 333 systems, and/or system capabilities). The RGCs will be stated in a series of
 334 intermediate goals and tracked through fully integrated, system-level test and
 335 evaluation events until the reliability threshold is achieved.
 - 336 j. A listing of all critical commercial and NDIs; their previously tested or use-
 337 demonstrated environmental conditions; a comparison of those conditions with
 338 the intended operational environments; and identification of test events that will
 339 characterize ESS under the conditions where military use will be outside the
 340 previously tested or demonstrated bounds.
 - 341 k. A list of safety releases and design safety criteria that must be met prior to any
 342 operator-supported testing. The list shall identify test events that will support,
 343 gauge success in meeting, and/or assess the safety of the system/item.
- 344 (2) Address preparations for IOT&E and beyond, to include:
- 345 a. A tabulation of factors and their levels against quantitative mission-oriented
 346 response variables for effectiveness and suitability (selected from KPPs,
 347 MOEs, MOSs, CTPs, or KSAs). The factors are an updated list of independent
 348 variables that affect the selected measures of effectiveness and suitability.
 349 Their levels are the values of the factors used in testing to obtain breadth of
 350 coverage of the operating envelope.
 - 351 b. Identify IOT&E entrance criteria as per paragraph 5.
 - 352 c. A determination of the critical interfaces and information security risks
 353 requiring Red Team/penetration IA testing in IOT&E
 - 354 d. Identification of built-in test and embedded instrumentation
 - 355 e. Identification of anticipated coordinated testing (such as a Capstone group or
 356 joint mission environment) in which the program will participate.
- 357 (3) Address (updated) coordinated T&E resource requirements (test articles, test sites and
 358 instrumentation, test support equipment, threat representations and simulations, test
 359 targets and expendables, operational force test support, models and simulations,
 360 testbeds, joint mission environment, distributed test networks, manpower/personnel,
 361 training, Federal/State/local requirements, range requirements, and any special
 362 requirements) that reflect the best estimate for conducting all activities in the TEMP.
- 363 (4) Contain an (updated) integrated test program schedule and an (update to the)
 364 integrated master schedule of the AS. This schedule update should make note of any

- 365 multi-program coordination needs related to IOT&E (such as required for some
 366 Capstone programs, joint mission environments, interoperability testing, etc).
 367
- 368 c. The Milestone C TEMP may be an update of the MS-B TEMP. The MS-C TEMP shall:
 369 (1) Address T&E activity during the P&D Phase, to include:
- 370 a. The entrance criteria necessary for proceeding to IOT&E.
 - 371 b. A listing of all test events in the dedicated phase of IOT&E before FRP/FDD to
 372 evaluate operational ESS.
 - 373 c. Operational evaluation of mission-level interoperability across key interfaces.
 374 Systems that provide capabilities for joint missions shall be tested in the
 375 expected joint mission environment. Red Team/Penetration testing at IOT&E,
 376 if required, shall emulate anticipated threats in the operational environment.
 - 377 d. An updated cross-tabulation of factors and levels against critical effectiveness
 378 and suitability measures. The tabulation shall indicate the T&E events
 379 conducted and planned through the end of IOT&E.
 - 380 e. Updated RGC or RGCs reflecting current information and an updated reliability
 381 growth plan. The reliability growth plan shall be updated (in the TEMP and
 382 SEP) to form a complete and comprehensive reliability and maintainability
 383 (R&M) program to test and improve R&M performance throughout the life of
 384 the program. The updated plan (in the SEP and TEMP) shall include top-level
 385 reliability requirement allocations to the component and sub-components;
 386 measurements and models of the operating environment of the critical
 387 component and sub-components; and current operational system or capability
 388 reliability (either measured directly or estimated from measurements of the
 389 component and sub-component reliabilities in the anticipated operating
 390 environment). The TEMP shall also include a listing of all failure modes
 391 identified thus far; the method of failure mode discovery; and disposition (will
 392 fix/will not).
- 393 (2) Address T&E activity following IOT&E for remainder of program lifecycle, to
 394 include:
- 395 a. Expectations for follow-on OT&E (FOT&E) to verify correction of deficiencies
 396 and address any DOT&E recommendations accepted by the receiving Service.
 - 397 b. Continued reliability growth
 - 398 c. An on-going T&E plan to monitor capabilities in the face of technical changes.
 399 The plan shall include a list of known acquisitions within the System of Systems,
 400 consistent with the PV-2, that may require follow-on testing. The plan shall also
 401 include the T&E approach, consistent with Enclosure 1-2 of this policy, for on-
 402 going technical refreshes of rapidly advancing hardware and software
 403 components.
 - 404 d. Production qualification testing should continue as required.
- 405 (3) Include the resource estimates for IOT&E, which shall be derived from defensible
 406 statistical measures of merit (power and confidence) associated with the coverage of
 407 the factors (Reference(XX)³). MS-C resource estimates shall also include anticipated
 408 annual budget for ongoing, routine system upgrades.

³ 10-19-10 DOT&E Guidance on the Use of Design of Experiments in Operational Test and Evaluation.

- 409 (4) Address detailed schedule through FOC and initial estimated schedule for on-going
410 test program activity IAW Enclosure 1-2. The schedule shall include routine system
411 upgrades (technical refreshes) for rapidly changing hardware and software
412 components. The schedule shall also reflect future critical acquisitions in the System
413 of Systems environment, consistent with the PV-2.
414
- 415 d. DOT&E and DASD(DT&E), in consultation with T&E and system stakeholders, may
416 identify closely associated programs that require coordinated T&E activities. These
417 programs will typically be consistent with the program interdependencies documented in the
418 component programs' AS and/or ISP. A Memorandum from DOT&E and DASD(DT&E) to
419 USD(AT&L), the CAE, and all relevant PEOs and PMs shall identify the programs that must
420 coordinate some T&E activity in order to achieve robust, rigorous, and efficient testing. The
421 memorandum will direct the CAE to identify a lead PM or PEO for the Capstone programs.
422 The lead PM or PEO shall document a strategy for coordinated and combined T&E activities
423 for their System of Systems (SoS) in a Capstone TEMP. All Capstone programs shall update
424 their TEMPs to include a section on their contribution to Capstone testing. The Capstone
425 TEMP shall:
- 426 (1) Address T&E activities to occur during Capstone test events, to include:
427 a. The T&E objectives, measures, and criteria that shall be applied to end-to-end
428 mission testing of the SoS capabilities in an operationally relevant (and joint
429 where applicable) environment.
430 b. Assignment of responsibilities
431 c. A listing of the critical interfaces within the SoS and external to the SoS. This
432 listing shall support NR-KPP evaluation for the SoS.
- 433 (2) Address required resourcing and resource responsibilities for all SoS T&E activities
434 (3) Address scheduling of Capstone tests. For pre-FRP/FDD component programs,
435 contingencies shall be developed to prevent Capstone events from interfering with
436 acquisition activities. Fielded programs may combine routine T&E of system
437 upgrades with Capstone test events.
438
439
- 440 e. The TEMP shall be updated after MS-C for FRP/FDD and thereafter as needed. DOT&E
441 and/or DASD(DT&E) shall direct the CAE to provide a TEMP update, as required TEMP
442 updates shall provide for:
- 443 (1) Regression testing and evaluation of test articles that incorporate all improvements,
444 modifications, and corrective actions prior to fielding of the system.
445 (2) Continued DOT&E approval of operational test plans, test monitoring, and FOT&E
446 reporting to:
447 a. Complete IOT&E activity.
448 b. Refine IOT&E estimates, verify correction of deficiencies, and address any
449 DOT&E recommendations accepted by the receiving Service.
450 c. Monitoring of fielded system ESS and its operational environment.
451 d. Perform routine testing of routine system upgrades (technical refreshes) of rapidly
452 changing hardware and software IAW Enclosure 1-2. Upgrades that pose a
453 substantial risk of degrading fielded military capabilities shall be tested
454 operationally before such changes are deployed for operational use.

- 455 (3) Continued reliability monitoring and reliability growth after fielding until terminated
 456 by the receiving Service.
- 457 (4) On-going monitoring of operational system environment and operational system uses
 458 to inform of necessary T&E activities. When a system is to be used in a substantially
 459 new environment, FOT&E test events shall be employed to evaluate whether the
 460 system continues to meet operational needs and retains operational ESS in the new
 461 environment.
- 462 (5) Demonstration of the maturity of the production process through Production
 463 Qualification Testing of LRIP assets prior to full-rate production
- 464 (6) Resources to support FOT&E activities.
- 465
- 466 f. PMs shall submit draft TEMP's to reviewers no less than 60 days prior to the milestone
 467 decision. PMs shall submit Component-approved TEMP's to cognizant T&E authorities for
 468 approval NLT 30 days prior to the milestone decision.
- 469
- 470

471 5. T&E EXECUTION

472 a. Planning Test Events

- 473 (1) Test Plans shall include the plans for data collection, management, analysis and
 474 evaluation. The plan shall indicate the decisions being supported.
- 475
- 476
- 477 (2) The cognizant OT&E authority shall approve the Operational Test Plan (OTP) prior
 478 to any operational test event (Sec. 2399.b.1 Reference(k)). For programs on OSD
 479 OT&E oversight, the Lead OTA shall brief the DOT&E on T&E concepts for the
 480 Operational Test Plan as early as possible and not less than 180 days prior to start of
 481 any such testing. DOT&E and Component leads shall be kept apprised of changes
 482 in test concept and progress on the OTP. The Lead OTA shall deliver a draft OTP
 483 for DOT&E review NLT 60 days before test start. The Lead OTA shall deliver the
 484 Component-approved OTP for DOT&E approval NLT 30 days before test start.
 485 When there are fewer than 60 days between test events, concept briefs and
 486 Operational Test Plans should include advance planning for contingencies, indicating
 487 how results of one test will influence subsequent testing.
- 488
- 489 (3) Only fully documented developmental test data may be used for an operational
 490 assessment or evaluation. For best results, DT events in operationally relevant
 491 environments should be coordinated with the Lead OTA and the cognizant OT&E
 492 authority prior to the start of testing. When advance coordination is not possible the
 493 Lead OTA shall facilitate data re-use through independent documentation of data
 494 pedigree (test conditions, methodologies, etc) for inclusion in the operational
 495 assessment or evaluation.
- 496
- 497 (4) In OT&E, typical users/units shall operate and maintain the system or item under
 498 conditions simulating combat stress (Sec 139, Reference(k) and peacetime conditions
 499 when applicable. If practical OT&E shall use mission-based test design: the Lead
 500 OTA, in coordination with the T&E WIPT, shall identify realistic operational

- 501 scenarios based on mission threads derived from the Joint Mission Essential Task
502 List or Component specific Mission Essential Task List.
- 503
- 504 (5) Contractors for the system being developed may participate in OT&E or integrated
505 test only to the extent they are planned to be involved in the operation, maintenance,
506 and other support of the system when deployed in combat (Sec. 2399.e
507 Reference(k)).
- 508 a. No contractor that has or is participating in the development, production, or
509 testing of any DoD system shall in any way establish criteria for data
510 collection, performance assessment, or evaluation activities for OT&E.
- 511 b. Only DOT&E may waive contractor limitations and only if the DOT&E
512 determines, in writing, that sufficient steps have been taken to ensure the
513 impartiality of the contractor in providing the services. Contractor limitations
514 do not apply to any contractor that has participated solely in test or test
515 support on behalf of the DoD.
- 516
- 517
- 518 (6) IOT&E shall use production or production-representative test articles that shall at a
519 minimum incorporate the same parts and software items to be used in LRIP articles.
520 Production-representative articles should be assembled using the parts, tools, and
521 manufacturing processes intended for use in full-rate production; utilize the intended
522 production versions of software; and the logistics system and maintenance manuals
523 intended for use on the fielded system should be in place. The hardware and
524 software shall be as defined by the system-level Critical Design Review, Functional
525 Configuration Audit, and System Verification Review, including correction of major
526 deficiencies identified during developmental testing. The manufacturing processes to
527 be used in full-rate production should be adhered to as closely as possible, and the
528 PM shall provide the cognizant OT&E authority with a detailed description of
529 manufacturing process differences.
- 530
- 531 (7) The numbers of IOT&E test articles shall be determined in the MS-B TEMP. The
532 DOT&E, following consultation with the Lead OTA and PM, shall determine the
533 quantity of test articles procured for all OT&E test events for any system under OSD
534 OT&E oversight (Sec 2399.c Ref(k)). The Lead OTA, following consultation with
535 the PM, shall determine the number of test articles procured for IOT&E for any
536 system that is not on the OSD OT&E oversight.
- 537
- 538
- 539 (8) IOT&E shall require more than an assessment that is based exclusively on computer
540 modeling, simulation, or an analysis of system requirements, engineering proposals,
541 design specifications, or any other information contained in program documents
542 (sections 2399 and 2366 of Reference (k)). When possible, IOT&E should include
543 the system under test and all interrelated systems used to employ and support the
544 capability under test.
- 545

546 (9) PMs for all programs (and particularly those designated by the MDA as responding
547 to an Urgent Operational Need) may elect to perform testing in conjunction with
548 training, joint/operational exercises, or multi-program test settings such as Capstone
549 events. Such testing is efficient but inherently increases the risk that a significant
550 problem will not be discovered. If such testing is the sole form of operational testing
551 prior to fielding, then additional testing must continue subsequent to fielding. In
552 these cases, the Lead OTA (and DOT&E or DASD(DT&E) if applicable) shall fully
553 report on the results of subsequent testing. The plan for such reporting shall be
554 included in the applicable TEMP or other planning documentation. Significant
555 problems shall be reported promptly to senior DoD leadership when those problems
556 are identified.

557
558 b. Conducting Test Events

- 559 (1) Test plans shall consider the potential impacts on the environment (sections 4321-
560 4347 of Reference (ac) and Reference (ad)) and on personnel. The PM, in concert
561 with the user and the T&E community, shall provide safety releases (to include
562 formal environment, safety, and occupational health (ESOH) risk acceptance in
563 accordance with Enclosure 12, paragraph 6) to the developmental and operational
564 testers prior to any test using personnel.
565
566 (2) OT&E events shall be executed in accordance with the approved operational test
567 plan. For programs on OSD OT&E oversight, deviations that may influence the
568 planned evaluation shall receive approval from DOT&E prior to the start of test
569 execution. This policy shall not interfere with the real-time decision needs of test
570 directors/officers.
571
572 (3) All pertinent operating instructions (i.e., Tactics, Techniques, & Procedures (TTP),
573 Standard Operating Procedures (SOP), Technical Manuals(TM), Technical Orders
574 (TO), etc) should be considered for their impact on the test outcomes and included in
575 test plans when relevant. Similarly, test plans shall include the criteria to be used to
576 make matter of fact changes (delays for weather, test halts, etc).

577
578 c. Data Management, Evaluation, and Reporting

- 579 (1) The DASD(DT&E), the DOT&E, and their designated representatives shall all have
580 full and immediate access to all records, all reports and all data, including but not
581 limited to: data from all tests, system logs, execution logs, test director notes,
582 user/operator assessments, etc. All data include but are not limited to: classified,
583 unclassified, and competition sensitive or proprietary data when available. Data may
584 be preliminary and shall be identified as such. Release of IOT&E evaluation results
585 may be withheld until the final report, according to the established policies of each
586 OTA. However this shall not limit the statutory requirement for immediate access to
587 all records and data, including evaluation results, by DOT&E.
588
589 (2) OTAs and other T&E agencies shall include every OT&E and LFT&E event in some
590 written report. Regardless of the statutory or regulatory requirement for a report,
591

592 regardless of level or classification of the program, regardless of oversight status,
 593 there shall be no undocumented test events. Full reports will often contain multiple
 594 test events, and shall be accomplished in the most timely manner practicable. Interim
 595 précis summaries of individual events shall be prepared as results become available.
 596

597 (3) OTAs shall publish interim test event summaries as interim reports when the test
 598 events provide information of immediate importance to the program decision makers.
 599 This will occur particularly in support of early or rapid fielding efforts, time critical
 600 operational needs, and contingencies, Such reports should provide the best
 601 assessment possible based on the available data and should not be delayed. Such
 602 reports should be followed by the planned comprehensive reporting once all data and
 603 analyses are available and complete.
 604

605 (4) For OSD T&E oversight programs, DOT&E and DASD(DT&E) shall be kept
 606 informed of available program assets, assessments, test results and anticipated
 607 timelines for reporting throughout report preparation.
 608

609 (5) The PM and test agencies for all programs shall provide the Defense Technical
 610 Information Center (DTIC) with all reports, and all reduced data and metadata for all
 611 test events supporting those reports. Limitations in the data that will be provided to
 612 DTIC shall be approved in the MS-B TEMP.
 613
 614

615 6. ASSESSMENT OF OPERATIONAL TEST READINESS (AOTRs)

616 a. The DoD Components shall each establish an OT Readiness Review (OTRR) process for
 617 programs on OSD OT&E oversight, consistent with the following requirements:

618 (1) The process shall include a review of DT&E results, an assessment of the system's
 619 progress against the KPPs, KSAs, and CTPs in the TEMP, an analysis of identified
 620 technical risks to verify that those risks have been retired or mitigated to the extent
 621 possible during developmental testing, a review of system C&A results, and a review
 622 of the IOT&E entrance criteria specified in the TEMP.
 623

624 (2) PMs shall provide copies of the DT&E data and evaluation results, and all IOT&E
 625 readiness assessments or briefs to the DASD(DT&E) and DOT&E. An OTRR shall
 626 occur no less than 60 days before the start of IOT&E, and those OTRR results shall
 627 be provided to OSD NLT 45 days before IOT&E start, or as agreed.

628 (3) The PMs, DASD (DT&E), and the Lead OTA shall assess the reliability growth and
 629 report the results of the assessment to Defense Acquisition Executive Summary
 630 (DAES) and MDA at MS-C.
 631

632 b. The DASD(DT&E) shall conduct an independent AOTR for all MDAPs and special
 633 interest programs designated by the USD(AT&L). Each AOTR shall consider the risks
 634 associated with the system's ability to meet operational ESS requirements. The AOTR
 635 shall assess the capabilities demonstrated in DT&E (including the full-up system-level
 636 DT&E), integrated test, the OA(s), and any other data available against the criteria
 637 documented in the TEMP. Where feasible, the AOTR shall be performed in conjunction

638 with the program's other review and reporting activities. The AOTR report shall be
639 provided to the USD(AT&L), the DOT&E, the CAE, the PEO, and the PM
640

- 641 c. For Space Systems acquisition, the AOTR is due prior to the consent to ship.
642
643 d. The CAE shall consider the results of the AOTR prior to making a determination of
644 materiel system readiness for IOT&E. In the event DASD (DT&E) recommendation is
645 not taken, the CAE shall provide the DASD (DT&E), USD(AT&L), and DOT&E) a
646 memorandum outlining the rationale for proceeding into IOT&E.
647
648

649 7. LFT&E Section 2366 of Reference (k) mandates the LFT&E and formal LFT&E reporting
650 for all covered systems, as determined by DOT&E, including rapid acquisition, survivability
651 improvement, and kit programs to address urgent operational needs. The DOT&E shall require
652 approval of LFT&E strategies, LFT&E plans, and survivability test plans for covered systems as
653 defined in Section 2366. The DOT&E, following consultation with the Lead OTA and PM, shall
654 determine the quantity of test articles procured for all LFT&E test events for any system under
655 OSD LFT&E oversight. The cognizant DT&E authority, following consultation with the PM,
656 shall determine the number of test articles procured for all LFT&E test events for any system that
657 is not on the OSD LFT&E oversight.
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661 8. FOREIGN COMPARATIVE TESTING (FCT) Paragraph (g) of section 2350a of Reference
662 (k) prescribes funding for U.S. T&E of selected allied and friendly foreign countries' equipment
663 and technologies when such items and technologies have potential to satisfy approved DoD
664 requirements. The USD(AT&L) shall centrally manage FCT and notify the congressional
665 defense committees of the intent to obligate funds made available to carry out FCT not less than
666 seven days before such funds are obligated.
667
668

669 9. CERTIFICATION AND ACCREDITATION (C&A)

670 As a matter of efficiency, C&A activities should be planned in conjunction with T&E activities
671 when practical.

- 672 a. A C&A/T&E coordination plan is recommended for inclusion in the MS-B TEMP with
673 an update at MS-C.
674 b. The PM shall provide the cognizant T&E authorities with all data on all certifications.
675 c. The system, T&E, and C&A stakeholders shall assist the user in writing testable JCIDS
676 requirements for information assurance (IA) and interoperability which shall be
677 expressed as CTPs, MOPs, MOEs, and/or MOSs in the TEMP.
678 d. IAW DODI 8500.02, all programs shall have IA controls and IA certifications consistent
679 with their Mission Assurance Category. Appropriate measures in the TEMP shall be
680 used to evaluate operational capability to Protect, Detect, React and Restore (PDRR) to
681 sustain continuity of operation. The Defense Intelligence Agency, in coordination with
682 the PM, shall determine the generation of expected threat. The PM shall resource and

- 683 ensure threat-appropriate Red Team/Penetration testing to emulate the threat in the
 684 operational environment at IOT&E.
- 685 e. IAW DODI 4630.8, the TEMP for all programs shall reflect interoperability and
 686 supportability requirements, and the TEMP shall serve as the basis for interoperability
 687 (IOP) assessments. The TEMP shall support interoperability C&A activities and shall
 688 include operational evaluation of mission-level interoperability across key interfaces at
 689 IOT&E. Systems that provide capabilities for joint missions shall be tested in the
 690 expected joint operational environment.
- 691 f. The PM is responsible for determining all required certifications (IA, IOP, HIPAA,
 692 environmental safety, FAA, etc) and ensuring involvement of the appropriate C&A
 693 representatives in the T&E WIPT.
 694
 695

696 10. T&E OF INFORMATION AND BUSINESS SYSTEMS

- 697 a. The DoD CIO in conjunction with DOT&E may tailor these requirements for some
 698 programs.
- 699
 700 b. The Lead OTA shall conduct an analysis of risks to achieving desired performance for
 701 each increment or capability. The analysis will document the likelihood of risk and the
 702 impact on mission accomplishment. The results of the risk analysis will be documented
 703 in the TEMP and used to determine the level of OT&E in accordance with Reference (x).
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706 11. OSD T&E OVERSIGHT LIST

- 707 a. Programs may be placed on the OSD T&E Oversight List in one or more of the following
 708 categories: DT&E, OT&E, or LFT&E.
- 709 b. The DASD(DT&E) shall determine the programs designated for DT&E oversight.
- 710 c. The DOT&E shall determine the programs designated for OT&E and LFT&E oversight.
- 711 d. The DASD(DT&E) and the DOT&E shall jointly publish the OSD Memorandum
 712 (Reference (bb)) identifying the T&E programs at least annually.
- 713 e. The OSD T&E Oversight List is unclassified. Highly classified and sensitive programs
 714 that are placed under T&E oversight shall be identified directly to their program
 715 managers
- 716 f. MDAPs on the OSD T&E Oversight List under the heading "OT&E" include those
 717 programs that meet the statutory definition of section 2430 of Reference(k), and those
 718 that are designated by the DOT&E as MDAPs for the purposes of operational test and
 719 evaluation under the authority of section 139(a)(2)(B) of Reference(k). The latter
 720 programs are not MDAPs for any other purpose and shall not be considered to be such.
- 721 g. Unless specifically waived, the test-related documentation specified for MDAP programs
 722 will be required for all programs on the OSD T&E Oversight List, including submission
 723 of DIA or DoD Component-validated STARS, TEMPs, OT plans, and reporting of test
 724 results.
- 725 h. Force protection equipment (including non-lethal weapons) shall be subject to OSD T&E
 726 oversight, as determined by DOT&E. The DOT&E shall approve required operational
 727 test plans and/or strategies for such systems.
- 728 i. OSD T&E Oversight List shall identify programs grouped under Capstone TEMPs.

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12. DEFINITION OF DT&E

Developmental Test and Evaluation (DT&E) is conducted throughout the system lifecycle from program initiation through system sustainment in order to reduce design and programmatic risks and to provide assessments. DT&E may be a mix of contractor testing and government testing. DT&E:

- a. Assesses achievement of CTPs and KSAs along with assessment of progress toward achievement of KPPs and COIs.
- b. Assesses system satisfaction of the thresholds as described in the capabilities documentation.
- c. Assess system readiness for IOT&E.
- d. Characterizes system functionality and provides information for cost, performance, and schedule tradeoffs.
- e. Assess system specification compliance.
- f. Reports progress to plan for Reliability Growth and characterizes reliability and maintainability.
- g. Identifies system capabilities, limitations, and deficiencies.
- h. Assesses system safety.
- i. Assesses compatibility with legacy systems.
- j. Stresses the system within an intended mission environment.
- k. Supports assurance certification and accreditation process and joint interoperability certification process.
- l. Documents achievement of contractual technical performance and verifies incremental improvements and system corrective actions.