TEST AND EVALUATION CHAPTER 3: MIDDLE TIER OF ACQUISITION

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1. Middle Tier of Acquisition (MTA) Overview

1.1 Introduction

In accordance with DoDI 5000.02, the DoDI 5000.80 establishes policy and prescribes procedures for the management of the MTA for rapid prototyping and rapid fielding in Section 804 of Public Law 114-92. The guidance provided here supports policy established in the DoDI 5000.89 and DoDI 5000.85. In the event of conflict, the reader should defer to policy documentation.

The MTA Pathway is intended to fill a gap in the defense acquisition system for those capabilities with a level of maturity to allow them to be rapidly prototyped or fielded, within five years of MTA program start. The intent for programs using the pathway is to accelerate capability maturation before transitioning to another acquisition pathway, or to minimally develop a capability before rapidly fielding. Technology sources for MTA pathways include available or emerging commercial technology, maturing technology from government labs, Defense Prime Independent Research and Development (IR&D) efforts, and innovative Small Business Innovation Research (SBIR) solutions. Major systems intended to satisfy a major interagency requirement primarily focus on technology development or have significant international partner involvement are discouraged from using the MTA pathway. Table 1 provides an overview of each MTA pathway, to include key differences and characteristics.

Table 1. Comparison of Middle Tier Acquisition Pathway

	Rapid Prototyping	Rapid Fielding
Purpose	• Based on innovative technology • Rapidly develops fieldable prototype • Produces a new capability • Meets emerging military needs	• Based on proven technology • Delivers field production quantities of new or upgraded systems • Requires minimal development
Objective	• Field prototypes meeting defined requirements that can be demonstrated in an operational environment • Can provide for residual operational capability within five years from MTA program start date	• Field proven technologies with minimal development • Initiate production within six months and complete fielding within five years from MTA program start date

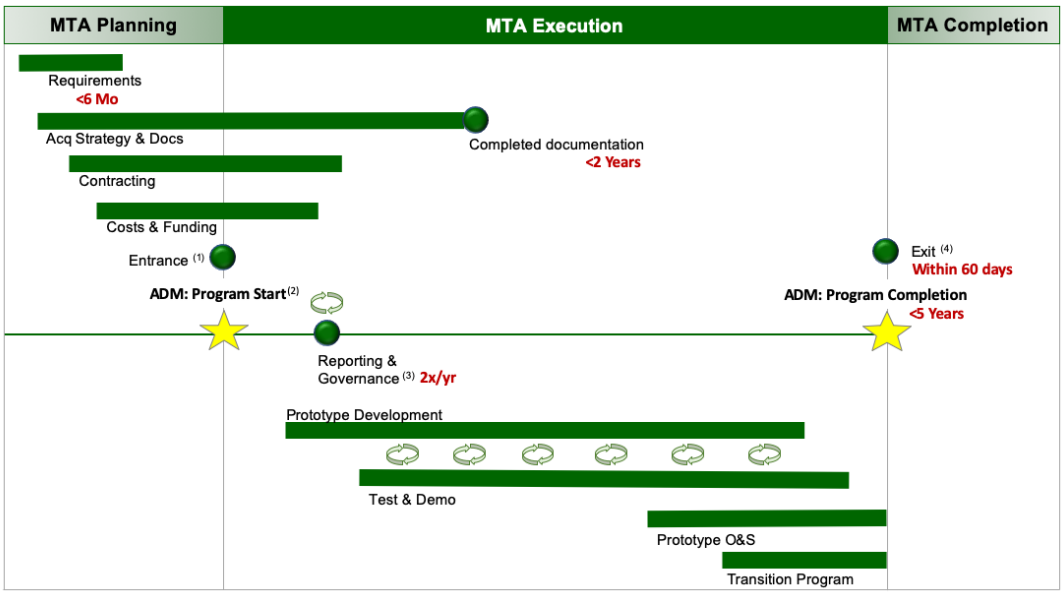
The Program Manager (PM) should involve the T&E organizations with the acquisition program from its inception and throughout its lifecycle to support the program decisions and delivery timeline. Contractor testing (CT), government developmental test and evaluation (DT&E), live fire test and evaluation (LFT&E), and operational test and evaluation (OT&E) should be integrated, streamlined, and automated to the maximum extent practicable to enable efficient use of data and resources across the test program and evaluation of system operational effectiveness, suitability, survivability, and lethality to inform the decision authorities. Maximum sharing, reciprocity, availability, and reuse of test results and artifacts among testing and certification organizations are encouraged for success. Collaboration between all organizations should be considered to develop digital system models, simulations, and test environments for common use across the spectrum of system tests that may produce necessary data or information.

This chapter describes T&E community involvement throughout the rapid prototyping and rapid fielding pathways.

1.2 Middle Tier of Acquisition (MTA) Pathway Description

1.2.1 Rapid Prototyping

The purpose of the rapid prototyping pathway (shown in Figure 1) is to provide for the use of innovative technologies to rapidly develop fieldable prototypes, demonstrate new capabilities, and meet emerging military needs. Rapid prototyping efforts are intended to determine whether a new technology or application of technology provides improved mission capabilities. The objective is to field a prototype that meets defined requirements that can be demonstrated in an operational environment and provide for a residual operational capability within five years of the MTA program start date.



(1) *Major Systems*: Acquisition Decision Memorandum(ADM) signed by the Decision Authority (DA), Acquisition Strategy (which includes [1] Security, Schedule & Production Risks; [2] Test Strategy/Results; and [3] Transition Plan), and Program Identification Data (PID)
Non-Major Systems: ADM signed by the DA, PID
(2) Major Defense Acquisition Programs (MDAPs) require Under Secretary of Defense for Acquisition & Sustainment (USD(A&S)) Prior Written Approval
(3) Updated PID submitted twice a year with President's Budget and Program Objective Memorandum submissions to Office of Secretary of Defense (OSD)
(4) Signed Outcome ADM, Final PID, Assessment of Test Results

Figure 1. Middle Tier of Acquisition Rapid Prototyping Pathway Model[10]

DoD Components will develop a merit-based process for the consideration of innovative technologies and new capabilities to meet needs communicated by the Joint Chiefs of Staff and the Combatant Commanders. DoD Components will develop the process to implement acquisition and full funding strategies for the program. This process will result in an Acquisition Strategy, which includes security, schedule, and production risks, and a cost estimate. DoD Components will develop a process for demonstrating performance and evaluating for current operational purposes the proposed products and technologies, and should document this process in the T&E Strategy. For each MTA program, DoD Components will develop a process for

[10] DAU website.

transitioning successful prototypes to new or existing acquisition programs under the rapid fielding pathway or other acquisition pathway. This process will result in a transition plan, included in the Acquisition Strategy, which provides a timeline for completion within two years of all necessary documentation required for transition, after MTA program start.[11]

1.2.2 Rapid Fielding

The purpose of the rapid fielding pathway (shown in Figure 2) is to provide for the use of proven technologies to field production quantities of new or upgraded systems with minimal development. The objective is to begin production within six months and complete fielding within five years of the MTA start date.

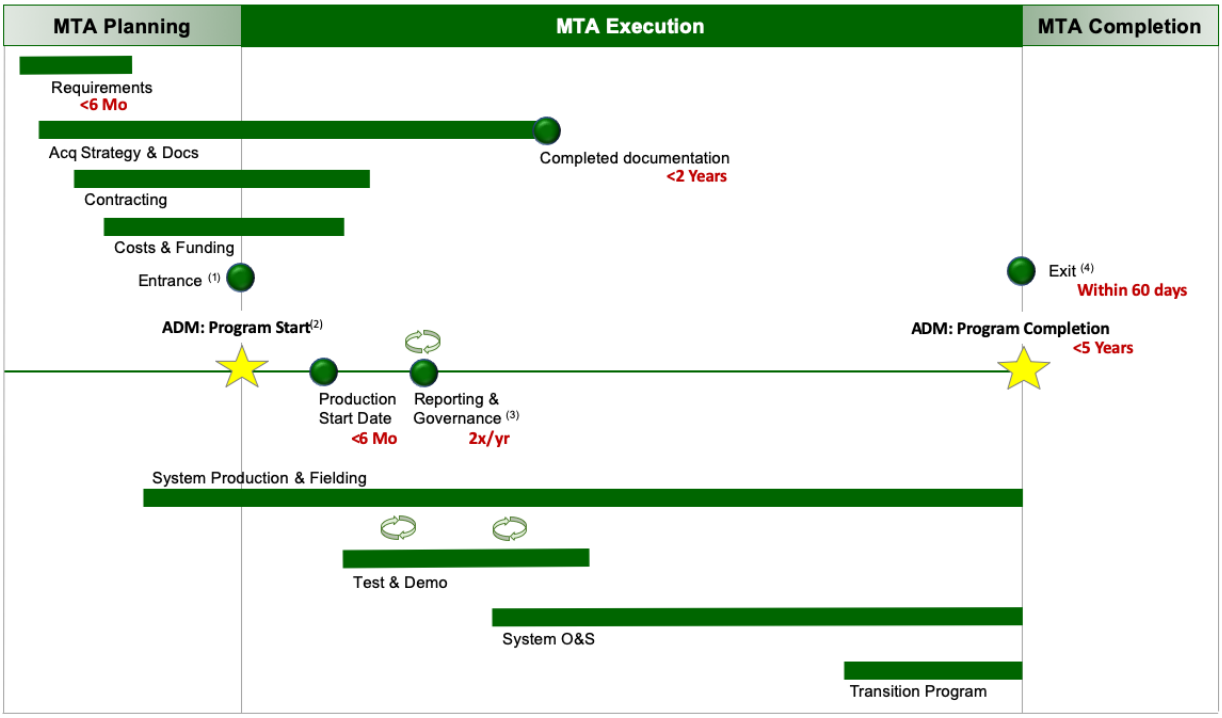


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Figure 2. Middle Tier of Acquisition Rapid Fielding Pathway Model[12]

DoD Components will develop a merit-based process for the consideration of existing products and proven technologies to meet needs communicated by the Joint Chiefs of Staff and the Combatant Commanders. DoD Components will develop the process for demonstrating operational performance and evaluating for current operational purposes the proposed products and technologies. This process should be documented in a T&E strategy. DoD Components will develop and implement acquisition and full funding strategies for the program, as well as a

[11] DoDI 5000.80, pg. 8

[12] DAU website.

process for considering lifecycle costs and address issues of logistics support and training; system, joint, and coalition interoperability; and planning for cooperative opportunities, to include foreign sales. For each MTA program, DoD Components will develop a process for transitioning successful programs to operations and sustainment. This process will result in a transition plan, included in the Acquisition Strategy, which provides a timeline for completion within two years of all necessary documentation required for transition after MTA program start.[13]

2. Middle Tier Acquisition Pathway T&E Overview

The T&E community plays a critical role in collecting and analyzing test data and information to assist the Decision Authority (DA) in managing risks and making informed outcome determinations and transition decisions. A T&E program for an MTA should consider the Acquisition Strategy, user requirements, and outline cost and resource estimates needed to accomplish its goals within the directed timelines. Figure 3 summarizes the T&E events and associated products for the rapid prototyping and rapid fielding MTA pathways.

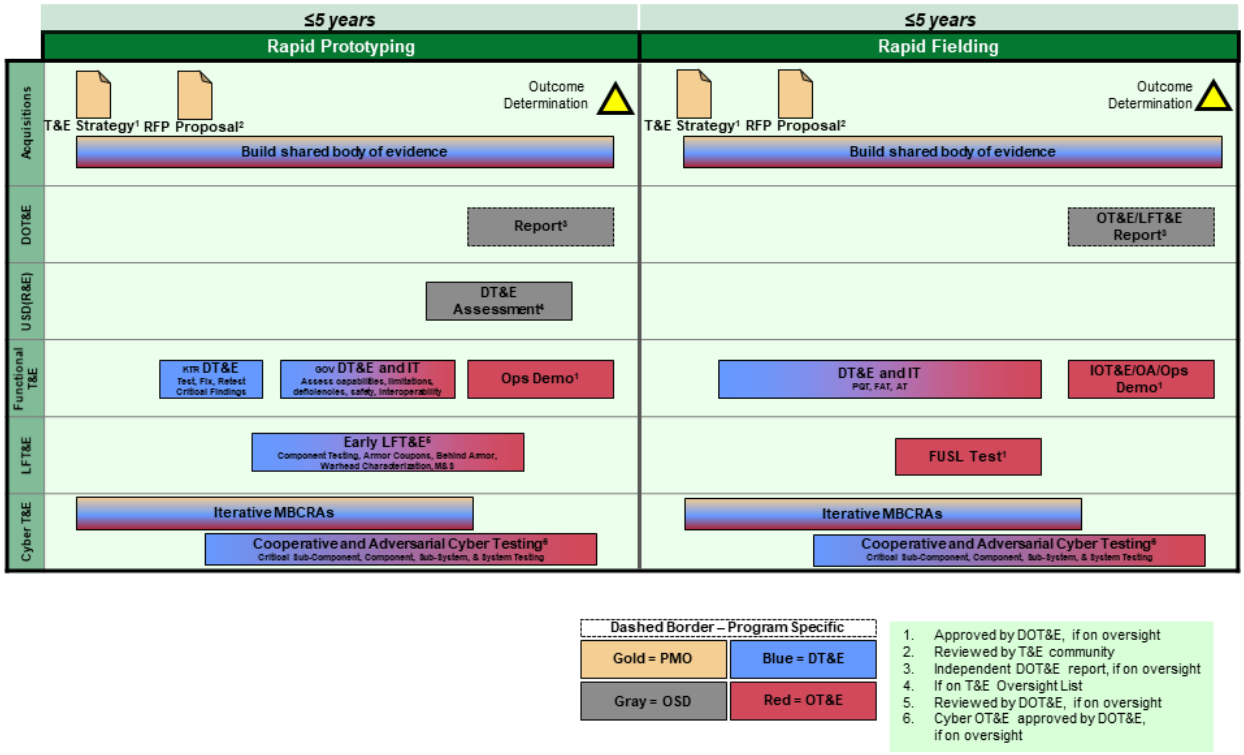

Figure 3. T&E Aligned with MTA Pathway

[13] DoDI 5000.80, pg. 8-9

2.1 Test and Evaluation Working-level Integrated Product Team (T&E WIPT)

During the MTA planning phase, the PM should charter a T&E WIPT or equivalent entity responsible for defining the T&E activities and requirements.[14] The T&E WIPT coordinates top-level planning for all test events and documents listed in Figure 3 and the schedule, which should account for the time needed to fix any deficiencies identified in test, and the associated analysis and reports. The T&E WIPT defines the data requirements and T&E resources needed to adequately plan and execute the T&E program. The PM, collaborating and consulting with the T&E WIPT, should include T&E requirements in Requests for Proposals (RFPs) and acquisition contracts to ensure government access to the data needed to mitigate risk and inform key program decisions. In addition to contracts, the T&E WIPT should participate in acquisition program requirements refinement to ensure that they are measurable, testable, achievable and relevant to the operational mission. The PM should assist the T&E WIPT to consult with the requirements authority to clarify requirements that may not be testable.

The T&E WIPT includes representatives from all organizations responsible for providing or overseeing the T&E Strategy development and its execution. In particular, the T&E WIPT should include representatives of test data stakeholders such as systems engineering, DT&E, OT&E, LFT&E, the user, product support, the Intelligence Community, and applicable certification authorities. The T&E WIPT should enable collaboration among stakeholders to maximize efficiency by planning and executing an integrated T&E program that leverages all test events for the purposes of meeting developmental, live fire, and operational evaluation objectives. The PM should ensure that results from all test events are captured in a shared data repository (discussed below) and available for all parties to use for independent assessment.

- T&E WIPTs should be involved from the inception of the program to help define the T&E requirements captured in acquisition contacts and the associated data.
- T&E WIPTs should strive to maintain a tempo that supports the required decisions using various tools (e.g., digital engineering, sequential testing, automation).
- T&E WIPTs should develop a robust T&E program to support the milestone decisions with end-to-end mission threads employing actual users.
- OT&E and LFT&E should concentrate on appropriately scoped, dedicated tests while integrating useable data and information from all sources to meet stakeholder needs, support operational evaluations, and inform decisions.
- T&E WIPT may develop collaborative test data scoring boards to evaluate and authenticate any available test data for potential to meet any IOT&E and LFT&E requirements.

2.2 Test and Evaluation Planning for Middle Tier of Acquisition

The purpose of T&E planning is to define an executable strategy to adequately evaluate systems throughout the program's lifecycle for technical, functional, and operational capability to enable delivery of a system that meets the operational users' needs. As the planning process is critical and sets the conditions for success, all test teams should be involved early in the program during the planning process to establish and document how testing, modeling and simulation (M&S),

[14] Different naming convention for the T&E WIPT such as Integrated Test Team are common and acceptable. This document will refer to any of these as the T&E WIPT.

analysis, and evaluation of performance at its various maturity stages will be accomplished. The T&E WIPT should identify the measures to be used to evaluate the system as a part of the planning process, and then the data needed and conditions under which those data will be collected. A tabletop exercise can assist in confirming the feasibility of the proposed plans, tools, and methodology prior to inclusion in the T&E Strategy.

T&E planning should be digitized and automated as much as possible to support continuous development, integration, and delivery of system capabilities. Digital test management tools automate the process of test planning, scheduling, tracking, and reporting test events.

During the planning process, various stakeholders are developing documentation, summarized and defined in Table 2, to include the associated testing resources, tools, data, and infrastructure.

Table 2. Planning Documents

Artifact	Description	Developed by
Tailored Test and Evaluation Strategy[15]	Defines the processes by which technical, functional, and operational performance will be tested and evaluated to satisfy developmental test and evaluation criteria, and to measure technological maturity and prototype performance, as well as a description of how the program will achieve a residual operational capability.	Program Manager with support from T&E WIPT
Requirements	Specifies the requirements for the system to deliver the capability that meets needs specified by the Joint Chiefs of Staff and Combatant Commanders.	Sponsor with support from the Program Manager
Acquisition Strategy	An integrated plan that identifies the overall approach to acquiring, developing, delivering, and sustaining capabilities to meet users' needs.	Program Manager
Cost Estimate	Developed in accordance with DoDI 5000.73 (Cost Analysis Guidance and Procedures). The estimate should consider the technical content of the program described in the Capability Needs Statement (CNS), User Agreement (UA), Acquisition Strategy, and test strategy.	Program Manager

[15] Different naming conventions for the T&E Strategy are common (i.e. test strategy, Test and Evaluation Master Plan (TEMP), Simplified Acquisition Master Plan (SAMP)). Regardless of name, this document can be tailored and should be submitted for DOT&E for approval for programs on the T&E oversight list.

Artifact	Description	Developed by
Intellectual Property (IP) Strategy	Identifies and describes the management of delivery and associated license rights for all software and related materials necessary to meet operational, cybersecurity, and supportability requirements. The IP strategy should support and be consistent with all other government strategies for design, development, test and evaluation, operation, modernization, long-term supportability of the software, and protection of the software supply chain, and should be implemented via appropriate requirements in the contracts.	Program Manager
Request for Proposal	A document used in negotiated acquisitions to communicate government requirements, including those for T&E, to prospective contractors, and to solicit proposals.	Program Manager

2.2.1 T&E Content and Interests in Planning Documents

While the T&E Strategy is the main testing document for either the rapid prototyping or rapid fielding pathway, the success of T&E relies heavily on each of the other documents discussed below. The T&E community should work with the acquisition community on these documents to incorporate needed T&E information. This section highlights T&E content and involvement of test teams in the development of each of these documents.

2.2.2.1 Tailored Test & Evaluation Strategy

The purpose of documenting the T&E Strategy is to guide the activities of test organizations in planning and executing an effective and efficient test process in support of the outcome determination. The T&E Strategy serves as an agreement between the PM and all the T&E stakeholders for T&E roles and responsibilities, and resources, and should enable the evaluation of the unit equipped with the system executing the missions the system is intended to perform while considering all interfacing systems, threats, and operational environments. The T&E WIPT, guided by appropriate threat modules from the Defense Intelligence Threat Library, identifies threat adequacy for test.

The T&E WIPT should ensure the T&E Strategy is executable and aligns with the Acquisition Strategy, T&E policy (DODI 5000.89), and relevant T&E focus area chapters in the T&E Enterprise Guidebook. Per the DoDI 5000.89, the T&E Strategy will include an Integrated Decision Support Key (IDSK), a table that outlines the acquisition, technical, and program decisions and the data (e.g., CT, DT, LFT, OT, M&S) necessary to support those decisions. The IDSK provides a framework for how test events can build on one another and support the data requirements for multiple stakeholders' evaluations simultaneously, producing efficiencies across the T&E lifecycle and facilitating the integration of DT, CT, and OT. The IDSK should evolve

and adapt as the system matures, and identify opportunities to incorporate operational realism (e.g., mission environments and operational users) as early as possible. Incorporating operational realism early in the test program improves the probability of identifying and correcting problems early, which is especially critical for MTA programs executed on short timelines. This approach facilitates a tailorable DT, OT, and LF approach that may affect the scope of individual test events. Stakeholders can pull data from prior events to support their evaluations. The T&E Strategy should describe how these data will be accumulated to build a shared body of evidence to support evaluations of the system (e.g.., data repository).

The T&E Strategy should define the conditions under which required data will be collected, and any tools required to manage the data and perform the testing. OT should consider informing the DT community of their OT data requirements to meet their evaluation objectives, and vice versa. As such, DT should consider the operational relevance of the developmental tests to identify operationally representative deficiencies sooner.

Embedding OT&E earlier in the program's lifecycle requires OT&E awareness and participation in the activity of the system development. This includes monitoring the tests that occur throughout the development and understanding the pedigree of the developmental testing to determine which results may be useable for operational evaluation. The test community must determine the applicability of prior data for OT&E, including the mapping of that data to the evaluation assessment areas, and identify gaps in data that will inform test planning for future iterations.

The DA approves the T&E Strategy, ensuring that it is executable and aligns with the Acquisition Strategy and the Acquisition Decision Memorandum (ADM). For programs on OSD T&E oversight, DOT&E is the final approval authority for the T&E Strategy.[16] The T&E Strategy will be submitted to the DOT&E for approval no later than 45 calendar days before the program start.

2.2.2.2 Requirements

The T&E WIPT should be involved with requirement development early to fully understand the desired capabilities and help inform how certain aspects of system design (e.g., cybersecurity) will be evaluated. The T&E WIPT should assist in the necessarily rapid definition of requirements that are clear, testable, and measurable. Test teams should:

- Understand what constitutes either a residual operational capability or mission effectiveness, suitability, survivability, and lethality, and how that should be evaluated consistent with the compressed schedules used for MTA programs
- Collaborate with stakeholders to help assure cyber and interoperability needs are rapidly identified and clearly defined, consistent with the MTA program schedules

2.2.2.3 Acquisition Strategy

The Acquisition Strategy should describe the MTA program and associated decisions sufficiently to convey what information/data testing needs to provide, and when to adequately support the

[16] DoDI 5000.89, November 19, 2020, pg. 5

transition decisions and evaluate the technical, functional, and operational performance as appropriate. The strategy should account for T&E when identifying resource needs. The Acquisition Strategy sets the schedule for delivering the capability. Test teams should collaborate rapidly and efficiently with stakeholders to help:

- Include the appropriate T&E-related provisions are included in RFPs and contracts
- Assure that adequate time is allotted in schedules to conduct the T&E needed to rapidly identify and fix key deficiencies.

2.2.2.4 Cost Estimate

The cost estimate should consider the technical content of the program described in the requirements document, Acquisition Strategy, and T&E Strategy. Test teams should collaborate to assure that the cost estimate includes all the resources necessary to plan and execute the T&E consistent with rapid prototyping or rapid fielding.

2.2.2.5 Intellectual Property (IP) Strategy

The IP strategy will identify and describe the management of delivery and associated license rights for all hardware, software, and related materials necessary to meet operational, cyber, and supportability requirements. It should include, to the maximum extent practicable for an MTA program, delivery of and access to the computer code, automated tools, and data needed to conduct T&E consistent with the schedule for rapid fielding or prototyping.

Test teams should provide input to the IP strategy on the rights of data generated (such as contractor-generated test results) during all phases of testing that would allow building a shared body of test evidence, available throughout the program's lifecycle. The PM should consult with the T&E community to determine any access needed to support independent testing and include these accesses in the IP strategy as needed.

2.2.2.6 Request for Proposal (RFP)

The RFP defines what the government expects from the contractor. If T&E expectations are not explicitly stated in the RFP and the acquisition contract, needed data will not be provided, increasing risk to the T&E program and potentially the entire program's cost and schedule. The T&E Strategy is a source document for the RFP and should be generated in time to support RFP development. A draft T&E Strategy should be included as an attachment to the RFP to inform contractors of the anticipated T&E activities and associated data. Test teams should work collaboratively and efficiently with the appropriate stakeholders to define the contract deliverables supporting the T&E Strategy that should be included in the RFP.

2.2.2 T&E Resources

The T&E Strategy should document the T&E resources required to support DT&E, OT&E, and LFT&E. Programs should identify one-of-a-kind T&E resources and long-lead items early in the acquisition process to allocate adequate funding for development and use. The lead test organizations should verify and validate the tools planned for OT&E use before the program enters execution. This verification and validation should consider data collection, interfacing systems and databases, networks, simulated environments, simulated users, and ranges. These resources include, but are not limited to:

- **Test articles (e.g., the system under test, test targets and expendables, threats, spares)**
  The environments used to conduct testing for OT&E should be as operationally realistic as possible, including realistic system use and threats. This requires the identification and inclusion of interfacing systems that form the system of systems.

- **Test facilities, infrastructure, instrumentation, and ranges, to include cyber ranges and test team, software integration laboratories**
  Programs should use government T&E capabilities unless an exception can be justified as cost-effective to the government. PMs will conduct a cost-benefit analysis for exceptions to this policy and obtain approval through the T&E Strategy approval process before acquiring or using non-government test facilities or resources.

  The T&E Strategy should include any proposed use or application of embedded instrumentation. The intent of embedded instrumentation is to facilitate data collection and system diagnostics without modifying the system's operational configuration. The PM should work with the T&E WIPT and other stakeholders to plan for the of use embedded instrumentation to collect system performance and diagnostic data whenever feasible and should work to obtain accreditation and certification prior to use in OT&E. This may include adding requirements for these embedded instrumentation in program RFPs and other resourcing provisions.

  The PM should work with the T&E stakeholders for all test infrastructure and instrumentation that support the outcome determinations to be verified and validated by the intended user or appropriate accreditation agency.

- **Automated testing tools**
  Automated test execution tools may be a part of the process of executing test cases or procedures on the system under test. The T&E WIPT and PM should work with the contractor to fully understand the contractor's tools, specifically their verification and validation plans, and the credibility of those tools for the intended use. The automated tools should be structured to provide visibility into the continuous testing occurring within the development and fielding processes, as appropriate to the MTA approach, so that stakeholders can gain confidence as quickly as possible that the program will succeed. It is encouraged that government test teams be able to use these tools as appropriate so they can use their outputs to inform evaluations. Using the same tools as the contractor is advantageous for the government (e.g., easier to replicate events when necessary); provisions enabling this should be included in acquisition contracts. In some cases, government test teams must become experts in the tools used by both the contractor and government. Such expectations should be clarified with the appropriate contractual provisions.

- **M&S, and their verification and validation plans**
  The T&E Strategy should document initial versions of system M&S tools to be matured during development for use by government test organizations. These may include initial

digital system models, component level reliability and availability models, or other M&S tools. The PM, in collaboration with the T&E WIPT, should also consider whether the delivery of these tools, when applicable, should be included in the program RFPs.

The M&S strategy and schedule, including the using organization, intended use, and the commitment to provide a verification and validation plan for each tool or test infrastructure asset, should be documented in the T&E Strategy. The T&E Strategy should specify when particular T&E resources are required, and which organization is responsible for verification and validation, and for providing the associated resources.

- **Manpower and personnel**
  The T&E Strategy should include information about friendly and threat operational forces, data collectors, and subject matter experts that will be required to execute the T&E program.

- **Federal/State/local requirements, range requirements, and any special requirements**
  This may include requirements for explosive ordnance disposal, corrosion prevention and control, or frequency management and control.
- **Projected and actual level of funding to execute the required test program**
  Pursuant to Section 839(b) of Public Law 115-91, the PM should include a table in the T&E Strategy that lists the initial resource estimates for government DT&E, OT&E, and LFT&E. T&E funding in the resources section should be consistent with the cost estimate and budget submissions.
- **Data Repositories**
  During the MTA planning, the PM should establish a shared data repository to store test and evaluation data and provide access to all test teams so that they can review, use, and input these test data to meet their objectives. This should enable the use of sequential testing, big data analytics, and other adaptive methods in support of the IDSK and T&E efficiencies. Throughout system development, T&E should be building a shared body of test evidence to support efficient technical, functional, and operational performance evaluations and adaptive T&E. Relevant test data gathered through all testing should be included in this test data repository. To enable adequate use of sequential testing and similar T&E planning and analysis methods, the T&E WIPT should leverage existing or develop collaborative test data scoring boards to evaluate integrated test data for potential to meet operational or live fire requirements prior to the operational demonstration. It is possible to collect useful OT data across all planned and executed test events. The OTA should maintain the authoritative source of data authenticated to meet OT&E requirements.

3. T&E During MTA Pathway

3.1 Rapid Prototyping

Specific T&E activities within the Rapid Prototyping Pathway include:

- Generate the T&E Strategy
- Assist in including T&E requirements in the RFP
- Conduct developmental T&E
- Conduct an operational demonstration (ops demo)
- Conduct LFT&E (if applicable)
- Deliver a report
- Inform the outcome determination and transition decision

3.1.1 Generate the T&E Strategy

In coordination with the PM, the T&E WIPT should develop and document the T&E Strategy before starting the MTA program. For programs on the Rapid Prototyping pathway, the T&E Strategy should describe the data and testing necessary to measure technology maturity and performance and achieve a residual operational capability. The T&E Strategy should be complete enough to estimate and plan for the major resources required for adequate T&E consistent with the program's requirements and intended use. The T&E Strategy should document any risks to conducting adequate T&E and describe how those risks will be mitigated. To the extent possible, the T&E Strategy should:

- Present an IDSK that links data requirements for DT&E, OT&E, LFT&E
- Describe the evaluation focus areas and evaluation framework to meet DT&E, OT&E, and LFT&E, to include cyber T&E objectives
- Present an integrated program schedule that documents the test events
- Describe each test phase or event, to include how any test limitations will affect the evaluation
- Identify key T&E resources and projected level of funding for those resources (e.g., target sets, ranges, threat emulators, threat M&S, intelligence mission data)
- If applicable, specify the baseline against which the new system will be judged
- Identify key responsible T&E stakeholders, to include stakeholders responsible for verification and validation of proposed digital tools

3.1.2 Conduct Developmental T&E

The goal of DT&E is to manage and mitigate risk during development, verify system compliance with contractual and technical requirements, prepare for operational test (OT), inform decision makers throughout the program life cycle, and assess whether the integrated system provides military utility for the warfighter. Contractor DT&E should focus on test, fix, and retest of critical findings to mitigate risk to the program's cost, performance, and schedule consistent with the intent to rapidly prototype or field. Government testers should continue to leverage contractor-conducted DT&E to supplement government DT&E to assess:

- System capabilities and limitations per system specifications
- System safety and survivability, if applicable
- System ability to integrate within the operational environment
- The extent to which the contractor has mitigated any critical findings that have been discovered

- System ability to sustain mission capability and remain operationally resilient in a cyber-contested environment

Government developmental testing should also include prototype experimentation. Rather than simply demonstrating that a capability meets the need it was built to meet, experimentation should stress the technology to identify its full capabilities and limitations. In addition to evaluating the technical feasibility of a prototype, experimentation can also identify military utility and help in the development of preliminary CONOPS and tactics, techniques, and procedures for emerging technological capabilities.

The USD(R&E) will conduct DT&E Assessments for MTAs on the T&E Oversight List to support the Outcome Determination decision and any other key decision point(s) in the MTA effort, or as requested by the DA or PM. The assessment will address the adequacy of the program T&E planning, and the implications of T&E results to date.

3.1.3 Conduct Operational Test and Evaluation

The lead OTA will execute an ops demo at the culmination of the rapid prototyping phase to support the outcome determination. The purpose of an ops demo is to assess the technical maturity and interoperability of the system, as well as characterize a system's risk toward operational effectiveness, suitability, and survivability in a threat-realistic operational environment, as well as the system's capability and limitations.

The lead OTA will plan and conduct the ops demo with representative units, missions, and environments. Ops demos may consist of a series of incremental test events or a separate "capstone" demonstration event. Whenever possible, events should be conducted in an integrated fashion, supported by collaboration with the developer, Program Office, DT, and OT agencies and representative operational end users.

Ops demos should consider all aspects of system performance, including survivability and lethality, if deemed critical to mission effectiveness or force protection. During the ops demo, representative operational users should operate the system, with the minimum necessary level of contractor support. Mission demonstrations should consider operational missions, end-to end/system of systems mission kill chains and mission threads, and intended operating environments.

Operational T&E for an MTA Rapid Prototyping pathway program should ensure that systems function as intended, mitigating risks associated with known and exploitable vulnerabilities to provide a level of assurance commensurate with technology, program, system, and mission objectives.

For programs on the T&E Oversight List, the OTA must submit the ops demo plan to the DOT&E for approval before testing begins. For programs conducting multiple ops demos, DOT&E will tailor this approval process to minimize disruptions during early testing. Programs not on T&E oversight should follow guidance provided by their Service. Plans for ops demos should adequately describe system configuration, capabilities to be demonstrated, the operational units, users, mission, and environment, and the primary T&E data that will demonstrate the required capabilities.

The OTA supports the outcome determination and transition decision by reporting the findings of T&E activities, to include the system's operational capabilities and limitations. For programs on DOT&E oversight, the Director, Operational Test and Evaluation provides the Defense Acquisition Executive (DAE), the Secretary of Defense, the Service, the DA, and Congress with an independent report documenting the results of T&E activities, including capabilities and limitations of the system and its ability to provide a residual operational capability. For programs only on LFT&E oversight, the Director will submit a report at the conclusion of survivability or lethality testing.

3.1.4 Conduct Live Fire Test and Evaluation

Programs that intend to field rapid capabilities are not exempt from the requirements of 10 U.S.C. §§ 4172 to conduct "realistic survivability testing" or "realistic lethality testing" before proceeding to outcome determination. Early live fire testing of new technologies is critical to ensuring a timely evaluation of the survivability or lethality of a system as it progresses through design, prototyping, and fielding. In particular, LFT&E:

- Provides information to decision makers on potential user susceptibility to an attack, design vulnerabilities if engaged, and the effect of those vulnerabilities on user casualties, as well as residual mission capability post-engagement and recoverability from an attack
- For weapon systems or weaponized platforms, it provides information on lethality while taking into equal consideration the survivability of the weapon system as it is employed against its target
- Ensures testing of the system under realistic combat conditions

LFT&E occurs over the course of a rapid prototyping phase, beginning with component-level and sub-system and system-level testing during the initial design stage, warhead characterization of new threats, and M&S-based assessment. T&E continues as the system matures from assemblies to sub-systems, and finally to full-up, system-level (FUSL). During FUSL testing, the weapon system is powered and fully equipped for combat with all sub-systems operational. For programs that intend to transition into operational use, rapid fielding, or an existing program, a decision about whether to request a waiver from FUSL testing should be made before rapid prototyping to allow for submission of the waiver package to Congress. The statute states that any waiver must be approved prior to the start of prototype development, or as soon as is practicable after program initiation, depending on the specifics of the acquisition schedule for a given system. The waiver package sent to Congress consists of two parts: 1) certification that the waiver is needed (on the basis of both cost and practicality), and 2) an alternative LFT&E plan for evaluating survivability or lethality. These two parts require coordination between the acquisition executive and DOT&E. After test completion, DOT&E will produce an LFT&E Report, combined with the Operational Assessment Report. The OTA provides an independent report. For programs on DOT&E oversight, the OTA provides these reports to DOT&E. (DoDI, November 19, 2020 Section 6.4.c).

3.1.5 Informing the Outcome Determination and Transition Decision

For each MTA program, DoD Components will make a transition decision or outcome determination at the conclusion of the phase. The T&E WIPT and independent T&E organizations provide the information gained from DT&E, OT&E, and LFT&E to support the decision, which could include the following courses of action available:

- **Prototype is Discarded and Program is terminated.** The prototype built is the simplest and least expensive prototype possible that answers the required question and has no further utility.
- **Residual operational capability sustained in the field.** Prototypes will transition to operational use to address an existing critical warfighter capability gap.
- **Transition to Rapid Fielding Pathway.** The MTA pathway can authorize a rapid fielding pathway for prototypes that meet a high-priority warfighter need or reduces the lifecycle cost of a weapon system. Production using this pathway is expected to begin within six months and completed within five years.
- **Transition to new or existing Program in a different acquisition pathway.** Some prototyping projects are designed to develop new technology that will integrate into an MCA or an existing fielded Program of Record as a component or subcomponent of the larger system.

3.1.6 Deliver a Rapid Prototyping Report

At decision points identified in the T&E Strategy, a report will be provided to the DA on the current state of capabilities, system integration, operational effectiveness, suitability, survivability, and lethality (if required), and sustainment. The OTA is responsible for producing an independent evaluation report(s) identifying the system's operational capabilities and limitations. The DA will use the report(s) in determining if a rapid prototyping program transitions to a follow-on program. For programs on DOT&E oversight, the Director, Operational Test and Evaluation will provide independent operational assessment and LFT&E reports to the Office of the Secretary of Defense, Joint Staff, Military Services, and congressional defense committees.

3.2 Rapid Fielding

Key T&E activities in the Rapid Fielding pathway include:

- Generate the T&E Strategy
- Assist in including T&E needs in the RFP
- Conduct developmental T&E
- Conduct operational T&E
- Conduct LFT&E (if applicable)
- Deliver a Rapid Fielding Report
- Inform the outcome determination and the transition decision

3.2.1 Generate the T&E Strategy

In coordination with the PM, the T&E WIPT should develop and document the T&E Strategy before starting the MTA program. For program transitions from the rapid prototyping pathway, a new or updated T&E Strategy should be generated. For programs on the Rapid Fielding pathway, the T&E Strategy documents the data and resources necessary to demonstrate performance of the proposed products or technology for current operational purposes and how the capability contributes to mission accomplishment. The T&E Strategy should be complete enough to estimate and plan for the major resources required for adequate T&E in accordance with the requirements outlined in the requirements document. The T&E Strategy should document any risks conducting adequate T&E and describe how those risks will be mitigated. To the extent possible, the T&E Strategy should:

- Present an IDSK that links data requirements for DT&E, OT&E, LFT&E, to include cyber T&E to key program decisions
- Describe the evaluation focus areas and evaluation framework to meet DT&E, OT&E, and LFT&E, to include cyber T&E objectives
- Present an integrated program schedule that documents the test events
- Describe each test phase or event
- Identify key T&E resources and funding for those resources (e.g., target sets, ranges, threat emulators, threat M&S, intelligence mission data)
- If applicable, specify the baseline against which the new system will be judged and the resources allocated for the baseline testing
- Identify key responsible T&E stakeholders, to include stakeholders responsible for verification and validation of proposed digital tools

3.2.2 Conduct Developmental T&E

Rapid fielding efforts are intended for systems or upgrades with little to no development required. However, the government will need information on the extent to which the integrated system provides the required capabilities and can be sustained in operations. The program executes government DT&E to assess:

- System capabilities and limitations per system specifications
- System safety and survivability, if applicable
- System ability to integrate within the operational environment
- The extent to which the contractor has mitigated any critical findings
- System ability to sustain mission capability and remain operationally resilient in a cyber-contested environment
- Whether production processes have been refined and are acceptable

Government testers should leverage contractor-conducted DT&E to supplement government DT&E. Production Qualification Testing (PQT), First Article Testing (FAT), and Acceptance Testing (AT) are normally conducted either by Program Management Office personnel or by the contractor using government-approved test plans and under the oversight of government personnel resident at the contractor facility.

FAT evaluates how production processes and environmental stress affect system performance, and should be conducted expeditiously because the production line may continue to flow while results are analyzed.

AT ensures that each system from the production line functions properly, and is critical because it is the point where the government accepts ownership and responsibility of the system and may also be the date on which warranty coverage begins.

PQT could also be warranted where new or modified production processes or materials are used. PQT ensures the effectiveness of the manufacturing process, equipment, and procedures, and provides data for the independent evaluation required for materiel release so that the evaluator can address the adequacy of the materiel with respect to the stated requirements. These tests are conducted on a number of samples taken at random from the first production lot and is repeated if the process or design is changed significantly and when a second or alternative source is brought on-line.

3.2.3 Conduct Operational Test and Evaluation (OT&E)

Operational T&E for a rapid fielding pathway program should ensure that systems function as intended, mitigating risks associated with known and exploitable vulnerabilities. OT&E should provide a level of assurance commensurate with technology, program, system, and mission objectives for the rapid fielding pathway program. There are several options for operational testing of rapid fielding programs, which may include:

- **Initial Operational Test & Evaluation (IOT&E).** An IOT&E is appropriate for MTAs requiring a full-rate production decision.
- **Operational Assessment (OA).** An OA is appropriate for reducing program risk, demonstrating system performance, and identifying key potential user, interface, and operational usage issues to reduce risk of finding major issues during IOT&E.
- **Ops Demo.** An Ops Demo is appropriate for MTAs integrating into an existing program of record or for MTAs transitioning to a new or existing program in a different acquisition pathway.

Operational T&E activities may use production or production-representative test articles (depending on the type of OT&E and whether a full-rate production decision is planned) to assess the rapid fielding system's operational effectiveness, suitability, survivability, and lethality, if applicable. OT&E activities require more than an evaluation based exclusively on computer modeling, simulation, or an analysis of system requirements, engineering proposals, design specifications, or any other information contained in program documents. OT&E should feature end-to-end testing of system capabilities, including all interrelated systems needed to employ and support those capabilities. OT&E should include representative users or units employing the system under conditions simulating combat stress, and if applicable, peacetime operations. Individuals employed by the contractor for the system being developed should only participate in OT&E to the extent they are planned to be involved in the operation, maintenance, and other support of the system when deployed in combat. The OTA supports the outcome determination and transition decision by reporting the findings of T&E activities, to include the system's operational performance.

The lead OTA conducts operational T&E activities in accordance with a test plan approved by DOT&E for programs on DOT&E oversight.

3.2.4 Conduct Live Fire Test & Evaluation

Rapid fielding pathway programs are not exempt from 10 U.S.C. §§ 4172 and should conduct realistic survivability and lethality testing before proceeding to outcome determination. Realistic survivability testing means testing for the susceptibility, vulnerability, force protection, and recoverability of the system and its crew in a contested operational environment using adversary-representative threats fired against the production-representative system equipped with any available countermeasures. Realistic lethality testing means testing for lethality by engaging the production-representative weapon against adversary-representative targets configured for combat equipped with any associated countermeasures.

Early live fire testing of new technologies is critical to ensure a timely evaluation of the survivability or lethality of a system as it progresses through its lifecycle. In particular, LFT&E:

- Provides information to decision makers on potential user susceptibility to an attack, design vulnerabilities if engaged and the effect of those vulnerabilities on user casualties, as well as residual mission capability post engagement and recoverability from an attack
- For weapon systems or weaponized platforms, it provides information on lethality while taking into equal consideration the survivability of the weapon system as it travels to its target
- Ensures testing of the system under realistic combat conditions

LFT&E should occur over the course of a rapid fielding phase, beginning with component-level and sub-system and system-level testing during the initial design stage with warhead characterization of new threats and M&S based assessment. T&E continues as the system matures from assemblies to sub-systems, and finally to full-up, system-level (FUSL). During FUSL testing, the weapon system is powered and fully equipped for combat with all sub-systems operational.

Although there is no waiver from LFT&E, the law contains provisions for a waiver from the requirements for FUSL testing. The Secretary of Defense may waive the application of the required FUSL testing if the Secretary determines that such testing would be unreasonably expensive and impractical. The waiver package sent to Congress consists of two parts: 1) certification that the waiver is needed (on the basis of both cost and practicality), and 2) an alternative LFT&E plan for evaluating survivability or lethality. These two parts require coordination between the acquisition executive and DOT&E.

DOT&E approves LFT&E plans for select live fire test events, as identified in the T&E Strategy. The document approval matrix in the T&E Strategy specifies which planning documents will be submitted for DOT&E approval and which will be submitted for information and review only. The Service OTA or assigned test activity conducts LFT&E events, executing the planned events in accordance with the LFT&E Strategy and approved LFT&E Plan.

After test completion, DOT&E will produce an LFT&E Report, combined with the Operational Assessment Report. The OTA provides an independent report. For programs on DOT&E oversight, the OTA provides these reports to DOT&E. (DoDI 5000.89, November 19, 2020 Section 6.4.c).

3.2.5 Informing the Outcome Determination and Transition Decision

For each MTA program, the DA will make a transition decision or outcome determination at the conclusion of the effort. The information gained from DT&E, OT&E, and LFT&E supports those decisions. There are three distinct follow-on courses of action for programs:

- **Transition to Operations and Sustainment.** Programs will transition to operations and sustainment use to address an existing critical warfighter capability gap.
- **Integration into an Existing MCA.** Some programs are designed to integrate into an existing MCA as a component or subcomponent of the larger system.
- **Transition into a New or Existing Program of Record in a different acquisition pathway.** Some programs may initiate a new program using the MCA pathway and entering at Milestone C to produce a higher quantity of the production articles or integrate into an existing MCA as a component or subcomponent of the larger system.

MTA programs may not be planned to exceed five years to completion and, in execution, will not exceed five years after MTA program start without a DAE waiver.

3.2.6 Deliver a Rapid Fielding Report

At decision points identified in the T&E Strategy, a report will be provided to the DA on the current state of capabilities, system integration, operational effectiveness, suitability, survivability, and lethality (if required), and sustainment. The OTA is responsible for producing an independent evaluation report(s) identifying the system's operational capabilities and limitations. The DA will use the report(s) in determining if a rapid fielding program transitions to a follow-on program, or if it begins initial production. For DOT&E oversight programs, the Service OTA provides the report to DOT&E. For programs on DOT&E oversight, the Director, Operational Test and Evaluation will provide independent OT&E and/or LFT&E reports to the DA, Office of the Secretary of Defense, Joint Staff, Military Services, and congressional defense committees.