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AN ANALYSIS OF TEST AND EVALUATION IN RAPID ACQUISITION PROGRAMS

December 2015

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The last decade of conflict in Operation Enduring Freedom, Operation Iraqi Freedom, Operation New Dawn, and other contingency operations has brought about many technical advances for our Soldiers. In order to get new capabilities fielded quickly, the traditional Department of Defense acquisition cycle was modified to achieve rapid fieldlings. This paper examines how requirements are developed for programs of record (POR) and rapid acquisitions (RA), and then how test and evaluation (T&E) is administered to each. A materiel release is required for any equipment, regardless of how the requirement is generated. POR that are transitioned from RA still must go through the Joint Capabilities Integration Development System process, but the path may be shortened if the gains from the RI are capitalized upon. After examination of two POR that began as RA, we found clear examples of how to capitalize on the testing that occurred during the fielding of an RA. We recommend that all RA conduct T&E in a manner that provides usable data for decision makers and also to inform future POR. We further recommend that T&E be included during R&D phases of acquisition to reduce T&E burden in later phases of program.

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AN ANALYSIS OF TEST AND EVALUATION IN RAPID ACQUISITION PROGRAMS

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Submitted in partial fulfillment of the requirements for the degree of

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LIST OF ACRONYMS AND ABBREVIATIONS

AAE	Army Acquisition Executive
ABO	Army Budget Office
ACAT	Acquisition Category
ADM	Acquisition Decision Memorandum
AEC	U.S. Army Evaluation Center
AFMS	Army Force Management School
AMC	Army Materiel Command
AOA	Analysis of Alternatives
AOR	Area of Operation
APC	Acquisition Program Candidates
APG	Aberdeen Proving Ground
AR	Army Regulation
AR2B	Army Requirements & Resourcing Board
ARCIC	Army Capabilities Integration Center
AROC	Army Requirements Oversite Council
ASA (ALT)	Assistant Secretary of the Army for Acquisition, Logistics, and Technology
ASCC	Army Service Component Commander
AST	ATEC System Team
ATEC	Army Test and Evaluation Command
C&L	Capabilities and Limitations
CAE	Component Acquisition Executive
CBRN	Chemical, Biological, Radiological, and Nuclear
CBTDEV	Combat Developer
CCDR	Combatant Commander
CDD	Capabilities Development Document
CDRT	Capabilities Development for Rapid Transition
CECOM	Communication-Electronics Command
CG	Commanding General
CLR	Capabilities and Limitations Report
CLS	Contract Logistics Support
CMR	Conditional Materiel Release
COCOM	Combatant Command
COI	Critical Operational Issue
COTS	Commercial off the Shelf
CPD	Capabilities Production Document
CREW	Counter RCIED Electronic Warfare
CWA	Chemical Warfare Agents
DA PAM	Department of the Army Pamphlet
DAG	Defense Acquisition Guidebook

DAMO-CI	Department of the Army, Military Operations-Capability Integration
DAU	Defense Acquisition University
DOD	Department of Defense
DODI	Department of Defense Instruction
DOT&E	Director Operational Test and Evaluation
DOTMLPF-P	Doctrine Organization Training Materiel Leadership Personnel Facilities-Policy
DR	Directed Requirement
DR SKO	Dismounted Reconnaissance Sets, Kits, and Outfits
DT	Developmental Testing
DT&E	Development Test and Evaluation
DTC	Developmental Test Command
E3	Electromagnetic Environmental Effects
ECM	Electronic Counter Measure
ECOP	Equipment Common Operating Picture
EDT	Engineering Developmental Testing
EMC	Electromagnetic Compatibility
EMD	Engineering and Manufacturing Development
EMI	Electromagnetic Interference
ESD	Equipment Sourcing Document
FAT	First Article Test
FMR	Full Materiel Release
FOA	Forward Operational Assessment
FRP	Full Rate Production
G3	Directorate of Plans, Training, Mobilization & Security; HQDA
G3/5/7	Operations, Plans, and Training; HQDA
G8	Force Structure, Resources, and Assessment; HQDA
GOTS	Government off the Shelf
HHA	Health Hazard Assessment
HQDA	Headquarters Department of the Army
ICD	Initial Capabilities Document
IED	Improvised Explosive Device
IMS	Integrated Master Schedule
IOC	Initial Operational Capability
IPT	Integrated Product Team
IT	Information Technology
J8	Joint Force Structure, Resources, and Assessment Directorate
JCIDS	Joint Capabilities Integration Development System
JIEDDO	Joint IED Defeat Organization

JNBCRS	Joint Nuclear Biological Chemical Radiological System
JPEO	Joint Program Executive Officer
JPEO CBD	Joint Program Executive Officer, Chemical and Biological Defense
JPM NBC CA	Joint Project Manager for Nuclear, Biological, and Chemical Contamination and Avoidance
JRAC	Joint Rapid Acquisition Cell
JUONS	Joint Urgent Operational Needs Statements
KPP	Key Performance Parameter
KSA	Key System Attribute
LCMC	Life Cycle Management Command
LFT&E	Live Fire Test and Evaluation
LMD	Logistics Maintainability Demonstration
L/M Demo	Logistics/Maintenance Demonstration
LRIP	Low Rate Initial Production
LUT	Limited User Test
M&S	Modeling and Simulation
MANPRINT	Manpower and Personnel Integration
MDA	Milestone Decision Authority
MDAP	Major Defense Acquisition Program
MIL-STD	Military Standard
MOE	Measure of Effectiveness
MOP	Measure of Performance
MOT	Multi-service Operational Testing
MR	Materiel Release
MSA	Materiel Solution Analysis
MS-B	Milestone B
MS-C	Milestone C
NS-E	Non-Standard Equipment
NSS	National Security Systems
O-6	Army officer rank, Colonel
OA	Operational Assessment
OCO	Overseas Contingency Operations
OEF	Operation Enduring Freedom
OEM	Original Equipment Manufacturer
OER	OTA Evaluation Report
OER-A	Abbreviated Operational Evaluation Report
OIF	Operation Iraqi Freedom
OMAR	OTA Milestone Assessment Report
OMS/MP	Operational Mode Summary/Mission Profile
OND	Operation New Dawn

ONS	Operational Needs Statements
OSD	Office of Secretary of Defense
OT	Operational Testing
OT&E	Operational Test and Evaluation
OTA	Operational Test Agency
OTC	Operational Test Command
PBS	Performance-based Specification
PDE	Protection and Detection Equipment
PEO	Program Executive Office
PM	Program Manager
POM	Program Objective Memorandum
POR	Program of Record
PQT	Production Qualification Testing
R&D	Research and Development
RA	Rapid Acquisition
RAM	Reliability, Availability and Maintainability
RCIED	Remote Controlled Improvised Explosive Devise
RF	Radio Frequency
RTP	Reliability Test Plan
SAR	Safety Assessment Report
SEP	Systems Engineering Plan
SFQT	Software Functional Qualification Test
SIPRNet	Secure Internet Protocol Router Network
T&E	Test and Evaluation
TC	Type Classification
TDS	Technology Development Strategy
TEMP	Test and Evaluation Master Plan
TES	Test and Evaluation Strategy
TIC	Toxic Industrial Chemicals
TIM	Toxic Industrial Materials
TMR	Training Materiel Release
TRADOC	Training Doctrine Command
TRL	Technology Readiness Level
TTP	Techniques, Tactics, and Procedures
UMR	Urgent Materiel Release
USAREUR	United States Army Europe
USARPAC	United States Army Pacific
USMC	United States Marine Corps
USN	United States Navy
VCSA	Vice Chief of Staff of the Army

WIPT	Working-level Integrated Product Team
WMD	Weapon of Mass Destruction
YPG	Yuma Proving Ground

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I. BACKGROUND

A. RESEARCH INTRODUCTION

This chapter will provide an overview of the research topic starting with a background on how the Department of Defense (DOD) and, more specifically, how the Army provides materiel solutions for their Soldiers. According to the Office of the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA [ALT]),

> the Mission of the Army Acquisition professional field is to provide our Soldiers a decisive advantage in any mission by maintaining quality acquisition professionals to develop, acquire, field, and sustain the world's best equipment and services through efficient leveraging of technologies and capabilities to meet current and future Army needs. The reason for this is to generate and prepare the best equipped Army that maintains the technological advantage and capabilities against any threat in any environment. (Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA [ALT], n.d., p. 1)

The Army Acquisition process will be examined in this paper in two ways: through the lens of the traditional acquisition process utilizing the Joint Capabilities Integration Development System (JCIDS) and through the vantage point of rapid equipping through joint urgent operational needs statements (JUONS) and Operational Needs Statements (ONS). In addition, the Capabilities Development for Rapid Transition (CDRT) process will be examined to understand better how the Army transitions Rapid Acquisition (RA) programs to enduring Programs of Records (POR). We will also address the Army Materiel Release process that includes several different mechanisms such as Full Materiel Release (FMR) and the Urgent Materiel Release (UMR).

After describing the acquisition avenues available to the Army the purpose, importance, and criticality of Test and Evaluation (T&E) activities will be explored. This background information will establish a relevant baseline that can be used throughout our research to identify potential risk and or short comings associated with RA as they move to enduring capabilities. We used two specific research questions to analyze the data and apply it to our problem statement:

1. Did the abbreviated T&E requirements in an RA environment dilute the important role of the "honest broker" that a T&E team should play in an acquisition program?

2. What are the long-term effects on programs from the manner that T&E is conducted to meet RI timelines?

This report will address our thesis topic concerning T&E in an RA environment. Our research protocols and research rational will also be provided. The following sections provide background acquisition information for requirements generation, the role of T&E, and the NS-E transition process.

1. Requirements Generation

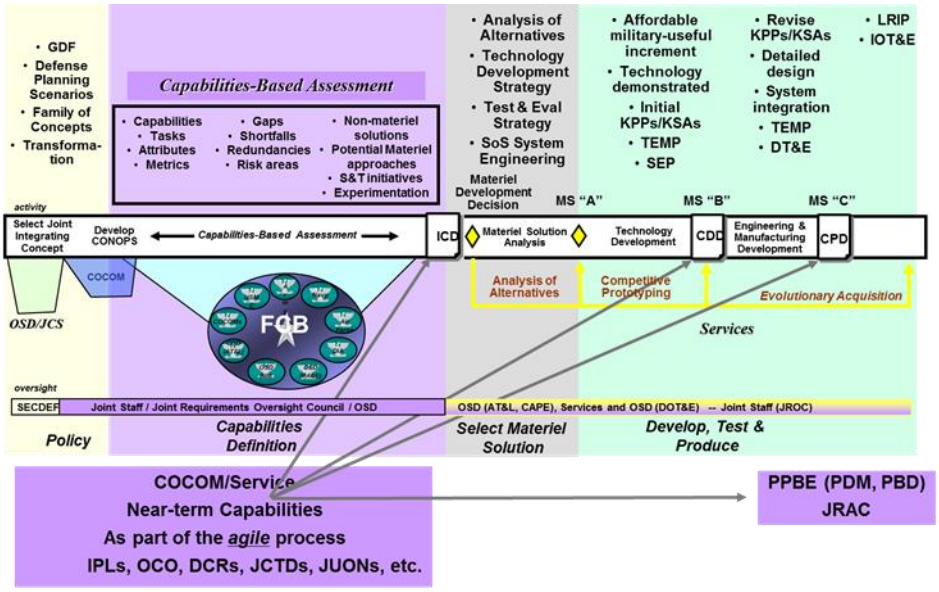
The DOD is dependent on equipment and technology. As technology develops faster the DOD has developed a system to determine which technology is used. The JCIDS process is used to assist the DOD in requirements generation.

> JCIDS is a need driven joint capabilities-based requirements generation process. The objective is to develop a balanced and synchronized Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, and Policy (DOTMLPF-P) solution approach that is affordable, militarily useful, supportable by outside agencies, and based on mature technology that is demonstrated in a relevant operational or laboratory environment. (Army Force Management School, 2013, p. 6)

The JCIDS process uses a deliberate, structured, and thorough process to generate requirements (illustrated in the first portion of Figure 1, leading to the full acquisition process) and can be viewed as the kickoff of a new Army acquisition program. Several years may be spent on up front analysis to ensure DOTMLPF-P considerations are adequately addressed and appropriate steps are taken during T&E planning and execution.

JUONS are created by Combatant Commanders (CCDR) in order to identify a multi-service capability shortfall for a force preparing to deploy or those currently deployed. This process is not designed to circumvent the JCIDS process but used in a limited manner to provide a rapid capability for a very specific purpose. Field Commanders identify capability gaps and forward those gaps to the CCDR's staff.

Figure 1. JCIDS Process Overview



From R. James, personal communication, January 9, 2015.

The staff then determines whether the requirement meets the threshold of a JUONS. If all the requirements for a JUONS are met, the CCDR submits the JUONS formally to the Joint Staff for action. The Joint Force Structure, Resources, and Assessment Directorate (Joint Staff J8) either validates or rejects the JUONS. If validated, the JUONS is sent to the Joint Rapid Acquisition Cell (JRAC) for resourcing and action. The JRAC assigns the action to an organization to fulfill the need and sustain it for up to 24 months following fielding.

The Army ONS process is used when operational commanders, in the grade of O6 and higher, identify a capability gap. The commander's unit must be deployed, preparing to deploy or a part of a high priority unit. The unit produces an ONS and begins the process by submitting it through the Equipment Common Operating Picture (ECOP) system. The request then moves through the approval process. If the unit is deployed, the request is routed through deployed unit's chain of command to the Army Service Component Commander (ASCC).

Non-deployed units submit requests through the major command to which they are assigned. Once the ONS is approved by the respective ASCC, it moves on to

Headquarters Department of the Army (HQDA) Deputy Chief of Staff for Operations (G3) for validation. If validated, the ONS moves to HQDA Deputy Chief of Staff for Resource Management (G8) for resourcing. Resourcing is the process of providing budget authority to a PM for execution. If resourcing is available, the validated request is forwarded with funding to the acquisition community for action. A program manager is assigned the requirement and allocated resources to carry out with an acquisition plan.

2. Role of Test and Evaluation

Test and Evaluation plays a key role in acquisition programs. "Testing is the process of obtaining, verifying, or providing data to determine whether an item meets or fails to meet defined objectives. Evaluation is the analysis of data to assess progress of design, performance, supportability, or other required attributes" (W. Chadwick, personal communication, January 16, 2014). The *Defense Acquisition Guidebook* (DAG) states that

> a rigorous and efficient T&E program provides early knowledge of developmental and operational issues. Correcting these issues early enough can mitigate risks of cost overruns and schedule slippages, and can ultimately contribute to delivery of effective and suitable weapons, Information Technology (IT) and National Security Systems (NSS) to the Warfighters in a timely manner. (Defense Acquisition University, 2015a, p. 773)

The Army Test and Evaluation Command (ATEC) strives "to be a team of highly skilled test and evaluation professionals focused on informing equipping decisions for today's and tomorrow's warfighter" (ATEC, n.d.). Army policy assigns ATEC as the responsible organization for Operational Utility Assessments.

Under an RA environment with an abbreviated fielding schedule, the systems engineers, test leads, the product managers, and the entire Integrated Product Team (IPT) needs to ensure that reduced T&E events still provide the appropriate level of data, analysis, and technical confidence that the product satisfies user needs.

3. Materiel Release

The Army uses the materiel release process to ensure that equipment is safe, suitable, and logistically supportable. Army Regulation (AR) 700–142 (*Type Classification, Materiel Release, Fielding, and Transfer*) establishes policy and prescribes procedures for the Army's Type Classification (TC), Materiel Release (MR), material fielding, and material transfer processes.

There are four types of materiel release: Full Materiel Release (FMR), Conditional Materiel Release (CMR), Urgent Materiel Release (UMR), and training materiel release (TMR). The definitions and requirements for each are found in the Appendix.

A FMR allows Program Managers (PM) to field non-developmental items or commercial items to soldiers. In a developmental effort, an FMR allows the PM to move on to a Full Rate Production (FRP) decision. The three main characteristics being evaluated are safety and hazards, suitability, and supportability. There are 32 overall activities that can be evaluated. While each of the 32 activities or documents require some level of testing or analysis, T&E plays the largest role in the evaluation of activities 17 (ATEC MR position memorandum) and 18 (ATEC OTA Milestone Assessment Report (OMAR) or OTA Evaluation Report (OER)). ATEC is responsible for carrying out T&E efforts according to the Test & Evaluation Master Plan (TEMP) in order to show how the system meets the established requirements identified in the capabilities documents. When the PM can demonstrate through T&E that the requirements for an FMR are met, the MDA will grant the FMR.

A CMR is used for various reasons when the conditions for a FMR cannot be met. A CMR is appropriate when FRP is not a required part of the program. When the Army Acquisition Executive (AAE) allows the program to proceed on to FRP with only a CMR, a PM is prepared to execute Low Rate Initial Production (LRIP) and will meet all the requirements of the FMR prior to FRP. If an upgrade is scheduled post FRP that will meet the all requirements.

A UMR is used in very specific situations in which the Army requires a capability to be fielded rapidly to a unit that has an operational need and is deployed or preparing to

deploy for an approved contingency. An UMR is generated in response to an ONS or a Department of the Army Deputy Chief of Staff for Operations, Plans and Training (HQDA G3/5/7) Directed Requirement. HQDA G3/5/7 is the Army lead for determining what capabilities the Army is required to have. HQDA G3/5/7 is located in the Pentagon and led by a Lieutenant General. An UMR is limited to the specific quantity, location, and application as laid out by the approved requirement. The Commanding General (CG) of the gaining organization will retain all equipment until operational contingency requirements are met. The main focus of UMR documentation requirements is to ensure the safety of the users, validate the requirements (e.g., a JUONS or HQDA directed requirement), and document and notify the CG (or other requestor) of all known equipment, supportability, and sustainment issues with the CG's acceptance statement. Since the UMR is for a specific capability demonstrated in some capacity for a specific location, many of the documentation and activities associated with a FRP decision are not required here. For example, a completed TEMP (and associated activities) is not a prerequisite for a successful UMR.

A TMR is used by a PM when materiel solutions are to be used by the Army Training and Doctrine Command (TRADOC) to develop periods of instructions and curriculum. Items released under a TMR may be a prototype, or produced in a manner different from normal production or may have not met the requirements for a FMR.

4. Non-Standard Equipment Transition Process

The Army has transitioned rapidly developed capabilities into enduring requirements once proven valuable in operational theaters. Using Army Directive 2010–07 to identify which valuable capabilities to maintain and integrate into the Army capability baseline, the HQDA G3/5/7 DAMO-CI and TRADOC developed the Capabilities Development for Rapid Transition (CDRT) process (Army Training and Doctrine Command [TRADOC], 2012, p. 1).

The purpose of the Army CDRT process is to identify valuable capabilities that have been developed to meet emerging challenges. "The process identifies, through operational Army unit input, systems working well in operational theaters and speeds the

process to get them into the hands of Soldiers throughout the Army for the long term, and reduces expenditures by terminating sustainment funding of systems no longer required" (TRADOC, 2012, p. 2). The HQDA G3/5/7 DAMO-CI and TRADOC, quarterly identify the best nominated non-standard materiel and non-materiel insertions the Army should incorporate throughout the force: "The goal is to significantly reduce the time needed to field selected systems or capabilities to the operational Army" (TRADOC, 2012, p. 1). Tactical NS-E transitioning to Acquisition Program Candidates (APCs) will be sustained in theater using Overseas Contingency Operations (OCO) funding until approved JCIDS documentation and Program Objective Memorandum (POM) funding is in place (TRADOC, 2012, p. 1).

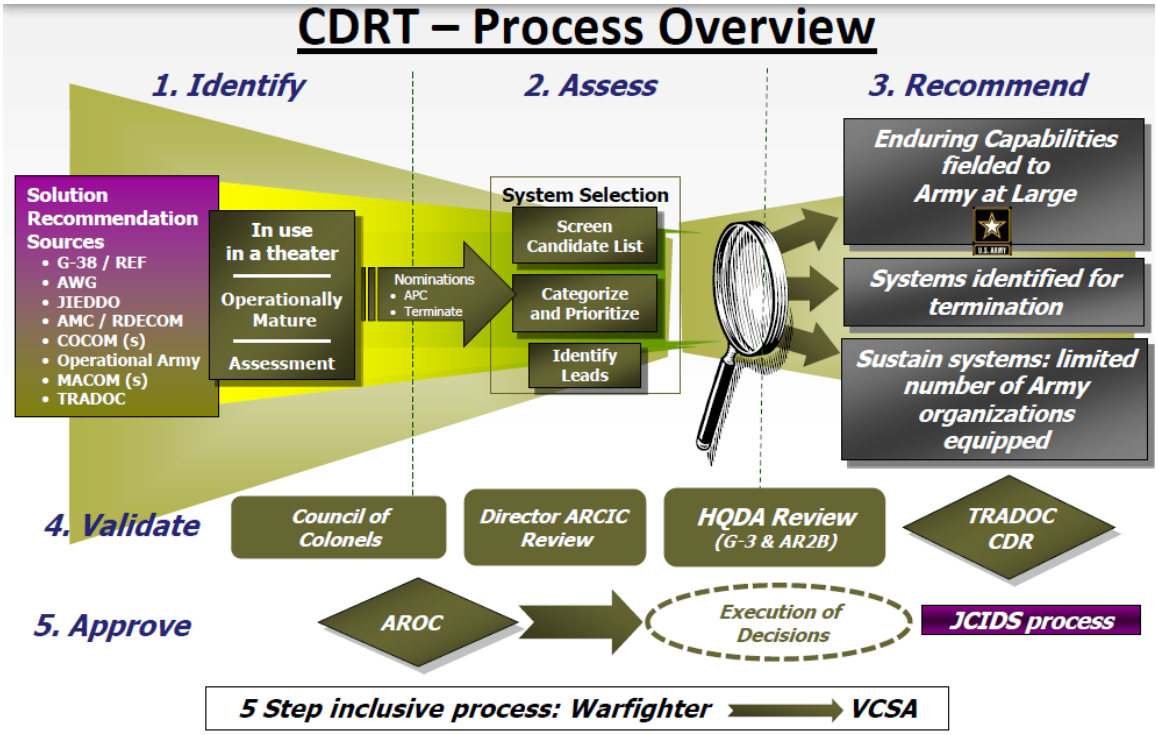
The CDRT process was developed to bring programs and systems developed and fielded quickly under a steadier funding profile for long-term sustainment. Gaps that were not addressed during the initial development and fielding would be addressed once the system secured POM funding.

A capability considered under CDRT can go in one of three directions: selection as APC, sustainment of the capability, or terminate the capability. A capability selected as an APC has shown to fill a current operational need, is theater-proven, and is applicable to the entire Army and future force structures. The program is intended to enter the JCIDS process at Milestone B (MS-B) or Milestone C (MS-C), or merge into existing programs. The program will begin to submit for program funding in the POM but sustain current funding with a bridge resourcing strategy through OCO funding (R. Mason, personal communication, unpublished PowerPoint, December 14, 2012). A capability selected as 'sustain' fills current theater operational need but without broader, enduring applications to the entire Army or future force structure. It is recognized as equipment for specific theater use only and will be sustained for that theater (R. Mason, personal communication, unpublished PowerPoint, December 14, 2012). A capability selected for termination does not fulfill its intended function or performs unacceptably. The rationale can include obsolescence, better alternatives, or an already active replacement activity. The capability can be sustained in theater only if retained and

funded by a specific unit (R. Mason, personal communication, unpublished PowerPoint, December 14, 2012).

Figure 2 outlines the process a capability must be validated through in order to be considered an APC and enter into the JCIDS process. To be eligible for CDRT, a capability is required to be operationally mature, in theater for a minimum of 120 days, and have a completed a Forward Operational Assessment (FOA). A FOA is conducted by ATEC, in the theater of operations where RA are deployed to determine the suitability of the capability. The capability can be nominated for consideration by various sources or organizations. The candidate list is then assessed and prioritized with lead capabilities identified (R. Mason, personal communication, unpublished PowerPoint, December 14, 2012).

Figure 2. RA to POR Process Flow



From R. Mason, personal communication, unpublished PowerPoint, December 14, 2012.

Then the capabilities are recommended for termination, sustain, or APC status The decision is validated through and reviewed by a Council of Colonels, the Director of the Army Capabilities Integration Center (ARCIC), HQDA, and TRADOC to ensure the

capability meets DOTMLPF-P considerations for current and future Warfighter needs. Finally, the Army Requirements Oversight Council (AROC) approves or disapproves the recommendations. The approved capabilities move into the JCIDS process (with HQDA processing the documentation), bypassing the traditional capabilities based analysis phase with either a Capability Production Document (CPD) or Capability Development Document (CDD) (TRADOC, 2012, p. 1).

Once the AROC approves the CDRT recommendations, HQDA (through TRADOC headquarters) tasks a TRADOC center or other combat developers to produce the required JCIDS documentation. HQDA is critical in ensuring funding is aligned with required capabilities across the POM. A system is considered an acquisition program once it has an approved CPD, a MS-C decision, and funding in the base budget. Capabilities transitioning to APCs will be sustained in theater using OCO funding until approved JCIDS documentation and POM funding is in place (TRADOC, 2012, p. 1).

As of 2012, twelve iterations of the CDRT process have been conducted with the thirteenth being processed. Through Iteration 13, the CDRT process has considered 419 materiel systems and 13 non-materiel capabilities (some more than once). The AROC has approved 32 systems for acquisition program status and ten non-materiel capabilities as enduring (TRADOC, 2012, p. 2).

A similar process to CDRT was named the Non-Standard Equipment (NS-E) Army Requirements Oversight Council (AROC) process. While CDRT focused on identifying systems as candidates to transition into the JCIDS process with a desired end state as a POR, the NS-E AROC process focused on identifying continued funds to maintain a capability portfolio (but not necessarily as a POR). The review takes into consideration the costs to retain a system, how the system fits into the Army equipping strategy, the cost to buy new (either exact or a very similar capability), and best of breed considerations (R. Mason, personal communication, unpublished PowerPoint, December 14, 2012). NS-E AROC recommendations have four options (Retain, Invest, Maintain, or Divest) and implementation in a HQDA Memorandum approved by the Vice Chief of Staff of the Army (VCSA). Retained systems are identified with known quantities and will have a resourcing requirement established for the POM. An Invest recommendation

allows for further development of the capability (in the form of further RDT&E or science and technology (S&T) work) without retaining the equipment itself. The capability could also be transferred to another program of record. If a Maintain recommendation is given, the Army retains the equipment for operations but will then divest of it once available current funding ends, the equipment is no longer needed for operations, or there is a cessation of hostilities. A Divest recommendation means that equipment must be removed from the inventory even for the current fight (R. Mason, personal communication, unpublished PowerPoint, December 14, 2012).

5. Summary

This section provided a background on how the DOD addresses requirements using the JCIDS process, how the DOD and the Army addresses urgent requirements using JUONS and ONS, and why the Army conducts T&E, and finally how the Army achieves a MR for new materiel solutions. It is the responsibility of the generating force to ensure the operating force is equipped in a safe, suitable and effective manner. The acquisition community uses the JCIDS, JUONS/ONS, and the MR process to guide the development of materiel solutions. In some cases these processes overlap and in other cases large gaps exists that can create risk for Warfighters. This project will analyze how the operating force is equipped using each process as the capability moves from a rapid to an enduring requirement.

B. PROBLEM STATEMENT

The Department of Defense (and more specifically the Army) has compressed the acquisition process in order to field capability faster to units deployed in conflict. This compression has reduced the amount of T&E that is conducted up front and may not be fully addressed in future POR.

Thirteen years of combat operations, numerous other contingency, humanitarian aid, and civil support operations has generated the need for capability to be delivered faster than the normal acquisition process can accommodate. While the JCIDS process was developed to produce materiel solutions for the services, based on known capability gaps, it is a very deliberate process that requires a significant investment in time and

resources that may not be available. The services have developed processes to deliver capabilities faster than the traditional acquisition process. This has created potential gaps and risks associated with delivering rapid capabilities due to the unforeseen length of a system life cycle that may not have been taken into account during initial T&E activities. Requirements for RA often are not written with enough fidelity to inform the T&E community.

C. RESEARCH OBJECTIVES

The objective of this research is to determine the differences in T&E between RA and POR. Additional attention will be given to the tradeoffs specific programs, such as the Counter Radio Controlled Improvised Explosive Device (RCIED) Electronic Warfare (CREW) and the Dismounted Reconnaissance Sets Kits and Outfits (DR SKO), made in terms of cost, performance, and schedule.

D. THESIS STATEMENT

This study will explore the effect that the RA environment has had on the Army acquisition process during the recent conflicts in Iraq (Operation Iraqi Freedom and Operation New Dawn) and in Afghanistan (Operation Enduring Freedom). In order to achieve extremely quick fielding timelines, the Army often utilized the UMR fielding process, which reduces the amount of required T&E events. The analysis is designed to assess the benefits or drawbacks of using the UMR process (with limited T&E activities) for Army acquisition programs. Recommendations will be made for PMs that field RA on how to best capitalize on previous T&E activity that can be used as the RA transitions to a POR while still realizing rapidly fielding equipment.

E. RESEARCH QUESTIONS

The following research questions were used to guide our data gathering and associated analysis.

Research Question 1: Did the abbreviated T&E requirements in a RA environment dilute the important role of the "honest broker" that a T&E team should play in an acquisition program?

Research Question 2: What are the long-term effects on programs from the manner that T&E is conducted to meet RA timelines?

F. PURPOSE/BENEFIT

While RA programs were able to address urgent needs quickly during asymmetric warfare, they may end up being victims of their own success. This study will produce "lessons learned" from abbreviated T&E activities. Program Offices can use this information to mitigate risk in future research efforts or rapid fielding initiatives. Army organizations can also benefit by implementing small changes to their development methodologies that will improve the long-term posture and sustainability of new capabilities.

G. REPORT ORGANIZATION

The remainder of this report is organized as follows: Chapter II will focus on detailed literary examination of each research question. Chapter III explores the foundational and program specific data related to the research. Chapter IV will present our findings with our analytical approach and resultant findings. Chapter V will close with our conclusions and recommendations. There are three appendices with backup information.

II. LITERATURE REVIEW

A. FOUNDATIONAL BACKGROUND LITERATURE

Research for this project began with an intense review of relevant literature. In order to form a complete understanding of how the DOD fills capability gaps and confirms solutions, information was gathered from a variety of sources that included DOD Instructions, Defense guidebooks, Army regulations, Army posture statements, and pamphlets.

Any research involving acquisition requires the study and understanding of both Department of Defense Instruction (DODI) 5000.1 and DODI 5000.2. DODI 5000.1 lays out the overarching policy that all DOD organizations must follow in order to manage acquisition programs. It explains what the Defense Acquisition System should do in order to provide capabilities required by the National Security Strategy. DODI 5000.2 takes this guidance and provides the framework for how PM's use the Defense Acquisition System to manage programs and provide necessary capabilities to the warfighter.

There were two guidebooks that required study: *The Defense Acquisition Guidebook* and *The Test and Evaluation Management Guide*.

By design, *The Defense Acquisition Guidebook* (DAG) supports both DODI 5000.1 and 5000.2. It is commonly referred to as a desk reference for the acquisition workforce. The majority of the research for this document came from DAG Chapter 9, "Test and Evaluation." This chapter documents the key ingredients necessary to build a T&E program that is effective and meets the requirements of DODI 5000.2. Chapter 4 was also used in order to reference the Systems Engineering process (Department of Defense, 2015).

The *Test and Evaluation Management Guide* is another desk reference that supports the Defense Acquisition University (DAU) efforts to educate the Acquisition Workforce. It is used to facilitate T&E course work, and in the field, to provide a better understanding of the T&E process. While the guidebook covered all aspects of T&E, our researched delved into Chapters 5, 6, and 10. These chapters focused on the T&E

process, Development Test and Evaluation (DT&E), and Operational Test and Evaluation (OT&E) respectively (Defense Acquisition University, 2015a).

There were three distinct Army Regulations (AR) that were studied as part of this research effort: AR 700–142, AR 71–9 and AR 385–10.

AR 700–142 (*Type Classification, Materiel Release, Fielding, and Transfer*) identifies the policies and procedures for the acceptance of materiel solutions by the Army. This regulation is the safeguard that ensures materiel solutions are ready for each stage of the acquisition process. Chapter 4 "Materiel Release" covers the required actions a PM must complete in order to receive a MR from the Milestone Decision Authority (Department of the Army, 2008).

AR 71–9 *Warfighting Capabilities Determination*, establishes how the Army implements the JCIDS process. Chapter 3 specifically lays out the responsibility of the AROC and how requirements are generated by the Army (Department of the Army, 2009d). To further explore how RA capabilities become enduring capabilities, the NS-E and CDRT processes were explored as well.

A key piece to any materiel solution is the safety aspect of the system. AR 385–10, *The Army Safety Program*, is the cornerstone document for safety in the Army (Department of the Army, 2013b). This regulation is key to the management of safety risks that are identified for Army programs as well as any applicable civilian statutory requirements. Additional research to support AR 385–10 was conducted using Department of the Army Pamphlet (DA PAM) 385–16, *System Safety Management Guide* (Department of the Army, 2013a). This document is extremely important to Program Executive Offices (PEO) and PMs because it shows how the acquisition community should manage safety programs. In particular, Chapter 4 "System Safety for Testers and Evaluators" lays out the methodology for PM's and testers to uncover safety problems in order to manage or eliminate them.

Probably the single most important document researched for this project was ATEC Regulation 73–1 (*System Test and Evaluation Policy*). This documents how ATEC supports the acquisition process through T&E activities. More importantly, it provides

valuable insight into how the test community thinks and the rationale behind their decisions. Much of the information found in this PAM cannot be found elsewhere in literature (Army Test and Evaluation Command, 2013).

Additionally, the 2012 TRADOC Army Posture Statement on CDRT and Army Directive 2010–07 were referenced to understand the processes available for a RA to transition to a POR.

B. PROGRAM DATA LITERATURE

Once our basic research was complete, we decided to examine real world examples that moved from a JUONS/ONS to a POR. For this research, we focused on the Dismounted Reconnaissance Sets Kits and Outfits (DR SKO) and the Counter Remote Control Improvised Explosive Device Electronic Warfare (CREW) POR.

The first set of documents reviewed was the TEMP. The TEMP lays out what will be tested and how testing will occur across the life cycle of the program. It includes all required tests in order for the PM to meet the goals established in the Acquisition Strategy. The TEMP is required and approved at the MS-B (Defense Acquisition University, 2015b).

The second set of documents reviewed was the Systems Engineering Plan (SEP). The SEP much like the TEMP is approved at MS-B and is a key document to the execution of a program. The SEP details how the technical aspects of a program will be executed. The SEP is used as a reference that is continually updated throughout the product life cycle, making adjustments along the way (Defense Acquisition University, 2015b).

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III. DATA

A. FOUNDATIONAL DATA

The data presented in this section provides the reader with the required working knowledge to understand the T&E requirements and activities within POR and RA.

1. T&E Requirements for POR

To establish a control measure for our research, the following question was posed: What Test and Evaluation activity is required for Army Programs of Records (POR)?

During our research, we examined the Defense Acquisition Framework, DODI 5000.1, DODI 5000.2, the *Defense Acquisition Guidebook* (DAG), and ATEC Regulation 73–1.

T&E is defined by *Test and Evaluation Management Guide* as "the process by which a system or components are tested and results analyzed to provide performance related information" (Defense Acquisition University, 2015b). The information gathered during T&E is used to determine the operational effectiveness, suitability, and survivability of systems for their intended use. DAU also defines the terms operational effectiveness, suitability, and survivability.

> **Operational Effectiveness (OE):** Measure of the overall ability of a system to accomplish a mission when used by representative personnel in the environment planned or expected for operational employment of the system considering organization, doctrine, tactics, supportability, survivability, vulnerability, and threat. (Defense Acquisition University, 2015a)
>
> **Survivability:** The capability of a system or its crew to avoid or withstand a manmade hostile environment without suffering an abortive impairment of its ability to accomplish its designated mission. (Defense Acquisition University, 2012)
>
> **Operational Suitability (OS):** The degree to which a system can be satisfactorily placed in field use with consideration to reliability, availability, compatibility, transportability, interoperability, wartime usage rates, maintainability, safety, human factors, habitability, manpower supportability, logistics supportability, documentation,

> environmental effects and training requirements. (Department of Defense, 2012)

One of the first things a new program must establish is a Test and Evaluation Strategy (TES). The TES (and in some cases, the TEMP) is developed during the Materiel Solution Analysis (MSA) Phase to describe how T&E will be used throughout the execution of program. The TES is written in accordance with the Technology Development Strategy (TDS) and the requirements laid out in the Initial Capabilities Document (ICD). The TES identifies what test events and resources are required during the TDS phase.

The TES is composed of four major sections. Section 1 identifies the purpose of the program (i.e., why and what the PM is building) the Materiel Solutions key capabilities and interfaces, and any special test requirements the program will require. Section 2 of the TES provides the roles and responsibilities of stakeholders both inside and outside the program office. The TES lays out how data is collected and disseminated during DT and provides an integrated test schedule. Section 3 of the TES contains the overall evaluation approaches for both DT and OT. As a part of this process, the Technology Readiness Levels (TRLs) and prototype testing requirements are identified. This section also identifies how and when Modeling and Simulation (M&S) will occur. The final portion of this section identifies the test limitations and required future test events. Section 4 describes the resources required for testing. It identifies test articles, instruments, test sites, test targets, Operational Force Test Support, M&S test beds and most importantly, test funding requirements (Defense Acquisition University, 2015b).

Once the TES is complete, the PM submits the document for approval to the Component Acquisition Executive (CAE). If the system is on the OSD T&E oversight list, the PM submits the TES through the CAE to Office of the Secretary of Defense (OSD) T&E for approval. As the program moves toward Milestone B (MS-B), the TES evolves into the TEMP (Defense Acquisition University, 2015b).

A TEMP is required for all Acquisition Category (ACAT) I, ACAT IA, II and III programs and any under OSD T&E oversight. The TEMP must do five things:

- Integrate T&E with the overall Acquisition Strategy

- Reflect the user's requirements and describe how these capability needs will be tested in DT and OT
- Document the T&E program for the entire life cycle.
- Specify personnel, funding, and test range support requirements
- Be developed prior to MS-B and updates before each subsequent Program Decision Review (Test and Evaluation Master Plan, n.d.).

Development of the TEMP is the responsibility of the PM and the Working-level Integrated Product Team (WIPT), both of which will sign the TEMP. The TEMP should account for the use of evolutionary acquisition that will not only reduce risk but reduce the burden on T&E. The cost and the time required to conduct T&E should be addressed in the acquisition strategy and in the TEMP. Accordingly, the TEMP must also discuss:

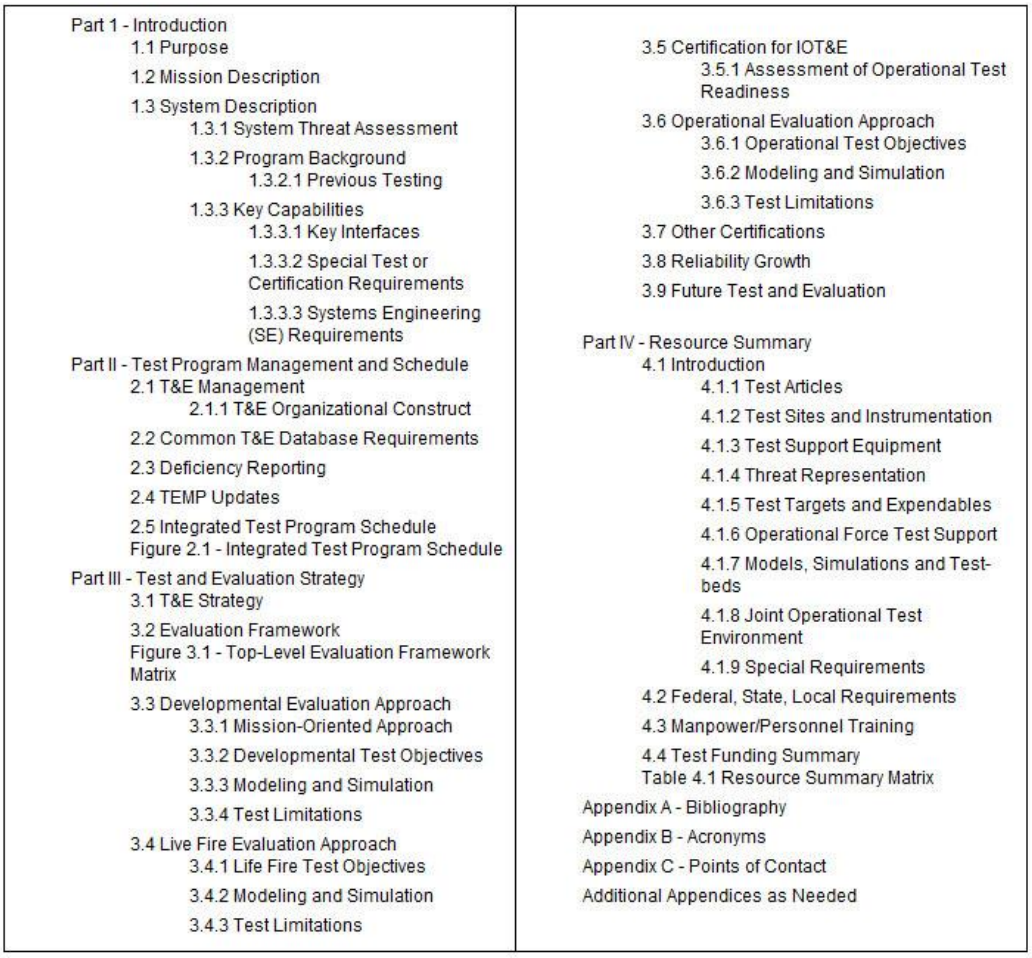
- The health hazards and safety issues with the system
- Support detailed test planning
- Provide the overall structure and path forward for all future testing, M&S, schedules and resources needed to meet the requirements contained within published requirements documents.

Figure 3 provides a sample TEMP table of contents from the Test and Evaluation Management Guide in order to show the extensive information included in the document (Defense Acquisition University, 2015b).

There are three types of T&E activities required by regulations to field all POR: DT&E, OT&E, and Live Fire Test and Evaluation (LFT&E). The TEMP will guide each of these activities and clearly lay out how the PM intends to prove that the system is safe, suitable, and effective.

As with the TES, the TEMP is submitted for approval to the CAE and on to OSD T&E as required by the program's level of oversight. The TEMP is tailored to each requirement and the staffing approval process is different based on the ACAT level. The TEMP is a representation of all T&E activities that bring together various stakeholders. For this reason, staffing the TEMP can be the most difficult and time consuming of all acquisition documents.

Figure 3. Example TEMP Major Topics.



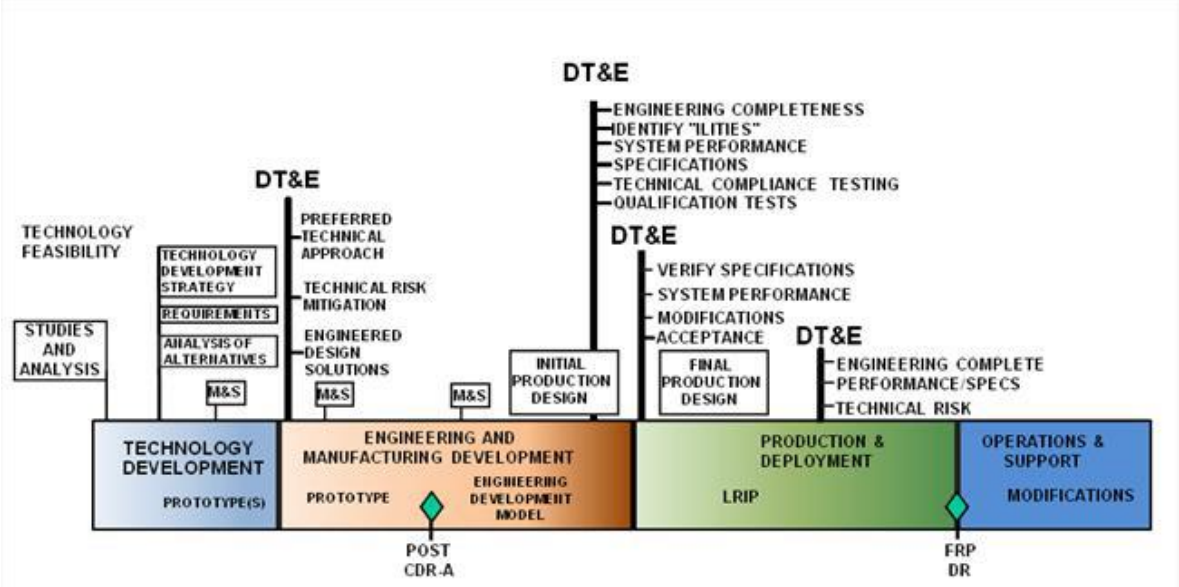
From Defense Acquisition University. (2012). Glossary of defense acquisition acronyms and terms. Retrieved from https://dap.dau.mil/glossary/Pages/Default.aspx

Developmental Testing (DT) is conducted throughout the acquisition process to determine if materiel solutions are safe and will meet technical performance criteria. In some cases, such as Chemical and Biological Defense, DT will also begin to determine effectiveness, survivability, and suitability. DAU defines DT&E as "Any testing used to assist in the development and maturation of products, product elements, or manufacturing or support processes. Any engineering-type test used to verify status of technical progress, verify that design risks are minimized, substantiate achievement of contract technical performance, and certify readiness for initial OT" (Defense Acquisition University, 2015b).

DT can be conducted by the government or by the contractor. Contractor testing usually occurs at the vendor facility during the Engineering and Manufacturing Development (EMD) phase. Testing can occur on prototypes, board models, sub systems, or major components. A brass board is an early prototype that can be used outside the laboratory. This testing is designed to determine the maturity of the production process and to verify that components are operating consistent with the planned performance. Once complete, this data is approved during the Technology Readiness Review. This process will provide the government team the information needed to move through MS-C and into LRIP.

Production Qualification Testing (PQT) occurs after MS-C using LRIP assets. PQT demonstrates the "integrity of the system design over the operational and environmental range in the specification" (Defense Acquisition University, 2015b). If software is involved, testing occurs on the delivery version. PQT informs the Milestone Decision Authority (MDA) prior to making the FRP decision. DT&E occurs across all phases of the Acquisition process as demonstrated in the graphic below (Figure 4).

Figure 4. Examples DT&E Activities across Phases of the Acquisition Life Cycle.



From R. James, personal communication, January 9, 2015.

Operational Testing and Evaluation is required by Title 10, United States Code, Section 2399 for all covered systems. A covered system is a system that is a Major Defense Acquisition Program (MDAP) and is a major system that fulfills a mission need. OT&E is further defined as "the field test, under realistic combat conditions, of any item of (or key component of) weapons, equipment, or munitions for the purposes of determining the effectiveness and suitability of the weapons, equipment, or munitions for use in combat by typical military users; and the evaluation of the results of such test" (10 U.S. Code Section 2399).

Operational Testing (OT), as stated by the *Test and Evaluation Management Guide* (Defense Acquisition University, 2015b), is "the degree of satisfaction of the user's requirements expressed as operational effectiveness and operational suitability of the new system." In the case of Chemical, Biological, Radiological, and Nuclear (CBRN) equipment, this may also be determined in part, through DT. The level of operational effectiveness determines the answer to the basic question: will a system work in its intended environment? Effectiveness is the measure of performance of a system when it is used by end users in an operational environment using current Techniques, Tactics and Procedures (TTP), doctrine, and threat scenarios.

Suitability is used to measure the interoperability of the system when considered from a transportability and Reliability, Availability, and Maintainability (RAM) stand point. OT may not extend long enough to fully determine RAM. Results from OT and DT can be combined to gather sufficient RAM data. Suitability ensures that the system can be deployed, used and maintained in the field.

Survivability is the measurement of a system's vulnerability and survivability. These are measured through LFT&E. LFT&E is required by all 'covered' acquisition programs. For LFT&E, the term 'covered' applies to a system that users occupy in combat, any conventional munitions and missile program, a conventional munitions program where the acquisition of a million rounds is planned, any modification to a current covered system, or any system designated for oversight by Director Operational Test & Evaluation (DOT&E). LFT&E is conducted to measure how well the system responds to live fire and also how well the crew survives.

There are some key facts to remember regarding OT&E.

- OT&E is conducted throughout all phases of the acquisition process.
- The DOT&E is the OT&E approval authority for all MDAPs
- OT&E is conducted by an independent Operational Test Authority (OTA).

In summary, T&E informs the MDA of the system's ability to meet the requirements as prescribed by JCIDS requirements documents. All acquisition programs, regardless of ACAT, require independent T&E. The level of testing will be determined by the MDA and the OTA. The TES will determine the personnel and logistics of T&E. Once the program transitions from MS A to MS B, the TES will evolve into the TEMP. The TEMP will then layout the T&E process the program will follow. DT testing will determine if the system performs as required, meets user requirements, and if a system is ready for OT. OT, which is performed by the government using an independent OTA, will determine if a system is effective, suitable, and survivable. Additionally, 'covered' systems require LFT&E to verify the survivability and lethality.

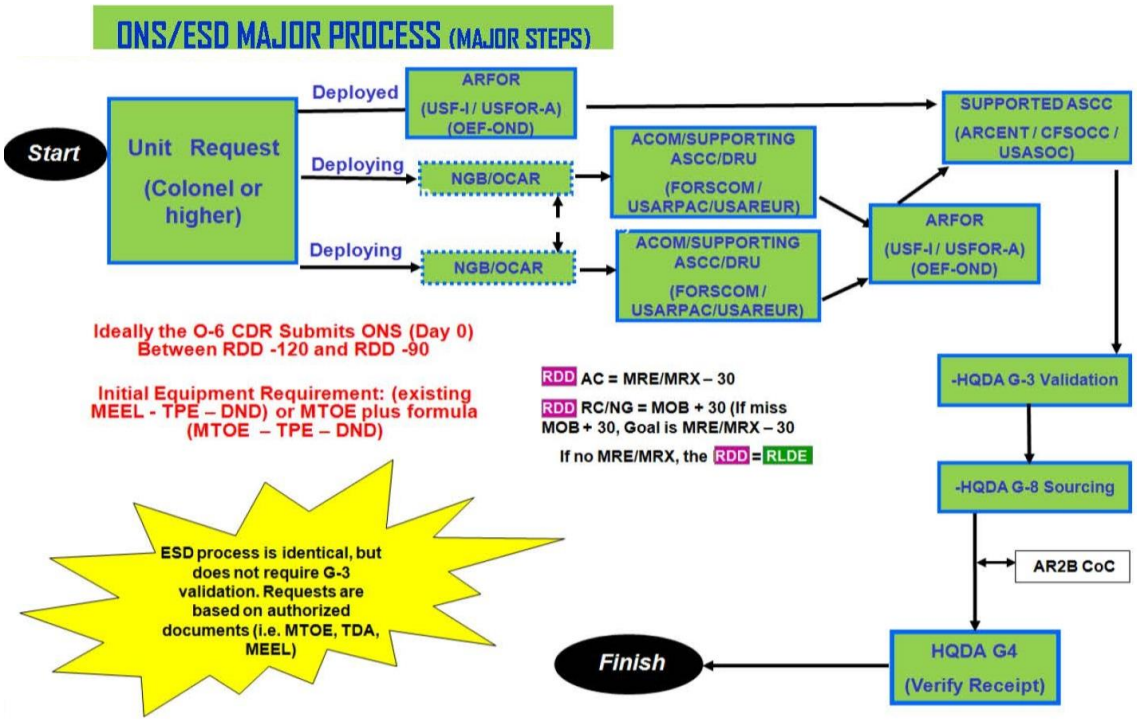
2. T&E Requirements for Rapid Acquisition

When the Army has a capability gap that cannot wait for fulfillment by the normal acquisition process or if the gap is non-enduring, the Army uses RA to close the gap. In order for a commander to utilize the solution, it must be evaluated by ATEC.ATEC will determine its capabilities and limitations as well as ensuring it is safe for Soldiers to use.

The Army ONS process is used when an operational commander identifies a capability gap and is either deployed, deploying, or a high priority unit. According to AR 71–9, there are three types of ONS: those for a deployed unit, those for deploying unit, and an ONS from other units. This is also how priorities are established for each ONS. The highest priority ONS is a deployed unit in a named operation. The second highest priority ONS is a unit deploying to a named operation. The lowest priority ONS is from all other units that have recognized a capability gap that requires a materiel solution (Department of the Army, 2009d).

Regardless of the type, Commanders follow the same ONS process. Once initiated, an ONS formally enters the process through the ECOP. The ECOP database is located at https://www.ecop.army.smil.mil on the Secret Internet Protocol Router Network (SIPRNet). ECOP requires access permission that can usually be granted in a few days. The user must first identify the gap and provide information on what missions cannot be accomplished. Next, the user provides justification for the requirement by providing rationale on what impact of not fulfilling the ONS will have on mission accomplishment. The unit must also demonstrate what efforts were used to meet the mission requirement with existing equipment and organization. The unit will then define how the equipment will be used, who will use it, and the Organizational Concept for employment. The unit will define how many systems are required, how they will complete training on the system, additional support needed, and recommend a source of supply or solution set. Once the request is complete, it can flow through the ONS/ Equipment Sourcing Document (ESD) approval process. Figure 5 from the ECOP Pocket guide illustrates the ONS/ESD staffing process (Department of the Army, n.d.). If the unit is deployed, the request is routed through the deployed unit's chain of command to the ASCC. Non-deployed units will submit requests through their major command. If the ONS is approved by the respective ASCC, it moves on to HQDA G3/5/7 for validation. If validated, the ONS moves to HQDA G8 for resourcing. If resourcing is available, the validated request is forwarded with funding to the acquisition community for action. If funding is not available, the requirement, must appear before the Army Requirements and Resourcing Board (AR2B). The AR2B is responsible for prioritizing and validating resources for current requirements and the reprioritization of resources as required. The AR2B primarily deals with resourcing within the year of execution and is also responsible for notifying Congress on resource changes that are required by law. Once funding is approved by the Army Budget Office (ABO), it is assigned to a PM. The PM accepting the requirement and resourcing, moves forward with an acquisition plan to fill the capability gap (Department of the Army, 2009).

Figure 5. ECOP ONS/ESD Staffing Process.



From (ECOP, n.d.) Retrieved from http://www.g8.army.mil

During the DA 3/5/7 evaluation period, the Army Staff evaluates the ONS for broader applications across the department. If the determination is made that the ONS affects a broader audience, DA 3/5/7 will release a Directed Requirement.

Directed Requirements (DR) are authored by HQDA G-3/5/7 Capabilities Integration Division (DAMO-CI) and approved by the VCSA. Once approved, the DR appears in front of the AR2B for resourcing. DRs cannot be used to develop new technology. The DR will only provide capability outside the traditional JCIDS process and only if the unfilled capability gap endangers lives or seriously impacts mission accomplishment.

Once the PM receives an ONS or DR and resources, the process of fulfilling the urgent requirement begins. To provide the required capability, there are several activities that must occur. The PM, working with ATEC, the user, and the MDA, must produce documentation as required by AR 700–142. These documents consist of a Safety

Confirmation, a Capabilities and Limitation Report, a User Acceptance Memorandum, and finally, an UMR is approved by the MDA (Department of the Army, 2013c).

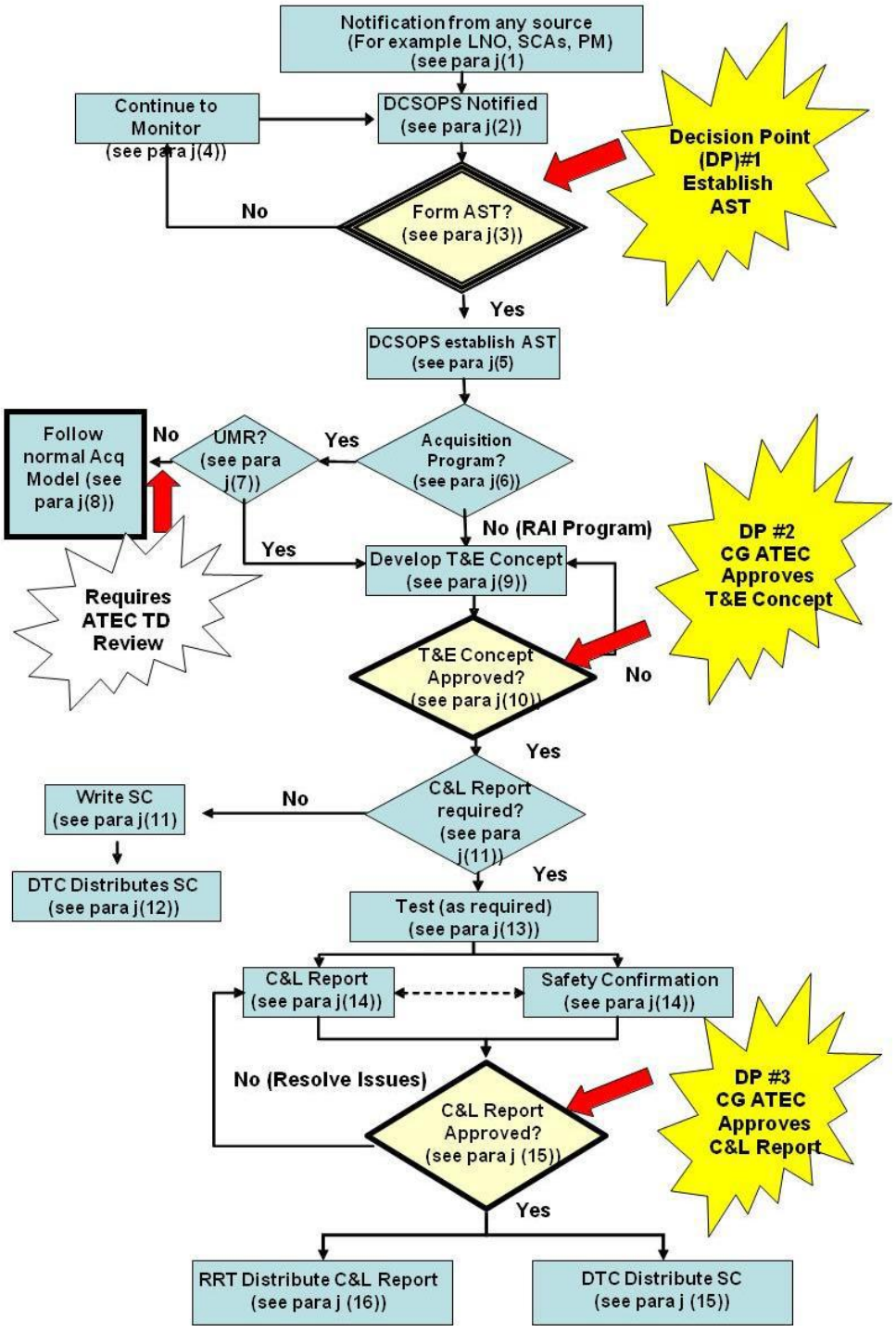
The PM is responsible for funding and requesting support from ATEC. Once ATEC receives the request, it is assigned to an ATEC System Team (AST). Once assigned to an AST, a chair is assigned with the primary responsibility of leading the T&E effort. The AST Chair will determine how the ONS/DR will be evaluated. The AST will use the ATEC Rapid Acquisition Initiative flow chart (shown in Figure 6) to assist in the management of the test effort (Army Test and Evaluation Command, 2004).

Once the PM has provided a solution and the AST has developed a test plan, the effort can be moved into the evaluation portion of the process. A Safety Release is required prior to a test event and once testing is complete, a Safety Confirmation is required to field equipment.

A Safety Release is required prior to placing equipment into the hands of soldiers. AR 385–10 states "A safety release must be obtained from Headquarters, ATEC or in accordance with guidance provided in DA PAM 385–16 whenever solders and involved with an event" (Department of the Army, 2013a).

The Safety Release is developed and written by the U.S. Army Evaluation Center (AEC) Test Manager having primary responsibility. The Safety Release has several key parts. First, the release covers a specific event i.e., Operational Assessment (OA), Limited User Test (LUT), or OT. It also covers a specific time period with definitive start date and has an expiration date. The Safety Release should identify the test participants that will use the equipment, the level of risk the soldiers will be exposed, and the overall safety risk of the system. The safety release addresses each piece of equipment and each component, evaluating against the requirements laid out in Military Standard (MIL-STD) 882E for risk. It is important to remember a safety release is a temporary document used for a specific event.

Figure 6. RAI and Urgent Materiel Release Process.



From U.S. Army Test and Evaluation Command. (2013). *System test and evaluation policy*. ATEC Regulation 73-1. Washington, DC: U.S. Army Test and Evaluation Command.

A Safety Confirmation is used during the normal course of acquisition and is required by AR 385–10 prior to each Milestone. It is also required during RA prior to an UMR decision. AR 385–10 defines a Safety Confirmation as "A separate document or part of the OTA evaluation report, OTA Milestone evaluation report, OTA Assessment report, or Capabilities and Limitations Report (CLR) that provides the DT or OT agency findings and conclusions, and states whether the specified safety requirements are met" (Department of the Army, 2013b). The purpose of this document is to evaluate the risk that the system poses to soldiers, ensure those risks are mitigated or removed, and in cases where residual risks remain, provide the user with a risk assessment to allow the user to manage the risk. ATEC collects this information through the evaluation of Technical Manuals, DT results, and observations during OAs. The Safety Confirmation is one of the key documents that is required in order to receive an UMR from a MDA. Table 1 shows when a Safety Release or Confirmation is required.

Table 1. Safety Release, Safety Confirmation Comparison.

Safety Release/Confirmation Matrix
(In Accordance with AR 70-1 & 73-1)

Acquisition Event / DTC Document	Testing, Pre-Test Training, or Demonstrations Using Soldiers	MS B	MS C (LRIP)	Full-Rate Production Decision	Materiel Release Decision (Full/Conditional /Training)	Urgent Materiel Release (UMR)	Rapid Fielding Initiative Rapid Equipping Force Global War on Terror	System Changes (Modifications and Upgrades)
Safety Release	✓							
Safety Confirmation		✓	✓	✓	✓	✓	✓	✓

From U.S. Department of the Army. (2015). *Type classification, materiel release, fielding and transfer*. Army Regulation 700–142. Washington, DC: U.S. Department of the Army.

A CLR is the culmination of DT and OT events that occurred informing the gaining command and the materiel release authority what the system can and cannot do. The AST Chair and the PM evaluate the requirement as written in the ONS or DR. After evaluation, the AST Chair develops a Test Concept Plan, which is approved by ATEC

CG and presented to the PM for funding. DT to support the CLR is conducted by various Test centers and OT is conducted by Operational Test Command (OTC). The AST chair and the PM or program sponsor will determine the type of operational testing based on the complexity of the system. At a minimum, some type of OA will occur to place the capability in the hands of soldiers. The evaluation will provide key inputs into the CLR.

The CLR consists of nine key areas: purpose, executive summary, mission need, system description, data sources, test limitations, observations, employment considerations, and recommendations.

The Purpose paragraph helps explain the reason for the evaluation providing context to both the user and acquisition community. The executive summary provides a brief overview of the CLR and its contents. The mission need paragraph lays out what capability is required and should reference the ONS number and identified unit or the pertinent DR. The system description paragraph lays out the system and how it is intended to work. It should also state how it should be used in its intended environment. The data sources and test limitations paragraphs tell what tests were conducted, both OT and DT, and what limitations where present during testing. The observation paragraph lists all the capabilities of the system and the current warfighter gaps the system fills. It includes all capabilities and limitations observations as well as safety, interoperability, training, supportability, and survivability observations. The CLR also includes recommendations to both the user on how to employ the capability, and to the acquisition community on how to make the system more suitable and effective.

Once the CLR and the Safety Confirmation are in place, the PM must gain acceptance of the capability from the Gaining Command. The Gaining Command will provide an acceptance memorandum, usually signed by a general officer or a senior executive service civilian equivalent. The memo should cover the items accepted and the quantity accepted. If the acceptance memo is for a Conditional Materiel Release, the user acceptance memo will cover the duration of the acceptance. Once accepted, the PM is ready to seek an UMR from the MDA.

A Materiel Release (MR) is granted much in the same way a milestone decision is granted. The MR authority will review the documentation for completeness, then make a determination to grant the MR. The procedure for all MRs (Full, Training, Conditional, or Urgent) are governed by AR 700–142. The authority to grant a materiel release depends on the materiel involved (Department of the Army, 2013c).

MR authority is granted in accordance with AR 700–142. There are several release authorities that can grant a MR depending on the type of materiel involved.

The CLR and the Safety Confirmation are released simultaneously and once coupled with a gaining command acceptance memo, are used by the MDA to grant a UMR. The UMR is granted for a specific event, specific quantities, and to specific commanders. Once the UMR is granted, the PM can then equip the user with the prescribed capability. After fielding, the capability is monitored, with ATEC updating the CLR as needed. HQDA and TRADOC will determine if the fielded capability will become enduring and transition to a program of record or disposed of once the capability is not required.

3. UMR and FMR Comparison

The following tables (Tables 2–5) compare the different activities required for a POR and associated FMR versus a shorter term RA and associated UMR. Some of the FMR requirements may also factor into PEO leadership taking on the responsibility to field an RA, as well as a GC being satisfied with and accepting the new capability. These are notated with a "PD" for "program dependent" since not all programs will require the same T&E efforts. However, if certain activities usually required for FMR are required for GC acceptance under an RA effort, they may be an abbreviated version or may also still show that risk exists in certain areas, but may be acceptable to the GC. Additionally, an area of great variation may exist within the suitability category where an FMR requires adherence to the detailed and long-term program TEMP and TES, and an UMR addressed the suitability question with a CLR that the AST chair defines in a program specific manner.

Table 2. Materiel Release Safe Hazards Release Requirements.

FMR - Safe Hazards	FMR	UMR
Supporting safety office certification	x	PD
TSG HHA	x	
Environmental statement	x	
Airworthiness statement	x	PD
SSRA for residual hazards	x	
Surface or Weapon danger zone	x	
Final hazard classification	x	
NRC license	x	
Army Fuze Safety Review Board Certification	x	
Energetic materiels qualification	x	
Ignition System Safety Review Board Certification and Standardization Agreement	x	
Safety review of technical manuals	x	
Results of safety inspections and analyses	x	PD
Software safety statement	x	

After U.S. Department of the Army. (2015). *Type classification, materiel release, fielding and transfer.* Army Regulation 700–142. Washington, DC: U.S. Department of the Army..

Table 3. Materiel Release Supportability Requirements.

FMR – Supportability	FMR	UMR
Supportability certification—will address support materiel, end item, and software	x	PD
USATA supportability statement on TMDE or ATE	x	
TC designation	x	
SDDC TEA transportability	x	
Army logistician assessment	x	PD
Supporting statements for COEI and ASOIE	x	PD
Software supportability statement	x	PD

After U.S. Department of the Army. (2015). *Type classification, materiel release, fielding and transfer*. Army Regulation 700–142. Washington, DC: U.S. Department of the Army.

Table 4. Materiel Release Suitability Requirements.

FMR – Suitability	FMR	UMR
ATEC MR position memorandum	x	PD
ATEC OMAR or OER	x	PD
CIO/G-6 AIC statement based upon AIC completion	x	PD
Certificate of Networthiness	x	PD
DIACAP certification statement	x	
Communications Security Logistics Activity statement for COMSEC supportability	x	
CAPDEV training assessment (statement of adequacy of institutional training support)	x	
Software suitability statement	x	
Quality, reliability, availability, and maintainability statement, including service or shelf life assurance, Ammunition Stockpile Reliability Program, and ammunition surveillance procedures	x	PD

After U.S. Department of the Army. (2015). *Type classification, materiel release, fielding and transfer*. Army Regulation 700–142. Washington, DC: U.S. Department of the Army.

Table 5. Materiel Release RA UMR Requirements

UMR	FMR	UMR
User requested/HQDA directed		x
Safety and Health data sheet with a risk assessment for the materiel system		x
Air worthiness statement (if applicable)		x
EOD supportability statement (if applicable)		x
PM Request for acceptance from the GC or requestor		x
GC acceptance statement		x

After U.S. Department of the Army. (2015). *Type classification, materiel release, fielding and transfer*. Army Regulation 700–142. Washington, DC: U.S. Department of the Army. .

B. PROGRAM RESEARCH DATA

The data presented in this section provides the reader with two specific examples of programs that have started as RA, made the transition to POR, and the T&E activities required to make that transition.

1. Dismounted Reconnaissance Sets Kits and Outfits

The DR SKO is an ACT III program assigned to the Joint Project Manager for Nuclear, Biological and Chemical Contamination Avoidance (JPM NBC CA) and the JPEO CBD. The JPEO CBD is responsible for the "Research, Development, Acquisition Fielding and Life-Cycle Support of Chemical, Biological, Radiological and Nuclear Defense Equipment, Medical Countermeasures and Installation and Force Protection Integrated Capabilities Supporting the National Strategies" (Joint Project Manager for Nuclear, Biological and Chemical Contamination Avoidance [JPEO CBD], n.d., Mission Statement). JPM NBC CA is responsible for the development, production, integration, testing and fielding of NBC detection, obscuration, and reconnaissance systems (JPM NBC CA (n.d.), Mission Statement). The acquisition objective for this program was for 440 systems at a cost upward of $500 million.

The DR SKO is used by all services to conduct dismounted CBRN reconnaissance. The system is a mixture of Commercial off the Shelf (COTS) and Government off the Shelf (GOTS) detection, sampling, personnel protection, and decontamination hardware (overview shown in Figure 7). The system is designed for world-wide deployment, packaged to meet individual service needs.

The primary mission of the DR SKO is to identify the presence of CBRN and Weapons of Mass Destruction (WMD) materiels (and their precursors), and can characterize the environment. Information gathered by this system can provide critical information to the commander on the presence and use of CBRN weapons. In his government blog, the DR SKO Systems Manager, Mr. Edward Conley, described the system as one that, "provides a modular baseline suite of modern detection, identification, and protection equipment to support the ever changing threat environment, especially for toxic industrial hazards" (Edgewood ChemBioCenter, 2012). The genesis of the DR SKO came from an ONS generated by units experiencing capability gaps during OEF. U.S. forces encountered multiple threats from Toxic Industrial Chemicals (TIC) and Toxic Industrial Materiels (TIM).

At the time, traditional CBRN organizations were equipped to conduct CBRN Reconnaissance against traditional warfare agents but lacked the ability to conduct site assessment, conduct confined space operations, identify TIC/TIMs, and had limited capability inside buildings in urban environments. After fulfillment of the ONS, the Joint Force, understanding the value of this new capability, submitted a JUONS to increase the capability from 16 to 40 systems. This evolution in capability over time is illustrated in Figure 8. With demand for this capability increasing, Army Combat Developers began development of JCIDS documents.

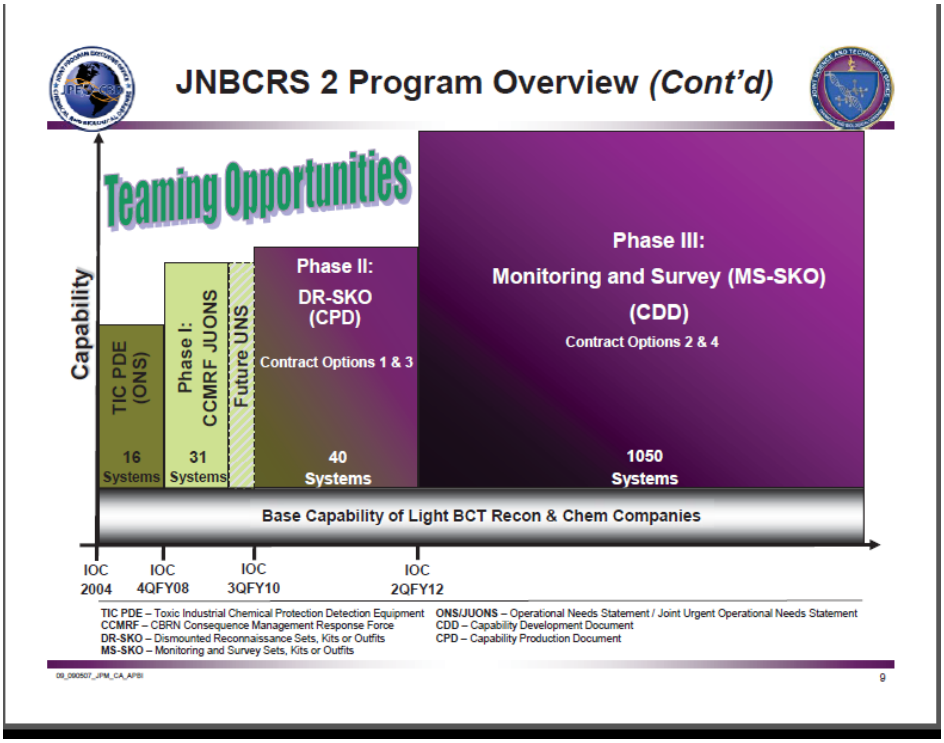
Figure 7. DR SKO Layout.

From JPEO CBD. (2014). Dismounted reconnaissance sets kits and outfits [Fact sheet]. Retrieved from http://jacks.jpeocbd.army.mil/Public/FactSheetProvider.ashx?productId=447

The early acquisition strategy attempted to capitalize on the heavy use of existing COTS or GOTS technology to enter into a MS-C decision with a production CPD. Ms. Anne Hise, the Lead System Engineer (Edgewood ChemBioCenter, 2012) stated, "Originally, the strategy included initial entry into the acquisition process at the Low-

Rate Initial Production decision. The lack of independently verified data to support evaluation of key performance parameters drove a change in strategy" The acquisition team, unable to verify many manufacturer claims and match those claims to Key Performance Parameters (KPP) and Key System Attributes (KSA) laid out in the CPD, re-grouped, moved the program back to a MS-B, and converted the CPD back to a CDD.

Figure 8. DR SKO Pre Program Evolution.



From JPEO CBD. (2009). DOD chemical biological defense advanced planning briefing for industry (APBI). Retrieved http://www.jpeocbd.osd.mil/packs/Default.aspx?pg=851

The Joint Requirements Office for CBRN Defense authored a CDD and the JPEO CBD, the MDA for this program, issued a MDD on July 6, 2010. The MDA approved the DR SKO for entrance into the acquisition cycle at MS-B and also approved the Acquisition Decision Memorandum (ADM) on March 30, 2011. Once approved, the DR SKO could enter into the EMD phase. Two major test events occurred during EMD: Engineering Developmental Testing (EDT) and OAs.

EDT occurred at multiple Test Centers across the United States. Chemical testing took place at Dugway Proving Grounds and the Edgewood Chemical Biological Center, trace explosive testing took place at Indian Head, MD and the Electronic Proving Ground, and radiation testing occurred at White Sands Missile Range. The EDT validated equipment to verify manufacturer claims and to meet the requirements of the CDD.

Two OAs where conducted: one for ground based operations and one for maritime operations. The United States Marine Corps (USMC) tested the ground based version in an urban environment at Ft. Hood, Texas, and the United States Navy (USN) tested the maritime version under an excursion off the coast of North Carolina.

The EDT and OAs provided the required data to move DR SKO to the next acquisition phase. A CPD was developed and a MS-C decision took place during the second quarter of 2013. With the MS-C decision in hand, the DR SKO program moved toward the FRP Decision.

To meet the requirements of the FRP decision, additional testing was conducted. The DR SKO program conducted Performance Qualification Testing, Logistics and Maintainability Demonstration (LMD), and Multiservice Operational Testing (MOT).

DR SKO tested three areas as part of PQT: Transportability and Safety, System level RAM and Vapor Sampling Collection Demonstration. Transportability testing was used to assess system safety and verify modification made post EDT (Department of Defense, 2008). The systems were exposed to drop testing, on course vibration, rail impact, and a host of environmental testing. RAM testing operated components of the system for a total of 515 hours. Certified civilian operators conducted operations for 14.5 hour mission cycles consistent with the DR SKO Operational Mode Summary/Mission Profile (OMS/MP) (JPM CA, December 2012). The final PQT event was the Vapor Sampling Collection Demonstration. This event measured the ability of the equipment to collect a sample and maintain the sample until delivered to a laboratory for analysis.

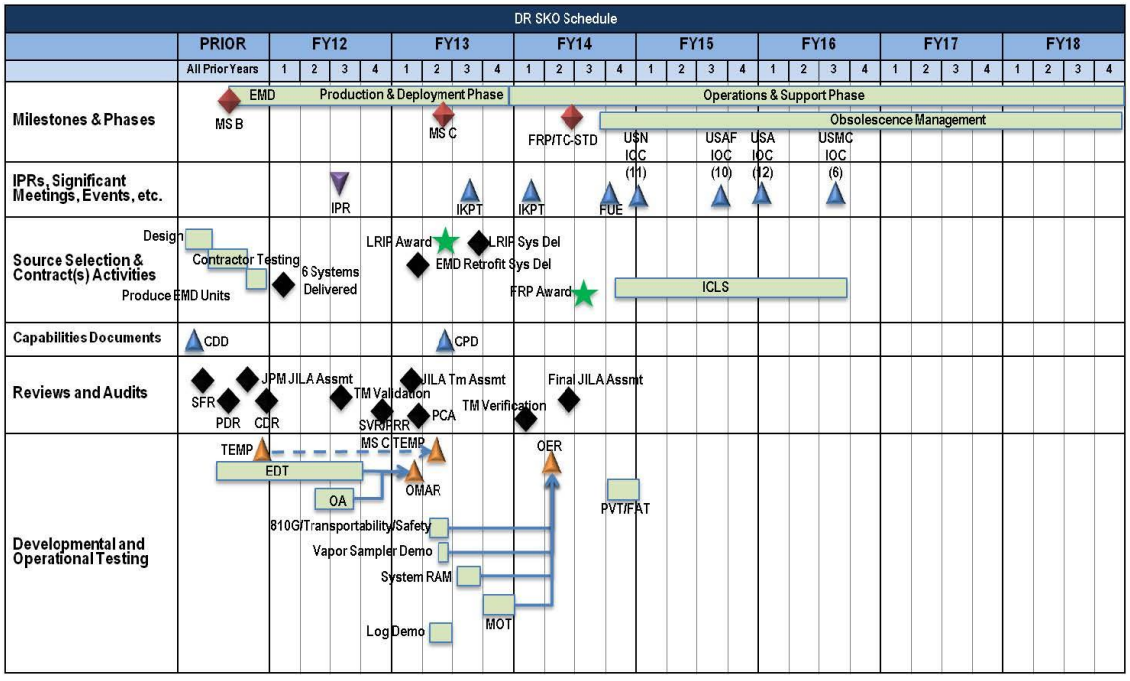
The DR SKO conducted a Logistics and Maintainability Demonstration assessing and validating the maintainability, repair ability and the system logistics. The demo lasted one month in order to test systems configured for the Army, USN, and USMC. The

purpose of the Logistics Demonstration was to determine system supportability, validate the Technical Manual, verify the Maintenance Allocation Chart, and ensure the completeness of the System Support Package. The Maintainability Demonstration measured the adequacy of built-in test, the tool kit, the provided test kit, and the measurement of both corrective and preventive maintenance times.

The final test event was the MOT. The MOT provided data to determine the effectiveness, suitability, and survivability of the DR SKO. The MOT was evaluated by the U.S. Army Operational Test Command (OTC) against realistic operational scenarios. Each service conducted OT in environments and scenarios relevant to their mission.

Once testing was complete, the MDA granted an FRP decision during the second quarter of Fiscal Year 2014 and full rate production started immediately. The program is still in production with Initial Operational Capability (IOC) for all services scheduled for third quarter Fiscal Year 2016. Figure 9 shows the DR SKO Integrated Master Schedule (IMS) from the DR SKO TEMP.

Figure 9. DR SKO IMS from DR SKO TEMP.



From JPM CA. (2012). Dismounted reconnaissance sets, kits, and outfits (DR SKO) test and evaluation master plan (TEMP). Aberdeen Proving Grounds, MD: JPEOCBD.

2. Counter Remote Control Improvised Explosive Device Electronic Warfare

The primary Army vehicle mounted Counter Remote Control Improvised Explosive Device Electronic Warfare system is named Duke (AN/VLQ-12). The following information is derived from the CREW Duke SEP (PEO IEW&S, 2013) and TEMP (PEO IEW&S, 2012).

The CREW Duke (or Duke Countermeasures Set) is a second generation Electronic Countermeasure (ECM) set used to jam Radio Frequency (RF) threats and is comprised of a complete, end-to-end RF system (PEO IEW&S, 2012, p. 1–2). The system chassis is self-contained with external power connectors for use with batteries, vehicle power, or generators, and performs the receiving, processing, and response transmitting function (PEO IEW&S, 2012, pp. 1–2). All of the end user controls necessary to operate the system are user-accessible with simple switches to change operational modes (PEO IEW&S, 2013, p. 14).

> Duke systems are needed to provide commanders with the capability to meet urgent mission requirements, provide vital force protection against RCIED threats, and reduce the risk of serious injury and loss of life to the Warfighter. During full spectrum operations, the Duke system is a combat power enabler. The CREW Duke system provides commanders the freedom of movement/action required to concentrate and disperse combat power to keep the enemy at a disadvantage. (PEO IEW&S, 2012, p. 1–1)

The system protects ground forces operating in convoys or single vehicle operations against signals that trigger RCIEDs.

The CREW Duke system is represented by two configurations (V2 and V3) and are deployed in theater on all designated tactical and non-tactical vehicles. The system has demonstrated adequate and reliable protection against priority RCIED threats (PEO IEW&S, 2012, pp. 1-1 – 1-2).

The CREW Duke TEMP details the need for CREW growing out of the surge of U.S. casualties as a result of roadside bombs, or Improvised Explosive Devices (IEDs), during OIF and OEF (2012). “IEDs have been the leading cause of U.S. Casualties, and

RCIEDs represent a very large portion of these casualties" (PEO IEW&S, 2012, p. 1-5). CREW systems in general (and specifically CREW Duke for the Army) have dramatically reduced the effectiveness of RCIEDs (PEO IEW&S, 2012, p. 1-5). As CREW Duke systems were rapidly deployed, there was a significant reduction in RCIED related casualties.

Constant evolution of the RCIED threat required specific changes to the Duke system in order to maintain relevancy. Multiple JUONS identified a critical need for increased capabilities that were provided by upgrading the Duke V1 to the Duke V2 and, finally, to the Duke V3 configuration. In August 2010, the CREW Duke system was designated as an ACAT II Program (PEO IEW&S, 2012, pp. 1–6).

> As an urgent need RA, the CREW Duke system was specified by a Performance Based Specification (PBS) via a competitive bid process. In order to maximize flexibility for the respondents, the System Architecture and Interface Control were not specified by the Government. Instead, the respondents were free to use the architecture "as is" and interface control method which would best allow them to meet the requirements of the PBS. An interface control document was required to be submitted by the Original Equipment Manufacturer (OEM) to define the physical interfaces. This defined interface control is a governing feature for any future upgrades or changes. (PEO IEW&S, 2013, p. 23)

The program office conducted numerous T&E events of the CREW Duke system prior to full fielding. Some of these events were in addition to the requirement of fielding a RA with the desired end state of becoming a POR in the future. Each CREW Duke configuration underwent DT. DT evaluated aspects of mission equipment, the electrical power source, and integration into a prime mover. AEC conducted a formal Capabilities and Limitations (C&L) Test prior to the initial deployment, which employed priority threats in a representative operational environment (PEO IEW&S, 2012, p. 1–6). The AEC, as the independent developmental and operational evaluator, is a principal T&E IPT member and chairs all RAM scoring conferences. AEC supplied documentation assessing how well the CREW-2 systems met the CPD developed by the Combat Developer (CBTDEV), including performance validation data, FOA feedback, and provided analysis in a CLR. AEC monitors key tests and prepares the Abbreviated

Operational Evaluation Report (OER-A) and Materiel Release Position Memo to support the FMR (PEO IEW&S, 2012, p. 2–2).

As described in the CREW-2 Duke TEMP (authored by PEO IEW&S), the following list documents the testing conducted prior to being designated a POR to include:

- **System Testing:** OEM implemented CREW system test program to ensure that compliant Duke systems of the highest quality were delivered to the Government. This included a thorough range of First Article Tests (FAT), to include a Reliability Demonstration for each phase, and a follow-on AEC-evaluated test at Yuma Proving Ground (YPG), AZ. The tests conducted by AEC utilized operationally-placed threats (2012, p. 1–6).

- **FAT:** conducted by the OEM at the contractor's facilities and witnessed by the government. The following tests were conducted for each CREW Duke version: high/low temperature, solar loading, shock/vibration, sand and dust intrusion, rain/blowing rain intrusion, ice/ freezing rain intrusion, humidity/salt fog/fungus intrusion, electromagnetic interference (EMI), electromagnetic compatibility (EMC), and reliability demonstration (2012, pp. 1-6 – 1-7).

- **Software Functional Qualification Test (SFQT):** to stress the software and ensure a stable software baseline acceptance (2012, p. 1–7).

- **Reliability demonstration:** OEM conducted Reliability Demonstrations for each version to verify that the Duke systems met the minimum reliability requirements with a confidence level that equals or exceeds the requirement specified in the CPD (2012, p. 1–7).

- **Safety and Health Hazards:** initiated by the OEM and evaluated by the Communication-Electronics Command (CECOM) Safety Office and the former Developmental Test Command (DTC) covering all aspects of the Duke system to ensure all hazards related to installation, transportation, operation, maintenance, and storage of Duke systems were eliminated or minimized. The Program office also required the contractor to develop a Safety Assessment Report (SAR) and complete the Health Hazard Assessment (HHA), as part of the safety release and safety confirmation process (certified in 3Q FY07 for Duke V2 and 2Q FY09 for Duke V3) (2012, p. 1–7).

- **Training:** evaluation was conducted to determine that all critical tasks related to system operation, maintenance, and support could be performed

in the specified environment by soldiers in the field, with minimal training (2012, p. 1–7).

- **Transportability:** engineering analysis of the host platforms incorporating the CREW Duke system was conducted to determine potential transportation problems and to ensure transportability requirements were met (2012, p. 1–7).

- **Electromagnetic Environmental Effects (E3):** conducted during EMI testing during FAT and simulated RF environments operating during all field tests (2012, p. 1–8).

- **Reliability and Maintainability:** A selected number of Duke pre-production units were tested in accordance with the Reliability Test Plan (RTP), developed by the OEM (2012, p. 1–8).

- **Performance:** CREW Duke performance was evaluated to determine if it met the requirements of the PBS and CPD for the CREW-2 system(s). This requirement was continuously tested, throughout the life of the system, including evaluated tests for each phase and continuously repeated for the numerous load set modifications required to stay relevant against new and emerging threats during all phases of the CREW Duke program. A fully developed traceability matrix from evaluation domain to Critical Operational Issue (COI) to Measure Of Effectiveness (MOE) to Measure Of Performance (MOP) was not developed until later in the program and initial performance was judged strictly against KPPs and KSAs identified in the requirements documentation. ATEC issued a Duke V3 CLR in 3Q FY10 (2012, p. 1–8).

- **Mobility:** Dimensional, weight, performance and center-of-gravity data were measured and compared with the constraints of the host vehicles to demonstrate the Duke system's ability to keep up with the supported unit and support the maneuver force. Mobility/Vibration road tests were also conducted at Aberdeen Proving Ground (APG), MD. The objective of this testing was to verify that the Duke system is capable of withstanding transportability stresses in the field and operating satisfactorily during and after exposure to mobility stress and vibration, as would be encountered in vehicle movement over rough terrain (2012, p. 1–8).

As recognition that the CREW Duke program was transitioning from RA to POR, program documentation was structured to capture all previous T&E events as an attempt to highlight any critical information that was still required. Due to the fact that the CREW Duke system started out as a RA, a significant portion of the technical review and audit processes found in a traditional acquisition program was abbreviated. CREW Duke

system acquisitions were based on a theater ONS and supporting urgent requirements, which mandated fielding to both OIF and OEF as quickly as possible. Consequently, PM CREW analyses performed during the early CREW 2.0 system development and acquisition (i.e., production and fielding) resulted in a reduced set of technical data requirements. To complete the transition to a POR, the Army evaluator identified follow-on T&E events that were required after fielding: system activity monitor test and Logistics/Maintenance Demonstration (L/M Demo) (PEO IEW&S, 2012, p. 3-1).

The objective of the system activity monitor test is to evaluate the self-monitoring capability of CREW Duke system and the length of time the system can operate on vehicle power (PEO IEW&S, 2012, p. 3–5). The L/M Demo was conducted at CREW University in Edgewood, MD, during the Summer of 2012, with a nondestructive disassembly and re-assembly of a production-representative system using all associated support materiels. This event provided data regarding adequacy of maintenance planning, System Support Package, Life Cycle Support Plan (LCSP), maintenance documentation, and training (PEO IEW&S, 2012, pp. 3-4, 3-5–3-6).

Test limitations were also identified. "Not all threats or emplacements were exercised during field testing, however this was mitigated by focusing on the highest priority threats as determine by theater and the Joint IED Defeat Organization (JIEDDO)" (PEO IEW&S, 2012, p. 3-4).

Reliability growth was not a factor during the initial design and fielding of the CREW Duke system. It was initially intended to be a RA to fill an immediate need, but its long-term importance became apparent as fielded quantities increased. There is insufficient testing scheduled at this time to demonstrate reliability growth and, because production of the system is complete, little value would be realized by the development of a reliability growth plan unless significant reliability problems arise (PEO IEW&S, 2012, p. 3-5).

IV. ANALYSIS AND FINDINGS

A. PRIMARY RESEARCH FINDINGS

1. Primary Finding 1—Differences between RA and POR for T&E

The differences between a RA and a POR in terms of T&E can be boiled down to three key areas: requirements, purpose, and intended use.

The first key difference is the determination of requirements. Requirements may be the single most important factor when embarking on a T&E effort. They determine what to test, they aid in deriving how the test should be designed, and what test the results should be measured against.

POR follow a specific requirements process that, once complete, identifies a very specific materiel solution. This requirement is born in one of several strategy documents that the joint community conducts a Capability Based Assessment against. The remaining gaps manifest themselves in the form of an ICD. The ICD identifies the requirement in a very broad manner, allowing the acquisition community to determine ways to address the identified capabilities gaps. Meanwhile, the Capability Developer begins work on a requirements document that will identify KPPs and KSAs. These KPPs and KSAs will determine what the system needs to do in operational terms. This should provide the test community and program management team with the information required to develop a test and evaluation strategy to support the acquisition strategy.

A RA program is executed from a much smaller data set with far less analysis. The analysis could occur at the tactical level, service level, or at the COCOM level. This occurs only to solve an existing or emerging problem. It does not take into account the long-term implications or capability gaps outside of the immediate need. This requirement lacks the fidelity of a KPP and lacks the uniformity that the JCIDS process provides. ATEC Regulation 73–1 address this problem as follows:

> One of the key deficiencies in the RAI process is the Joint Use Operational Needs Statement (JUONS), Operational Needs Statement (ONS), and the abbreviated format known as the ten liner. These documents vary greatly in quality and for the most part do not express substantive operational requirements and associated key performance parameters or critical technical parameters. As such, it is incumbent upon the AST chair to use all means to bridge this requirements gap and produce a CLR that provides stakeholders with sufficient information so that readers can draw operational effectiveness and suitability conclusions or seek additional data. It is critical that these customers know as much as possible about the equipment, including the associated technical and operational risks inherent in its employment, as well as any unknowns. (ATEC, 2013)

The starting point of T&E is the requirement. The clarity of the requirement ensures testing can deliver quantifiable results that can be used to measure suitability, survivability, and effectiveness. POR have a clearer T&E path based on sound requirements, where RAs requirements are less clear and require interpretation by the test community and the program management team.

The second key difference between POR and RA is the purpose of the testing. For a POR, testing is conducted to determine if KPPs and KSAs are met. In RA, an evaluation takes place to determine the capabilities and limitation of the system. In the case of POR, if a test event results in a threshold requirement not being met, the program could face cancelation. This means the PM must attempt to address shortcomings and deficiencies. This test-fix-test approach allows the PM to achieve KPPs without compromising the program. This information is used to support an acquisition decisions at key junctures. Each phase of the process has key tests that are performed to support key decisions.

On the other hand, the RA goes through limited DT and an OA that evaluates the system against stated requirements, and against each of the DOTMLPF-P domains. This evaluation is designed to inform stakeholders of the performance capabilities and limitations of the proposed solution. It does not support an acquisition decision because (normally) the materiel solution has already been procured. The information from this evaluation will be used by the commander to support user acceptance, and by the MDA to support an UMR.

The final difference between a POR and RA is the intended purpose. A RA is developed for a very specific capability in a very specific environment, and for a specific period of time. When a UMR is granted, it is only for the specific use identified. The Safety Confirmation covers the materiel for a limited use in a specified environment. If a UMR is granted for use in one Area of Operations (AOR) for a commander, it cannot be transferred to another commander in another AOR without updating the UMR. The Safety Confirmation is very specific in this regard. An FMR focuses on the system's full safety and hazard elimination/acceptance, suitability, and supportability. Above all, the involvement of ATEC to carry out the activities identified in the TEMP requires an extensive T&E program (increasing program cost and schedule) in order to demonstrate effectiveness, survivability, Manpower and Personnel Integration (MANPRINT) compliance, reliability, supportability, and interoperability. Knowing these T&E goals early allows a PM to better focus and to conduct systems engineering efforts that result in the best solution for the Soldier. For a POR, an FMR is signed as part of the acquisition process leading to a FRP decision and, once fielded to the Services, it can be employed anywhere the Services need it. It means the system has been tested for suitability in all AORs and can be employed by all commanders. If a unit requires this capability, it can request this equipment through command channels. The FMR, unlike the UMR, is good for the life of the equipment unless updated by the MDA.

The key differences between POR and RA when it comes to T&E are the requirements generation, the intended purpose of the T&E activities, and the purpose of the equipment being used.

2. Primary Finding 2—Effect of Abbreviated T&E Requirements

Our research has indicated that there are two primary effects of abbreviated T&E requirements. The first is time required for fielding, and the second primary effect is risk.

In an RA environment, time is the most critical element. Time represent lives lost, or possibly mission failure. The luxury of time may not be available to a PM responsible for an RA. In these cases, the PM and the Test community are required to provide a solution, ensure the solution is safe, and evaluate its capabilities and limitations. This

may provide materiel solutions to warfighters with a less than ideal capability but in time to affect the immediate capability gap. This exposes the user to risk and can be a source of unseen cost increases. In the case of the DR SKO, some of the RA systems remained in the field for over a decade until the POR systems replaced them. The effect of abbreviated T&E is the ability to provide stop gap until the capability is no longer needed or until the long-term solution can be put in place. Given the service life of equipment and its lifetime enormous cost, T&E ensures that our investments are protected. In most cases, RAs do not have that luxury. The DR SKO and the CREW Duke were needed to fulfill immediate capability gaps. The threat of WMDs and IEDs pose significant challenges to commanders. Abbreviated T&E for the CREW Duke RA allowed the capability to be fielded rapidly and save lives immediately by providing commanders a capability until the POR elements could catch up. The DR SKO pre-program versions provided commanders with an upfront ability to detect the presence of a variety of harmful materiels that had previously gone undetected. The rapid nature of the T&E conducted provided the warfighter with a capability that reduced gaps and bought commanders the necessary time required for the POR to become established.

The second element is risk. When the T&E process is compressed to meet shortened timelines, many tests that normally occur are omitted. The pre POR versions of DR SKO did not conduct a significant amount of DT. In the case of RA, the services are left to manage any residual risk. The assumed risk is much broader than injury or inability to completely fill a capability gap. In one example, the risk comes in the form of unmet requirements. Due to the need for a compressed timeline, the PM for the DR SKO RA program used manufacturer claims in assist in procurement decisions. The DR SKO POR, on the other hand, used DT to verify those manufacturer claims and then disqualified those that did not meet the defined requirement.

Some of the risk also occurs in the form of increased cost of employing RA. One increase in cost of RA can be attributed incomplete RAM data collected. The CLR provides some RAM information, but it is mostly limited to observations during the OAs. In this case, the claims of the manufacture were also used for the DR SKO RA program. In contrast, the DR SKO POR used the Army Materiel Systems Analysis Activity

Scorecard (JPM CA, December 2012) to guide the program through the process of collecting RAM data. The POR evaluated RAM factors over 515 mission hours (JPM CA, December 2012). The RA simply lacked the time required to test to this level of fidelity. The lack of RAM data provided an incomplete picture for the service. Without complete RAM data, the mission suitability of the RA is questionable.

Additionally, the Service's logistics systems are not set up to support RA in the same manner they support POR. RA require their own support mechanism that may require a complete Contractor Logistic Support (CLS) package. The execution of maintenance is moved out of the commander's organic prevue and into the hands of CLS maintainers. This CLS may require additional outside personnel that require additional logistics support, such as security, facilitates, and berthing placing additional strain on units. CLS support usually requires a higher funding level from the PM as well. The DR SKO POR conducted a Logistics Demonstration during the first quarter of Fiscal Year 2013 that documented each of the 12 Integrated Product Support Elements. Once complete, the PM team had the information required to determine the suitability of the POR. This information was not available to the RA program and created the need for CLS.

The final element of risk that is not accounted for in RA is the cost of system-level replacement. PORs have a known shelf- life accounted for in POM cycles. The DR SKO CDD established clear Ownership Cost metrics with a threshold of $564 million and an objective of $508 million (JPM CA, December 2012). The life cycle of an RA may be unknown and may require upgrading and refresh multiple times throughout its mission life. The main concern of an RA is to ensure a capability reaches the warfighter with ownership costs becoming a secondary factor.

A subset within the risk element relates to when a system successfully fills a requirement and is identified for long-term use through either the CDRT process or the NS-E AROC process. The system can be identified as an APC or at least the recipient of further funding. If classified as an APC and required to enter the JCIDS process, the program office will need to generate all of the mandatory acquisition documentation that may have been not required under a RA, including the T&E activities. The risk is that the

T&E activities may reveal system shortcomings due to the limited amount of time available to conduct systems engineering design and analysis on the original system. While the capabilities were provided to the Soldier that needed it in the short term, a full T&E program may reveal complications in sustaining it in the Army inventory for the long term.

The effects of an abbreviated T&E process allow the commander to gain time in the filling of a capability gap, but also adds elements of risk that would not be present in standard POR with complete testing protocols. The services must weigh these risks during the requirements determination and validation process used to approve RI.

B. SECONDARY RESEARCH FINDINGS

1. Secondary Finding 1—Benefits and Drawbacks for CREW

IEDs became a very significant issue during OEF and OND, from both an operational stand point as well reducing national moral. The U.S. and Coalition ground forces were caught off guard by the widespread and successful use of IEDs (specifically RCIEDs) and needed to compensate for the asymmetric warfare they encountered. The Army required a solution that could address the wide spectrum of threats and, needed it quickly. The CREW Duke system was the solution to that gap.

The CREW Duke system was specified to meet performance against a set of known threats through a PBS as opposed to defining detailed hardware and software requirements. This method allowed vendors to propose solutions they had in a production-ready state. Instead of having to take the time (that was not available) and additional resources to develop a solution from scratch, contractors were able to propose solutions that met the performance requirements without having to adhere to strict government guidelines. For example, the incorporation of a reliability growth plan was not a required factor; neither was the requirement to utilize a modular design to increase the ease of upgrades in the future. In addition, the associated software and firmware was not required to be written to allow for ease of modification in the future. This allowed for fielding of a large number of CREW Duke systems over several years throughout OEF and OND to address the RCIED threat. From a T&E perspective, only the final system

performance against the defined set of threats was evaluated. Again, this allowed for a quicker solution to be fielded against an immediate gap, but did not allow the Army to have full visibility on software inefficiencies, all possible compatibility risks, or performance limitations for future RCIED threats.

The CREW Duke program did benefit from the high visibility (both in the media and within the DOD) due to the cost in lives the RCIEDs were taking. This also created a demand for many working groups and organizations (such as JIEDDO) that were established up to combat the IED problem. CREW Duke program benefited from this visibility since multiple avenue to secure funding for un-programmed costs. For example, of the 19 data sources used to establish CREW Duke's ability to meet suitability requirements, 17 of them were generated from the L/M Demo (PEO IEW&S, 2012, pp. D5 – D9). The L/M Demo occurred in the summer of 2012, after fielding and designation as a POR (PEO IEW&S, 2012, p. 4-1). Many of these unplanned costs resulted from developing and adapting the supportability strategy in real time. As the requirement for more systems grew and as the posture on the ground in theater constantly shifted, the expected lifetime of the system grew.

As noted in the CREW Duke TEMP, the L/M Demo was taking place after full fielding of the system had already been achieved. Several system considerations affecting the long-term life cycle of the CREW Duke system (e.g., laptop availability for software updates or the correct levels spare parts) were not part of the system-level evaluation earlier in the program. For example, laptops were not part of the system description (PEO IEW&S, 2013, pp. 14–19) so the continued success of the system relies on the availability of hardware outside the purview of the CREW Duke program. Also, the OEM reliability demonstration was able to show the system level reliability of the CREW Duke (PEO IEW&S, 2012, p. 1–7) but did not allow for identification of sub-system components that could lower system reliability. The total life cycle costs were not evaluated early in the program because speed of fielding was the most important priority in having a successful program. While success was achieved, conducting the L/M Demo earlier would have allowed for better planning for the total life cycle cost in preparation for transitioning to a POR.

Additionally, the Data Source Matrix identifying the requirements traceability from COI to MOE/MOP to KPP/KSA was not complete until the publishing of the CREW Duke TEMP in June 2012. The evaluation framework and dendritic were defined in the TEMP as activities not yet achieved in support of the CREW Duke FMR decision (PEO IEW&S, 2012, p. 3–1). Since performance against the RCIED threat was the main criteria for successful and quick fielding, this did not allow the Army the time to fully evaluate the requirements traceability and only required the L/M Demo to come later in the program. While many lessons learned have already been applied to the maintenance and supportability activities of CREW Duke, the transition to a POR may have required less follow-up T&E effort if the traceability was conducted earlier.

Overall, the quick fielding of the CREW Duke program was a great benefit to the Army because it was able to effectively combat the RCIED threat. The transition to a POR does require following up with several T&E activities to complete the forward planning for the entire life cycle of the system and fulfill all the requirements for FMR. Specifically for CREW Duke, this included the L/M Demo to evaluate the "logistical capability required to sustain the system" as well as the system activity monitor test used to evaluate the system's self-monitoring capability (PEO IEW&S, 2012, p. 3–5).

2. Secondary Finding 2—Benefits/Drawbacks for DR SKO

The DR SKO POR got a head start in the acquisition process because of the work done during the RA effort. The TIC Protection and Detection Equipment (PDE) ONS opened the door by fielding 16 systems in 2004. An additional 40 systems were added in 2010 after a JUONS was submitted. The Joint Nuclear Biological Chemical Radiological System II (JNBCRS II) (sometimes referred to as the JUONS II kit) replaced the TIC PDE ONS systems. The JNBCRS II remained in the field until they were replaced by DR SKO POR systems. This provided the acquisition community, as well as the user community, with six years of data that could be evaluated and analyzed and determine if the systems were filling capability gaps. Throughout this period, the PM did not remain idle.

As with any RA, the PM was required to obtain a CLR and a Safety Confirmation. This allowed the PM to conduct required system level safety testing. An OA was conducted that allowed users to use the system in controlled conditions where measurable data was collected. Several instruments were tested at Dugway Proving Grounds using Chemical Warfare Agents (CWA) and TICs. The intent was to secure a CLR and Safety Confirmation, but as a byproduct, volumes of data were collected to support the future POR. They further developed the RA by containerizing the system in Quad Con transportation containers. This design was proven successful at another OT conducted with users at Ft. Hood, Texas. During this same period, the PM funded ATEC to evaluate the RA system against the emerging requirements being codified in the CDD.

The DR SKO program clearly benefited from its RA predecessors in several areas. Due to the RA work, the need to conduct and Analysis of Alternatives (AOA) was alleviated. An AOA is designed to ensure that all other materiel options have been considered and cannot fulfill the existing capability gap effectively and efficiently. This is a lengthy process by design that could take one to two years from start to finish. In this case, the MDD determined that the Analysis of Materiel Solution met the requirements of an AOA.

Additional benefits were realized from previous data mining. The DR SKO TEMP lays out four clear efficiencies gained from the work completed during the POR:

1. Reduce the MOT test locations from three separate locations to two separate locations (land and maritime) (JPM CA, December 2012).
2. Reduce the MOT schedule by completing a standalone RAM Test during the PQT (a MOT test schedule reduction of 300 hours) (JPM CA, December 2012).
3. Reduce the Log Demo from 4 participating Services to 2 (USA and USMC) (JPM CA, December 2012).
4. Reduce the scope of Vapor Sampler testing from six TICs to one TIC (JPM CA, December 2012).

The benefits from the RA to the DR SKO POR are evident. What is not as clear are any drawbacks that were present. During the course of research for this project, it

appeared that the DR SKO, through an excellent program acquisition strategy, was a model for how to transition a RA to a POR.

The major concern with this method is how the POR requirements were developed. It is impossible to determine from this perspective, but the question should be asked: "did the RA drive the requirement or did the capability gap drive the requirement?"

Any time a program is this successful, it is easy for the requirement developers to default to standards that exist regardless of their relevancy. In the case of the DR SKO, the requirement was written to a civilian standard, not to an operational requirement. While the missions of civilian Frist Responders and DOD CBRN Reconnaissance Personnel have similarities, they are inherently different. The dynamics of combat and the countless variables encountered are not accounted for in the civilian standards used. In fairness, development of DOD unique standards is very difficult, costly, and time consuming. This may have been a tradeoff the combat developers made early.

C. SUMMARY

There are clear differences between the test and evaluation of a RA and a POR. The rigor that is required to support a POR is not present in a RA. This is done to get something that will immediately impact a mission or saves lives to the field as soon as possible. In essence, the RA framework shifts risk from the program manager to the commander. We evaluated the CREW Duke and the DR SKO programs, which are both models of how programs can be transitioned from a RA to a POR. In both cases, capturing data during RA activities that will support the POR is key in shortening the timeline of the POR. Program Managers should remain cognizant of transition opportunities when developing RA.

V. CONCLUSIONS, RECOMMENDATIONS, SUMMARY AND AREAS FOR FURTHER RESEARCH

A. CONCLUSIONS AND RECOMMENDATIONS

We began this research by asking two questions: Did the abbreviated T&E requirements in a RA environment dilute the important role T&E should play in an acquisition program? What are the long-term effects on programs from the manner that T&E is conducted to meet RA timelines?

The results of our research exposed a very different result to the first research question than expected. We found that the role T&E plays in RA is not diluted at all and is in fact extremely important. An RA, by design, requires a shortened timeline to deliver equipment to warfighters in order to saves lives and ensure mission success. T&E in this case serves a very important role during the production of a Capability and Limitation Report and a Safety Confirmation. The PM, working with the test community, must determine what testing will take place and in what form. For RA, the PM can conduct all types of testing to ensure the materiel solution meets the requirements stated. The user trusting the PM and T&E process is asked to accept the capability and its associated risks.

In some cases, these RA programs transition into POR. The Army uses the CDRT process to transition RA to POR. CDRT allows for the entrance of capabilities into the later stages of JCIDS process. Regardless of where the capability enters the process, some or all of the test data may be usable for the POR.

The long-term effects of T&E activities on RA programs can be measured in both cost and schedule. The challenge for the Services, PM, and test community is to conduct RA testing in a manner that allows for the data to be usable for a future POR. This may require additional resources initially, but could be a precursor for future savings. Many lessons were learned from the explosion of RA fielding activities in Iraq and Afghanistan. The Army Acquisition community was forced to be agile in a time-constrained environment to meet the threat of asymmetric warfare. The capability and process to move this quickly cannot be forgotten at the risk of not being able to meet the next

unforeseen threat. A process similar to CDRT or the NSE-AROC is recommended to become part of the recognized acquisition process in order to codify a path for capabilities to move into the Army inventory. These capabilities can be recognized as important but may have come from outside the traditional development and acquisition process (such as a COTS device or a repurposed piece of equipment). A critical piece of a permanent, successful CDRT-like process would be identifying a required set of T&E activities. This needs to be done prior to consideration for moving a capability into the Army inventory so that precious, quick-reaction time is not lost when a capability needs to move to the field immediately.

Additionally, it is recommended that the Army Research and Development (R&D) community proceed with integration of new technologies at the system level for near term deployment while keeping in mind the potential effects on total life cycle costs. When a technology matures past a lab based prototype, testing efforts beyond the baseline performance validation are required to prove out the measures of suitability and effectiveness. The R&D community must identify a transition path for new technology to reduce the risk of moving too far down a path without a clearly identified end state. This work up front will place new capabilities in a better position for a smoother and quicker transition to the Warfighter, without the need to back track to T&E events that were initially determined unnecessary.

B. AREAS FOR FURTHER RESEARCH

The amount of time RA remain in the field until they are retired, or transition into POR should be examined by the Services and Congress. The shear amount of JUONS and ONS that have been approved over the last decade and remain in the field demonstrate a need to understand what their residual effects are on the Warfighter and the Operational Army. A study of how this has impacted the Acquisition process should also be studied. We have almost a generation of acquisition professionals that were present in a pre-war environment. The impact of the last decade may reveal some key lessons learned to better support the process in the future

APPENDIX. MATERIEL RELEASE COMPARISON

The Materiel Release comparison table from Army Regulation 700-142 (Department of the Army, 2013, pp. 18–20), lists the requirements for materiel developers to follow when pursuing materiel releases.

Full materiel release requirements-safety

Aspect or Characteristic	Activity or Document	FMR Requirements	Functional Authority
Safe Hazards are identified and eliminated or accepted.	1. Supporting safety office certification. 2. TSG HHA (see AR 40–10 and AR 602–2).[1] 3. AMC EOD supportability statement (see AR 75–15).[2] 4. Environmental statement (see AR 200–1, 32 CFR 651).[3] 5. Airworthiness statement (see AR 70–62).[4] 6. SSRA for residual hazards (see AR 385–10). 7. ATEC (Army Evaluation Center) safety confirmation (see AR 385–10). 8. Surface or weapon danger zone (see AR 385–63). 9. Final hazard classification (see 49 CFR 173 and TB 700–2). 10. NRC license (see 10 CFR chap 1). 11. Army Fuze Safety Review Board Certification (see AR 385–10). 12. Energetic materials qualification (see AOP–7 edition 2 revision 1). 13. Ignition System Safety Review Board Certification (see MIL–STD–1901 and Standardized Agreement (STANAG) 4368). 14. Safety review of technical manuals (TM) (see AR 25–30). 15. Results of safety inspections and analyses. 16. Software safety statement.	System safety aspects have been reviewed and verified by the supporting safety office. -All known safety hazards have been eliminated or accepted through the SSRA process in accordance with AR 385–10. -All statutory requirements are met. -Applicable regulatory requirements are met. -All environmental impacts have been identified, mitigated if possible, and documented in accordance with the National Environmental Policy Act and 32 CFR 651.	Safety office

Notes:

[1] The HHA report is provided by the PHC on behalf of TSG.

[2] Determine EOD statement applicability using DA Pam 700–142. The EOD statement will certify that validated and verified render safe and disposal procedures, tools and equipment, and training aids are fielded to Army EOD units and EOD schools at least 30 days prior to MR and that the new materiel is fully supportable by EOD units. It will also certify that the EOD technical manuals have been approved by the Military Technical Acceptance Board at least 30 days prior to MR (see AR 75–15 to determine the MATDEV's responsibility for EOD supportability compliance during the development of the new materiel).

[3] The environmental statement must certify that the requirements of AR 200–1 and 32 CFR 651 have been met.

[4] If a statement of airworthiness qualification is not yet available, a FMR and subsequent FRP decision may be approved providing the request for system airworthiness has been submitted in accordance with AR 70–62 and there are no known issues that would prevent issuing the applicable airworthiness documents.

Full materiel release requirements-supportability

Aspect or Characteristic	Activity or Document	FMR Requirements	Functional Authority
Supportable Integrated product support (IPS) elements (see AR 700–127)	26. Supportability certification - will address support materiel (COEI and ASIOE), end item and software (see AR 700–127).[1] 27. USATA supportability statement on TMDE or ATE (see AR 750–43).[3] 28. TC designation. 29. SDDC TEA transportability statement (see AR 70–47).[4] 30. Army logistician assessment (see AR 700–127).[5] 31. Supporting statements for COEI and ASIOE. 32. Software supportability statement (normally provided by the LCMC SEC).	-Key LCSP performance aspects have been achieved as determined by the functional authorities.[2] -Maintenance planning has been accomplished and coordinated. Army preference is in accordance with AR 750–1. -Manpower and personnel requirements to operate and maintain the system have been identified and documented. -Adequate supply support for fielding and sustainment of units (interim contract support, performance-based logistics, organic) has been established. -Support equipment is identified and documented at the appropriate organization; TMDE supportability has been addressed; footprint is minimized. -Technical data rights of use are established. -TM and interactive electronic technical manual verification has been completed by the Government. -Training and training support to include TADSS and ammunition requirements for training have been identified, developed, and documented; training is available for all GCs and maintainers. -Maintenance of software is addressed in the LCSP software development plan and life cycle cost estimate, and hardware for mission-critical systems is available at the appropriate organization. -Facilities requirements are developed and documented (maintenance, training storage, covered, humidity controlled, and so on); facilities are available. -Package, handling, storage, and transportation system is transportable by all modes as specified in the capability document. -Transportability has been evaluated by SDDC and documented accordingly. -The PM has programmed funding to complete LCSP activities within the POM (coordinate with the DCS, G–3/5/7 (DAMO–TR)). -Ammunition Stockpile Reliability Program and ammunition surveillance procedures are in place.	Lead LCMC Integrated Logistics Support (ILS) center or ILS directorate

Notes:

[1] The supportability certification will verify that key aspects of the LCSP have been achieved; detail any known shortfalls and include them in a recom- mended get-well plan. A system receiving a FMR that has ASIOE at less than FMR must get acceptance from the GC prior to fielding.

[2] Systems supported by planned interim contract support that have been funded and have a transition plan for a longer term support strategy such as organic support may be fully materiel released.

[3] The TMDE supportability statement is not required if TMDE is not being provided to the operator or field or sustainment maintenance provider.

[4] The SDDC transportability statement is not required if a system is found to be a transportability nonproblem item in accordance with AR 70–47.

[5] USAMMA will provide an Army logistician assessment, system effectiveness assessment, and safety statement for medical materiel.

Full materiel release requirements-suitability

Aspect or Characteristic	Activity or Document	FMR Requirements	Functional Authority
Suitable -Effectiveness -Survivability -MANPRINT -Reliability -Supportability -Interoperability	17. ATEC MR position memorandum.[1] 18. ATEC OMAR or OER (see 10 USC 139, DOTE).[1]	-The materiel has been tested and evaluated in accordance with the approved Test and Evaluation Master Plan.[1] -Established requirements of the capabilities documents have been met or a decision has been made by the CAPDEV to accept the current performance; requires DCS, G–3/5/7 endorsement.	ATEC[1]
	19. CIO/G–6 AIC statement based upon AIC completion (see AR 25–1). 20. Certificate of Networthiness (see AR 25–1). 21. DIACAP certification statement (see AR 25–2).	-Software to include embedded software within platforms, has attained AIC. -Proper certifications for networthiness and DIACAP are attained.	CIO/G–6
	22. Communications Security Logistics Activity (CSLA) statement for COMSEC supportability.[2]	-COMSEC supportability and availability have been verified by CSLA.	CSLA for Army-adopted items
	23. CAPDEV training assessment (statement of adequacy of institutional training support) (see AR 350–1).	-Training is determined adequate per AR 350–1.	CAPDEV
	24. Software suitability statement (normally provided by the LCMC SEC). 25. Quality, reliability, availability, and maintainability statement, including service or shelf life assurance, Ammunition Stockpile Reliability Program (see AR 702–6), and ammunition surveillance procedures (see SB 742–1).[3]	-Software is suitable. -Reliability, availability, and maintainability requirements have been achieved.	Lead LCMC system engineering activity

Notes:

[1] In cases where U.S. Army Intelligence and Security Command or U.S. Special Operations Command are the single user, they may perform user testing in lieu of ATEC.

[2] The CSLA COMSEC statement is not required when the materiel does not contain standalone COMSEC devices and supporting materiels.

[3] In some cases such as missiles, the functional authority may waive the requirement to verify reliability with statistical confidence because of limited test assets (normally due to cost). If the LCMC quality and reliability assessment shows that there is only a low risk of not meeting the requirement(s), then the PM may establish a plan to verify reliability, availability, and maintainability through analysis of field and stockpile test data. In these cases, the LCMC quality or reliability assessment will show that a rigorous reliability, availability, and maintainability program has been executed and present the qualitative data or analyses that provide nonstatistical confidence in meeting the requirement(s). Such a program is outlined in SAE–JA1000 and will include activities such as: failure mode, effects, and critically analysis, physics of failure analyses or assessments based upon analogous or previous generation systems and others (see SAE–JA1000–1).

Urgent materiel release documentation requirements

	Required Documentation	
1a. User requested	-Joint Urgent ONS (JUONS)[1] *or* -A written request signed by a general officer or civilian equivalent within the gaining unit's chain of command	-Prepared by Combatant Command (CCMD) and coordinated with Joint Staff. -Prepared by unit commander, endorsed by chain of command, and submitted to the DCS, G–3/5/7.
	-DCS, G–3/5/7 ONS validation memorandum *or* -DCS, G–3/5/7 directed requirement memorandum (DAMO-CIC or DAMO-AOC)	-Will take the form of either an ONS validation memo or message traffic prepared by DCS, G–3/5/7 (DAMO-CIC or DAMO-AOC) communicating results of the Army Requirements and Resourcing Board.[2,3]
1b. HQDA directed	-DCS, G–3/5/7 approved capabilities documents (for example, operational requirement document, ICD, CDD, or CPD) *And*	Capability has been approved by DCS, G–3/5/7. -Pre-FRP phase. -MR activities not complete. -Capability needed urgently by field.
	-DCS, G–3/5/7 directed requirement memorandum (DAMO-CIC or DAMO-AOC)	Will take the form of either a directed requirement memorandum or message traffic prepared by DCS, G–3/5/7 (DAMO-CIC or DAMO-AOC) directing the fielding of equipment that has not been materiel released.
2. A safety and health data sheet with a risk assessment for the materiel system.		Prepared by the safety office summarizing all known safety and health hazard issues and their mitigation plans.[4, 5, 6, 7]
3. An airworthiness statement, if applicable.		See AR 70–62.
4. An EOD supportability statement from the AMC EOD staff officer, if applicable.		Confirms EOD support or coverage for the UMR action, if applicable.
5. PM request for acceptance from the GC or requestor.		This statement will notify the GC or requestor of all known equipment, supportability, and sustainment issues. This statement must include all known environmental, safety and occupational health hazards, operational and support limitations to include interoperability limitations and use restrictions.[8]
6. GC acceptance statement.		The GC or requestor's acceptance statement, signed by a general officer or civilian equivalent.[6]

Notes:

[1] JUONS do not require DCS, G–3/5/7 validation. Validation of JUONS will normally be done by the Joint Staff point of contact listed in the JUONS.

[2] The Equipment Common Operating Picture database and directed requirement memo will include the system or materiel quantity, gaining unit, geographic location, application, and destination's point of contract information to facilitate the UMR action.

[3] DCS, G–3/5/7 validation is not required if the unit is already authorized the equipment on their MTOE. An approved DCS, G–3/5/7 basis of issue that has not been applied to the MTOE will also serve as valid authorization and not require a separate DCS, G–3/5/7 validation.

[4] Review the safety office assessment when configuration changes are made, when the operational mission profile is changed, when an operational safety incident occurs, or at least annually to reassess any safety risk. The dates of reviews and reassessments will be entered and tracked in the MRTS.

[5] Coordinate with the U.S. Army Public Health Command (Health Hazard Assessment Program) for inclusion of potential health hazard information.

[6] Obtain the safety confirmation from ATEC (Army Evaluation Center).

[7] Prepare and coordinate a Safety and Health Data Sheet for acceptance of residual safety risks by the GC in accordance with DA Pam 385–16.

[8] Review the materiel for interoperability certifications such as AIC and DIACAP. Complete required certifications within one year of UMR in accordance with CIO/G–6 guidance.

Training materiel release requirements

Aspect or Characteristic	Activity or Document	TMR Requirements	Functional Authority
Safety	1. Supporting safety office certification. 2. TSG HHA (see AR 40–10, AR 602–2).[1] 3. AMC EOD supportability statement (see AR 75–15). 4. Environmental statement (see AR 200–1 and 32 CFR 651). 5. Statement of airworthiness qualification (see AR 70–62). 6. SSRA for residual hazards (see MIL–STD–882E). 7. ATEC (Army Evaluation Center) safety confirmation (see AR 385–10). 8. Surface or weapon danger zone (see AR 385–63). 9. Final hazard classification (see 49 CFR 173 and TB 700–2). 10. NRC license (see 10 CFR chap 1). 11. Army Fuze Safety Review Board Certification (see AR 385–10). 12. Energetic materials qualification (see local policy). 13. Ignition System Safety Review Board Certification (see MIL–STD–1901 and STANAG 4368. 14. Safety review of TMs (see AR 25–30). 15. Results of safety inspections and analyses. 16. Software safety statement.	-System safety aspects have been reviewed and verified by the supporting safety office. -All known safety hazards have been eliminated or accepted through the SSRA process in accordance with AR 385–10. -All statutory requirements are met. -Applicable regulatory requirements are met.	LCMC Safety Office
Suitability	17. TRADOC training assessment (statement of adequacy of institutional training support) (see AR 350–1).	-Training is determined adequate per AR 350–1.	Force modernization proponent
Supportable Support strategy to meet Soldier's requirements	18. Supportability certification—will also address support materiel (COEI and ASIOE), end item, and software (see AR 700–127). 19. USATA supportability statement on TMDE or ATE (see AR 750–43). 20. SDDC TEA transportability statement (see AR 70–47).[2] 21. Software supportability statement (normally provided by the LCMC SEC).	-Key LCSP performance aspects have been achieved as determined by the functional authorities. -Support equipment is identified and documented at the appropriate organization; TMDE supportability has been addressed; footprint is minimized. Transportability has been evaluated by SDDC and documented accordingly.	Lead LCMC ILS center or ILS directorate
CAPDEV acceptance	22. CAPDEV acceptance of materiel for issues or restrictions	-CAPDEV acceptance or non-acceptance of the materiel planned for a TRM signed by a general officer or civilian equivalent	CAPDEV

Legend for Table 4-8:

TRADOC may add additional requirements from table 4–2 and table 4–3 not already required, or may tailor required activities based upon the scope and use of training materiel.

Notes:

[1] A HHA is required only when materiel is fielded to TRADOC schools and training sites. Coordinate with the U.S. Army Public Health Command (Health Hazard Assessment Program) for inclusion of potential health hazard information in course curriculum or in user manuals.

[2] The SDDC transportability statement is not required if a system is found to be a transportability nonproblem item in accordance with AR 70–47.

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