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MBA PROFESSIONAL REPORT

ARMY MATERIEL REQUIREMENTS DOCUMENTS: QUALITATIVE ANALYSIS OF EFFICIENCY AND EFFECTIVENESS

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June 2013

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The U.S. Army must maximize the efficiency and effectiveness of the documents that facilitate successful materiel requirements generation for the warfighter. Throughout the last decade, incremental modifications to policies and procedures have resulted in changes to the mandatory materiel requirement documents. These incessant changes have forced continuous revisions to the requirements generation process and materiel requirements documents over the last decade. Consequently, many factors are constraining the future of the Army's requirements generation process as the Global War on Terror comes to a close. This project examines the benefits and shortfalls of past and present materiel requirements documents. It examines these requirements documents based on their efficiency and effectiveness for key stakeholders. The project also weighs these documents against current initiatives for best practices in the DoD. Subsequently, a comparative analysis is performed on requirement documents for three ground vehicles that have been either produced or projected for production. Recommendations for changes to future requirements documents are presented.

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ARMY MATERIEL REQUIREMENTS DOCUMENTS: QUALITATIVE ANALYSIS OF EFFICIENCY AND EFFECTIVENESS

ABSTRACT

The U.S. Army must maximize the efficiency and effectiveness of the documents that facilitate successful materiel requirements generation for the warfighter. Throughout the last decade, incremental modifications to policies and procedures have resulted in changes to the mandatory materiel requirement documents. These incessant changes have forced continuous revisions to the requirements generation process and materiel requirements documents over the last decade. Consequently, many factors are constraining the future of the Army's requirements generation process as the Global War on Terror comes to a close. This project examines the benefits and shortfalls of past and present materiel requirements documents. It examines these requirements documents based on their efficiency and effectiveness for key stakeholders. The project also weighs these documents against current initiatives for best practices in the DoD. Subsequently, a comparative analysis is performed on requirement documents for three ground vehicles that have been either produced or projected for production. Recommendations for changes to future requirements documents are presented.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAR	After Actions Review
ACAT	Acquisition Category
ADM	Acquisition Decision Memorandum
AMEDD	Army Medical Department
AoA	Analysis of Alternatives
AO	Area of Operation
APB	Acquisition Program Baseline
AR	Army Regulation
AR2B	Army Requirements and Resources Board
AROC	Army Requirements Oversight Council
ASA(ALT)	Assistant Secretary of the Army (Acquisition, Logistics, and Technology)
ASA(FM&C)	Assistant Secretary of the Army (Financial Management and Comptroller)
BCT	Brigade Combat Team
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance
CAPDEV	Capability Developer
CBTDEV	Combat Developer
CCP	Component Cost Position
CDD	Capability Development Document
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
COCOM	Combatant Command
CONOP	Concept of Operation
CPD	Capability Production Document
CRD	Capstone Requirements Document
CRS	Congressional Research Service

CSA	Chief of Staff of the Army
CTC	Combat Training Center
DA	Department of the Army
DAB	Defense Acquisition Board
DAGR	Defense Advanced GPS Receiver
DAS	Defense Acquisition System
DAU	Defense Acquisition University
DBB	Defense Business Board
DCR	Joint DOTmLPF-P Change Recommendation
DCS	Army Deputy Chief of Staff G-3/5/7
DoD	Department of Defense
DOTMLP	Doctrine, Organizations, Training and Education, Materiel, Leadership, and Personnel
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities
DOTmLPF-P	Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, and Policy
ECP	Engineering Change Proposal
EMD	Engineering Manufacturing and Development
FCB	Functional Capabilities Board
FRP	Full Rate Production
FSA	Functional Solution Analysis
GLOC	Ground Lines of Communications
GPS	Global Positioning System
GWOT	Global War on Terrorism
HME	Homemade Explosive
HQDA	Headquarters, Department of the Army
IBCT	Infantry Brigade Combat Team
ICD	Initial Capabilities Document
ICT	Integrated Concept Team

IED	Improvised Explosive Device
IPT	Integrated Product Team
ISC	Integrated Security Construct
JCA	Joint Capability Area
JCD	Joint Capability Document
JCIDS	Joint Capabilities Integration and Development System
JMPV	Joint Mine-Resistant Ambush Protected Vehicle Program
JROC	Joint Requirements Oversight Council
JUONS	Joint Urgent Operational Need Statement
KPP	Key Performance Parameter
KO	Contracting Officer
KSA	Key System Attribute
LAW	Light Anti-Tank Weapon
LCMC	Life Cycle Management Command (US Army)
LRIP	Low Rate Initial Production
MATDEV	Materiel Developer
MCD	Material Capabilities Document
MCoE	Maneuver Center of Excellence
MDA	Milestone Decision Authority
MEEL	Mission Essential Equipment List
MNS	Mission Needs Statement
MRAP	Mine-Resistant Ambush Protected
MRD	Materiel Requirements Document
MS	Milestone
MTO&E	Modified Table of Organization and Equipment
NBC	Nuclear, Biological, and Chemical
NSS	National Security Strategy
OEF	Operation Enduring Freedom
OEF-A	Operation Enduring Freedom – Afganistan

OEM	Original Equipment Manufacturer
OGPK	Object Gunner's Protection Kit
OIF	Operation Iraqi Freedom
OIPT	Overarching Integrated Product Team
OMB	Office of Management and Budget
OND	Operation New Dawn
ONS	Operational Need Statement
OPTEMPO	Operational Tempo
ORD	Operational Requirement Document
PEO	Program Executive Office
PLGR	Precision Lightweight GPS Reciever
PM	Program Manager
PMO	Program Management Office
POR	Program of Record
RMCT	Requirements Management Certification Training
RGP	Requirements Generation Process
RGS	Requirements Generation System
RKG	Ruchnaya Kumulyativnaya Granata
SAF	Small Arms Fire
SE	System Engineering
SECDEF	Secretary of Defense
SME	Subject-Matter Expert
SOU	Space and Naval Warfare Systems Command
SWAP	Size, Weight, and Power
TACOM	Tank and Automotive Command
TDA	Tables of Distribution and Allowance
TNGDEV	Training Developer
TR	TRADOC Regulation
TRADOC	U.S. Army Training and Doctrine Command

TRL	Technology Readiness Levels
TSM	TRADOC System Manager
TTP	Tactics, Techniques, and Procedures
UON	Urgent Operational Need Statement
U.S.	United States
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
USFOR-A	U.S. Forces-Afghanistan
VCSA	Vice Chief of Staff of the Army

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I. INTRODUCTION

The purpose of this chapter is to provide an overarching synopsis of this project. We accomplish this by summarizing the history and evolution of the current materiel requirements documents, identifying the primary research question and supporting questions, describing the scope of the project and the summarized research methodology, and outlining the organization of this project. Our objective in this chapter is to clearly define the intent of this project and the strategy to answer the research questions.

A. PREFACE

The Army's requirements generation process (RGP) has undergone multiple evolutionary changes since the beginning of the Global War on Terror (GWOT). These changes have resulted from many different causes. First, the National Security Strategies (NSS) over the past decade have dictated many incremental changes to the process and documents that support the process. Second, there have been organizational changes in the Army's structure and formation. Third, there have been ongoing initiatives for improvements and enhancements to streamline processes. Fourth, there have been shifts in the holistic mentality of the Department of Defense (DoD) to become more joint and unified between each of the Services. Furthermore, there continue to be changes to the existing RGP perpetuated by the government as adaptations are made in response to ever-changing worldwide threats.

The United States (U.S.) Joint Forces have persistently revised their materiel requirements to meet the urgent needs of warfighters and to fulfill capability gaps. Prior to the Joint Capabilities Integration Development System (JCIDS), each branch of Service possessed its own unique system to validate materiel requirements and the acquisition process used to interface with requirements and the associated documents. The Army's process had been very bottom-up driven. The Army's training schools identified the warfighters' need, and Army Headquarters (HQ) would acquire those validated needs. After 2003, a new mindset began to take precedence within the Joint Staff and Combatant Commands. An emphasis on joint thinking became a necessity

across the defense community. The requirements generation process had to be top-down driven in order to fully embrace joint thinking. By switching to top-down direction, the Joint Staff and Combatant Commands created greater oversight, which provides commonality across the Services. This top-down flow ensures clearly communicated strategic guidance and concept of operations (CONOPS). The approach for top-down thinking is depicted in Figure 1. Nevertheless, the implementation of change would prove to be challenging and defining the most efficient process would be an arduous task.

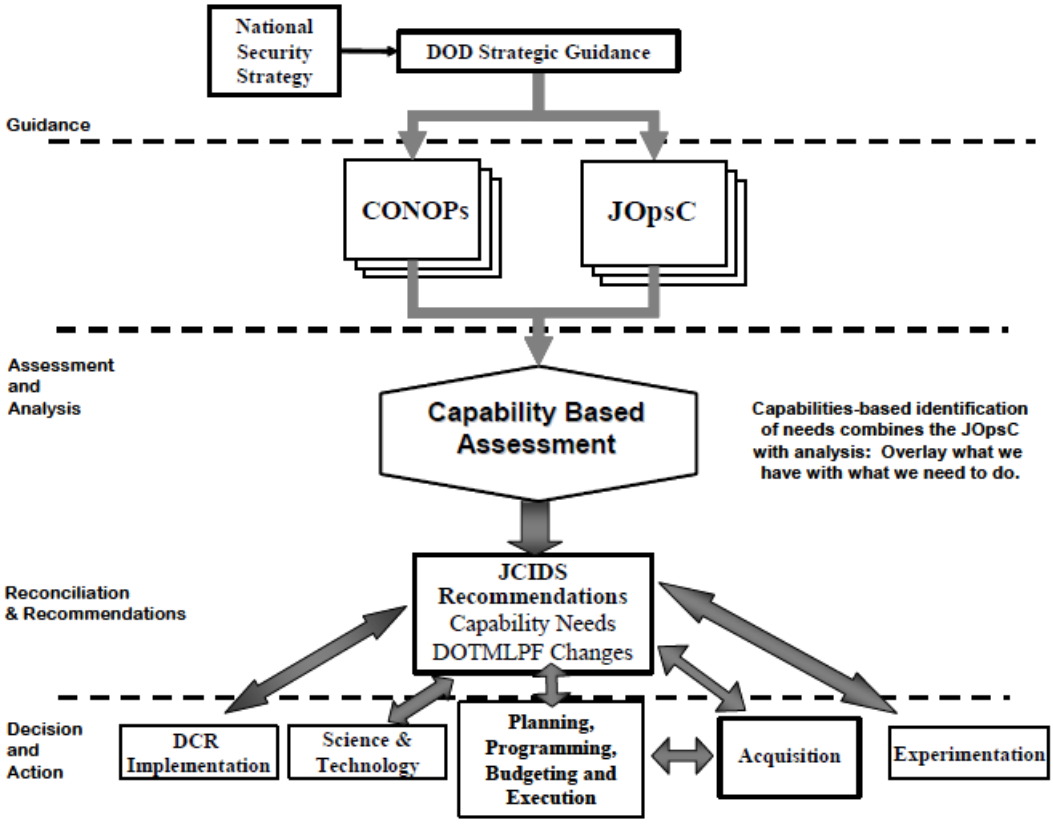


Figure 1. Top-Down Approach for Capability Needs (From CJCS, 2007, p. A-3)

1. The Past

In October 2001, the U.S. began combat operations in Afghanistan in response to the 9/11 attacks. Years later, in May 2003, the U.S. committed to its second combat front in Iraq. As with any war, the enemies began augmenting their tactics, techniques, and procedures (TTPs) based on observed actions of the people they were fighting. Change

of their TTPs drove the U.S. warfighters' demand for enhanced equipment to assist in neutralizing and defeating the enemy's new TTPs. The Army had to respond with full force and vigilant tenacity. The Army, as well as the whole DoD community, had to drastically evolve their RGP in order to meet the needs of the warfighters. By order of the Chairman, Joint Chiefs of Staff, the Army shifted from its own requirements generation system (RGS) and transitioned to the DoD's Joint Capabilities Integration and Development System. As a result, the materiel capabilities documents (MCDs) used in JCIDS replaced the Army's materiel requirements documents (MRDs) used in the RGS.

This change occurred at a volatile time for the DoD. Implementing change was difficult in a stable organization like the DoD that had been wedded to a process that had existed for over a decade. Implementing change in the midst of the beginning of two campaigns would prove to be much more difficult and somewhat disruptive to the DoD culture.

2. The Present

There are many stakeholders and key personnel involved in the RGP that contribute directly to the writing of MRDs. However, there are also indirect factors that drive and define the language of these documents. For instance, the enemy has always been relevant as one of the primary influencers on requirements for new equipment. Additionally, dramatic advancements in technology have resulted in the acquisition of new materiel and the associated new documents. The idea of *needs* in the RGS has been replaced by the concept of *capabilities* in JCIDS. Exact materiel solutions (new equipment/system) to meet desired capability should not be specifically requested. Additionally, capabilities can often be met without a materiel solution. Simply, the concept of needs was replaced with capabilities because the DoD did not feel that it was efficient for the warfighter to ask for a materiel solution. Asking for a specific materiel solution would only create multiple solutions and redundancies in equipment. Instead, the warfighter is to request capabilities.

A simplified example of this is if users state that they need an M224 60-mm Lightweight Mortar. This may not be the best solution. The user should request a system under 50 lbs. that may be disassembled, man portable, operated from the ground, fire

multifunctional munitions, including high explosive rounds, smoke rounds, and illumination rounds, and has a maximum effective range not less than 3,000 meters. This allows supporting stakeholders to identify what is the best and most efficient solution that can meet all of the users' capability needs.

Technological advancements on both friendly and enemy sides have also compelled the DoD to revise their MRDs into systems of systems and family of systems. According to the Office of the Deputy Under Secretary of Defense for Acquisition and Technology, Systems and Software Engineering (ODUSD [A&T] SSE), systems of systems bring "added complexity due to multiple system lifecycles across acquisition programs, involving legacy systems, systems under development, new developments, and technology insertion; typically have stated capability objectives upfront which may need to be translated into formal requirements" (Dahmann, Baldwin, & Rebovich, 2011, p. 3). The DoD recognizes that the future of technology is difficult to predict. Nonetheless, the DoD also realizes that, even with this unpredictability, the processes that initiate materiel solutions must project potential future capabilities insertions. Furthermore, unconventional warfare requires unconventional materiel solutions. Improvised explosive devices (IEDs), Ruchnaya Kumulyativnaya Granata 3 (RKG-3), and homemade explosives (HMEs) have led to U.S. forces developing capability requirements for equipment to improve survivability. Therefore, the United States has had to heighten its ability to answer the warfighters' demands to counter the enemy's abilities to conduct kinetic operations on the battlefield. Thus, the state of the world continues to have an effect on the future of the RGP and the associated MRDs.

3. The Future

The RGP and MRDs are facing another potential change due to the state of the nation. The U.S. government has projected the GWOT troop drawdown to occur in 2014. The president of the United States and the secretary of defense (SECDEF) have given guidance through their security strategies for the military's future fighting force to shift its focus to air and sea superiority. In addition, Congress has directed the Office of Management and Budget (OMB) through the Budget Control Act (BCA) of 2011, to annually reduce the defense budget by $54.7 billion from 2013 through 2021 (Heniff, Rybicki, & Mahan, 2011).

These directives pose new constraints and forces that may greatly impact the U.S. Army. First, budget reductions have caused the Army to begin executing a 50,000-soldier reduction plan to be complete by 2017, and potentially downsizing the Army's combat formations from 47 active duty brigade combat teams (BCTs) to as few as 32 active BCTs. The end-state composition of the Army has yet to be defined. Second, the unit-level modified table of organization and equipment (MTO&E) of this future Army is even further away from final delineation. Last, the projected threat and shift in emphasis on air and sea superiority will undoubtedly affect the Army's future missions. These constraints will change the future modernized equipment structure of the joint military and the U.S. Army. The Army must project and plan for this impending conversion. Aftereffects of a shift in force structure and MTO&E may lead to a change with the RGP. A change with the RGP would also impact the MRDs and force the documents to change.

4. The Way Ahead

The U.S. Army must posture itself for this transformation if it wishes to minimize the effects of change on its operations. The Army recognizes that its equipment must be modernized and at the forefront of technology if it is to remain the world's most powerful land force. Conversely, the Army recognized that RGS MRDs were inefficient and ineffective. MRDs lacking in efficiency and effectiveness lead the Army's acquisition programs down a path of not meeting the required capabilities. "If we always did what we always do, we will always get what we always got. We need tough examination of the assumptions of our past and real ideas for change that solve issues," said Paul Mann (personal communication, October 25, 2012), SES/Assistant Director Land Warfare & Munitions at OSD AT&L and former Joint Program Manager for Mine-Resistant Ambush Protected (MRAP) vehicles.

The Army recognizes that in order to improve its requirements documents, it must change in four key functions, as outlined by the Army Acquisition Review Board in 2011:

> 1. Realign, resource and focus its requirements and acquisition professionals on their raison d'être and associated core competencies, i.e., Training and Doctrine Command's timely delivery of requirements; Program Executive Office (PEO) and Program Manager delivery of

products meeting the requirement on cost and on schedule; and Army staffs that are accountable for enabling the requirement to be met

2. Involve all stakeholders collaboratively in requirements development, development planning and acquisition solicitation, rather than just critiquing others

3. Realistically assess and manage risk, and follow more tailored evolutionary acquisition strategies with associated reductions in steps, time and documentation to provide new systems

4. Improve the number, quality and accountability of the people essential to the acquisition of equipment and systems needed for our servicemen and women to be equipped, trained and ready. (Army Acquisition Review Board, 2011, p. iv)

More efficient and effective MCDs are crucial in the support of key functions 1, 2, and 3. Identified requirements may be met by numerous means by the Army. They may be answered by changing doctrine, organization, training, and TTPs. If requirements are not achieved by these methods, the acquisition of new equipment or systems is needed. The RGP is essential to a functional acquisition process. Three primary decision support systems interact to develop materiel capabilities: (1) the Planning, Program, Budget, and Execution (PPBE) process; (2) the Defense Acquisition System; and (3) the JCIDS (see Figure 1). The RGP falls within the JCIDS process. Thus, without an efficient RGP and supporting efficient and effective requirements documents, the overarching acquisition process cannot be efficient.

Cohesive MCDs will reduce unnecessary redundancies and will allow requirements to be delivered in an efficient and effective manner. Gaining stakeholders', such as the warfighter's, buy in and input early in the MCDs will provide better collaboration and will reduce scrutiny. Finally, effective MCDs are the tools to deliver defined requirements from the warfighter to fill capability gaps with materiel and non-materiel solutions to the warfighter. While there are many other facets in the defense acquisition system, MCDs are a crucial aspect that must continually evolve to refine a better way ahead for a more efficient RGP.

B. PURPOSE

The purpose of this project is to analyze the characteristics of Army materiel requirement documents that support material development up to Low Rate Initial Production (LRIP) within the Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System. We look at the necessary documents that facilitate the creation of a materiel solution, MRDs and MCDs used to develop the prototypes of the HMMWV, M-ATV, or JLTV. In this project, our analysis focuses on the documents used in both the old RGS and the new JCIDS processes, and identifies distinctive elements of efficiency and effectiveness, as shown in Figure 2.

Figure 2. Effectiveness vs. Efficiency (After Croxford, 2012)

In this project, we identify potential changes to the MCDs or the Army's RGP (JCIDS) that will result in more efficiency and effectiveness, based on our analysis of these documents.

C. RESEARCH QUESTION

Our objective in this research project is to answer the following question: What should be the Army's major considerations for the revisions of future materiel requirements documents?

To aid us in answering the primary research question, we utilized these supporting questions:

Question 1: What makes requirement documents efficient and effective, or inefficient and ineffective for the stakeholders who facilitate the RGP?
Question 2: What key differences exist in the documents from the old RGS process compared to the new JCIDS process, and why were these changes made during this transition?
Question 3: Does future change need to be evolutionary or revolutionary?

D. SCOPE

We analyze the requirements documents of two specific Army RGP systems in the project. The name of materiel requirements documents (MRD) was changed to materiel capability documents (MCD) during the transition to the Joint Capabilities Integrated Development System (JCIDS). For our project, we used the term "requirements documents" as a generic term for both. The first RGP system was the Requirements Generation System (RGS), which was used prior to 2003 and used MRDs. These documents are the mission needs statement (MNS), the initial operational requirements document (ORD), and the production ORD. The second RGP system is the JCIDS, established in May 2003, which uses MCDs and is augmented by the Joint Urgent Operations Needs Statement (JUONS) process. The JCIDS documents are the initial capabilities document (ICD), the capability development document (CDD), and the capability production document (CPD). Furthermore, the project team analyzed the type of change for a future requirements generation process and requirements documents. The identified changes are supplemented with effective methods and techniques to implement these system changes into the U.S. Army. Finally, the project team identified the benefits of recommended changes.

In Figure 3, we identify the project's scope where MRDs and MCDs affect the Defense Acquisition System (DAS) which is outlined by the DoD Instruction 5000.02 (DoD, 2008). The figure identifies the periods of time during which the RGS and JCIDS were in effect. Although there are three major DoD decision support systems (i.e., JCIDS, DAS, PPBE), in this project we focus only on the requirements documents interface between the Acquisition Management System (AMS) and the RGS as well as the interface between the DAS and JCIDS. The figure represents these interactions by the shaded cross-hatched sections. Specifically, in the project, we examine and analyze the requirements documents used to communicate between the two decision-support systems from both eras; this is represented by Figure 3.

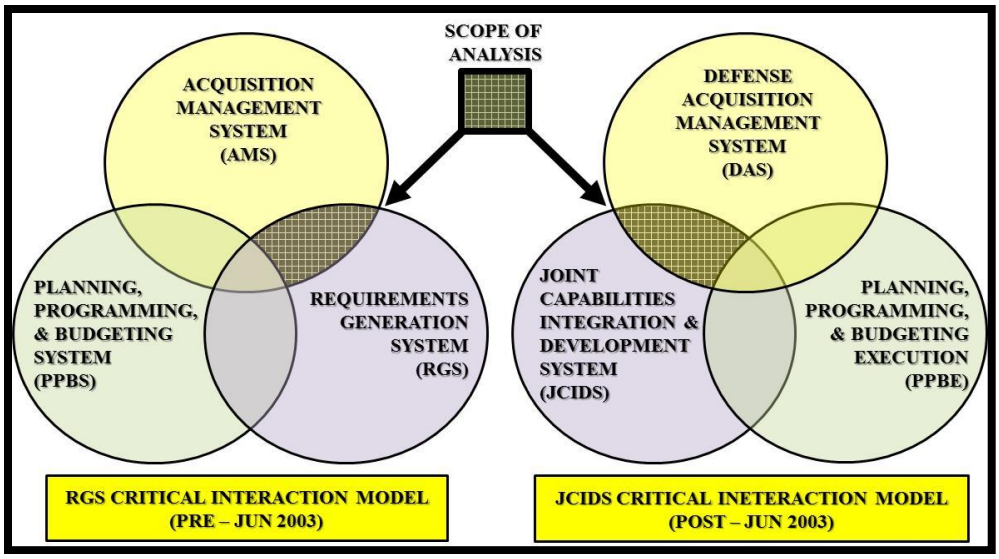


Figure 3. Scope of Analysis in Relation to the DoD Decision Support Systems (After CJCS, 2001, p. A-1)

One additional note pertaining to the scope of our project is with the research and data collected. Our project analyzes the requirements documents from the perspective of program managers and other personnel working within a program office.

E. RESEARCH METHODOLOGY SUMMARY

In this research project, the project team undertook three primary focuses. We focus on the evolution of the requirements generation documents prior to the Global War on Terror in Afghanistan and Iraq, the ongoing processes, including the JUONS process, that have supported the war, and the merger of both processes to develop future requirements. Within these areas of focus, we used a qualitative approach for document comparison. Another focus is a comparative analysis between three separate wheeled vehicles that were developed to meet the requirements from three separate requirement generation processes.

The project team utilized past and present policy and procedures, analyzed studies and reports produced during both RGP periods of RGS and JCIDS, reviewed past and present classes and trainings provided to the defense acquisition workforce, and conducted interviews with governmental subject-matter experts (SMEs) who have worked and lived through this period of time. All data were collected through public

records and all interviews adhered to the Naval Postgraduate School Institutional Review Board for the Protection of Human Subjects, Executive Decision Memorandum dated April 29, 2005.

F. ORGANIZATION OF MBA PROFESSIONAL REPORT

This project report is organized in the following order: the background of the requirements generation process, research methodology, case studies of the materiel requirements documents of the past and the present, results, and conclusions. In the background chapter, we provide an overview of the RGPs of the RGS and JCIDS and their respective requirements documents. In the research methodology chapter, we provide detailed information on how the study was conducted. In the next chapter, we present the case studies and results. In the case study, we provide an overview of evolutionary change versus revolutionary change and compare and analyze the requirements documents of three Army wheeled-vehicle platforms that have been affected by the different requirements generation processes with respect to Better Buying Power 2.0 and efficiency and effectiveness. In the results, we provide the findings from the comparative analysis. Finally, in the conclusions chapter, we provide answers to each of the proposed questions, techniques to effectively implement the project's recommendations, and the benefits of implementing the recommendations.

G. CHAPTER SUMMARY

In this chapter, we gave an overview of the background of the development of this project's topic, the purpose of this project, and the primary question and supporting questions that this project intends to answer. Additionally, in this introduction, we provided the scope of the project, the methodology that the project team utilized, and the organization of the project.

In the background chapter (Chapter II), we supply a synopsis for both the RGS and JCIDS RGP systems. In addition to the synopsis, we provide an overview of the requirements documents we analyzed for this project. Finally, we describe the key stakeholders that author, approve, and execute the MRDs and MCDs.

II. BACKGROUND

In this chapter, we provide an overview of the information required to understand the Army's requirement documents and their significance in the requirements generation process. We accomplish this by, first, describing the purpose as well as the evolution of the RGP from the Requirements Generation System to the current Joint Capabilities Integration and Development System. Second, we provide a summary of the requirement documents and their associated formats. Last, we describe the key stakeholders who author, staff, approve, and execute the requirement documents.

A. INTRODUCTION

In this project, we analyze the requirements documents that are utilized to create a materiel solution. Requirements documents are the essential records that articulate needs or requirements, and then refine such needs or requirements for a materiel solution if a non-materiel solution cannot be identified. Each requirement document has its specific designated authors, and the document is staffed for validation, approved by the respective authority, and executed within the Army's acquisition process. The requirements documents we discuss in this project were used during the requirements generation processes of the RGS (pre-June 2003) and the JCIDS (post-June 2003). The documents we analyzed in this project are listed in Table 1.

Table 1. Documents Analyzed for Project

RGS Materiel Requirements Documents	JCIDS Materiel Capabilities Documents
• Mission Needs Statement (MNS) • Operational Requirements Document (ORD)—Initial • Operational Requirements Document (ORD)—Revised	• Initial Capability Document (ICD) • Capability Development Document (CDD) • Capability Production Document (CPD) • Joint Urgent Operational Need Statement (JUON)

Our overview begins with the concepts on which these requirements documents were developed. These concepts are the purpose of each document, the RGPs in which

they were used, the time period in which they were used, why the RGS documents were replaced by the JCIDS documents and how they evolved, and how they are embedded in the DoD 5000 Defense Acquisition System (DAS). We have aligned these requirements documents in Figure 4 to illustrate their interface with the Defense Acquisition System.

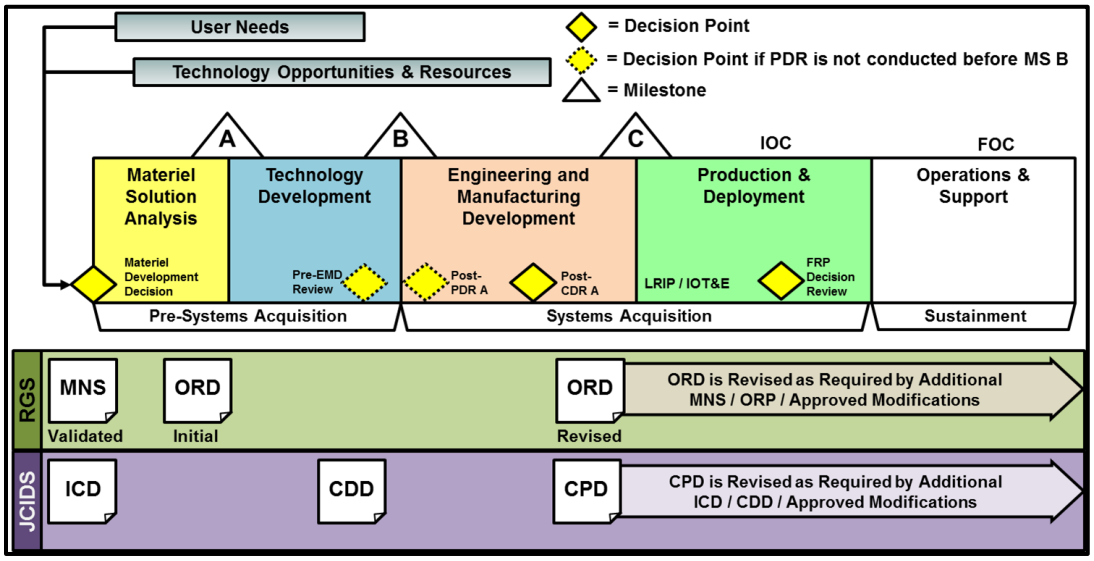


Figure 4. The Defense Acquisition System With Associated Requirements Documents (After DoD, 2008, p. 12)

Figure 4 is composed of several components to depict and guide the examination process we used in this project. We emphasize three specific segments in the figure. The first segment is the top portion. This area outlines the simplified version of the DoDI 5000.02 (DoD, 2008) DAS and identifies key milestones that occur between the specific phases of the process. The five phases are (1) Materiel Solution Analysis, (2) Technology Development, (3) Engineering and Manufacturing Development, (4) Production and Deployment, and (5) Operations and Support. In this project, we review the requirements documents that pertain to Phases 1, 2, 3 and 4, which take a program through Milestone (MS) A, B, and C.

The lower portion of Figure 4 outlines the requirements documents within their respective RGP. In the RGS (upper lane) and JCIDS (lower lane) sections are several document-shaped icons. Each icon represents a requirements document and is shown

where it would be implemented within the acquisition process. Requirements documents shifted in names, details, and locations within the acquisition process as the transition was made from RGS to JCIDS. The figure shows the past and present documents, and how the documents are nested into the DAS. Additionally, by depicting the requirements documents within the DAS, we have been able to better understand the transformation from one document to another.

We analyzed the documents required once a need/capability is identified (prior to MS A) to the time when a materiel solution is about to undergo LRIP. Once CJCSI 3170.1C (CJCS, 2003) cancelled CJCSI 3170.01B (CJCS, 2001) in 2003, ICD replaced the MNS, CDD replaced the ORD-Initial, and CPD replaced the ORD-revised. Both MNS and ICD are required before the decision point to move into Materiel Solution Analysis phase. The ORD-Initial is required before a materiel solution can enter MS A. However, the ICD moves forward through MS A, and the CDD is not required until the pre-EMD review and prior to entering MS B. Both ORD-revised and CPD are required prior to entry into MS C and LRIP. A detailed description of each requirements document is provided in this chapter.

B. REQUIREMENTS GENERATION PROCESSES

The Requirements Generation Process (RGP) is the documentation used by the Army to provide materiel and non-materiel solutions to fill capability gaps. The process identifies a system need or capability which brings an acquisition program from a mere thought to an actual product that is derived from the original need / capability. (How the Army Runs 2011-2012, p. 46). The RGP has been in a state of constant evolution since 2000. This evolution has resulted from transformation of the Army's force structure, advancement in technology, the state of the world, and threats to national security. Since 2000, the Army has realized that transformation is critical in order to accomplish present and future missions and strategic objectives. In 2002, the Army RGP was required to first address non-material solutions by considering doctrine, training, leader development, organization, materiel, and soldier (DTLOMS). The RGP consisted of four distinct

phases: Phase 1, Definition Phase; Phase 2, Documentation Phase; Phase 3, Validation Phase; and Phase 4, Approval Phase (U.S. Army War College, 2002).

During this time period (early 2000s), the Army was still operating under a force structure and MTO&E based on a Cold War mentality. The MTO&E brought clear expectations to the requirements for each level of organization within the Army. The MTO&E's priority focused on equipping heavy brigades with armored track vehicles like Abrams Tanks, Bradley Fighting Vehicles, and Armored Personnel Carriers. However, a heavy-force conflict has not occurred since the Gulf War and Operation Desert Storm (1990–1991). Conflicts ensuing after the Gulf War and Operation Desert Storm were Somalia (1992–1995) and the Balkans (1991–2001), but these operations used nowhere near the heavy force of Desert Storm. The scale of these operations neither caused nor influenced any significant changes in how the Department of Defense (DoD) conducted RGPs for materiel solutions.

Requirements started as a force development process to fill equipment shortfalls within the Army's formation. Identification of material solutions to fulfill needs would require a lengthy and arduous process. Then, going through the acquisition process often took up to 15 years before the material solution was fielded to soldiers. The Requirement Generation System (RGS) pre-June 2003 was very bottom-up focused. Bottom-up focus means the lower echelons state what they need or capabilities they want to have with regard for only their particular functional area. A bottom-up focus generally leads to unsynchronized actions and in acquisition can lead to systems that are incompatible with systems in other functional areas. This creates constraints on the material development system. Acquisition programs may end up being incompatible with other systems or may only serve one specific function within the specified area. However, with a "big picture" outlook, control can be placed on needs and capabilities to ensure compatibility and usefulness across all of the different functional areas within the Army.

General (GEN) Eric Shinseki, the chief of staff of the Army (CSA) in 2000, took operational and tactical, technical, and procedures (TTPs) lessons learned from the Balkans and recognized the importance of transforming the current Army's formation. GEN Shinseki's concept of transformation was to transition the legacy force into an

interim force and, ultimately, into an objective force. GEN Shinseki identified that transformation was not limited only to the Army's physical composition (force structure) but applied also to its doctrine (Burlas, 2003). A holistic change with regards to how the Army conducted operations was required to achieve a successful and seamless modification that would not interrupt the Army's ongoing missions (Shinseki, 2000). "Transformation isn't just about shiny new equipment—it's also about changing systems and processes" (Burlas, 2003). As a result, the Army's RGP would also need to transform to support the Army's initiatives of a highly mobile force that had the same lethality as a heavy force. The transformation would have to be top-down driven. Ultimately, GEN Shinseki's concept for modifying the RGP faced great resistance and slow change.

The events of 9/11 followed by the GWOT increased the need for the acquisition process to generate requirements more quickly. Capability gaps increased as well as the need to fill these gaps for the warfighter in order for them to execute their missions on the battlefield. It became the DoD's decision to revolutionize the RGP. Army leadership and the Joint Staff leadership recognized that the branch-centric approach with a sole acquisition focus for specific functional areas was no longer sufficient to meet warfighters' needs. Branch-centric mindsets and functions were inadequate to execute combat operations. "Requirements needed to be determined holistically and incorporate a greater perception of warfighting concepts focusing on the future and to provide the military with viable requirements" (U.S. Army War College, 2002, p. 5-5). The DoD evolved the RGS into the JCIDS. The change from RGS to JCIDS provides the DoD with the means to emphasize and structure the requirements generation process to begin looking at programs from a Joint perspective for all of the different Services. Consequently, the evolution of the RGS to JCIDS resulted in the modification of the requirements documents that facilitated materiel solutions.

The Army's process has evolved over the years; however, the basic concept of identifying system capabilities has always been a three-step procedure. First, it begins with the identification of a broad need or capability gap. Second, non-materiel or materiel solutions are recommended and every suggested proposal undergoes evaluation

to determine if it fulfills the need or capability. Third, a course of action is selected and refined with key performance parameters (KPPs). Figure 5 illustrates this concept.

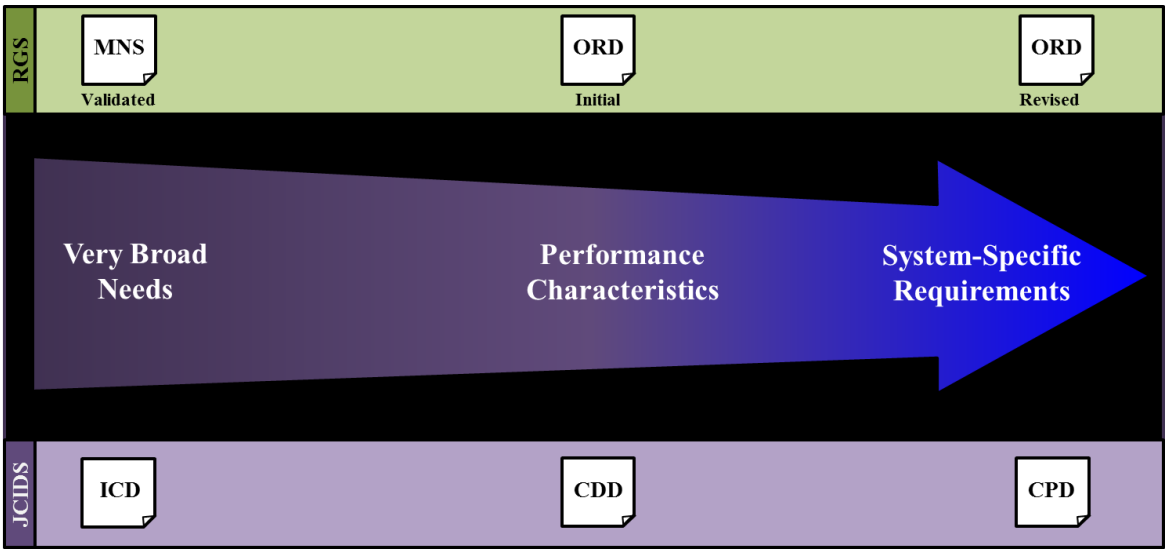


Figure 5. Identification of Systems Capabilities Flow Chart (After DAU, n.d., p. 4)

Each of these basic Army steps has an associated requirement document based on the time frame of the specific RGP (RGS or JCIDS) that is being followed: At Step 1, Very Broad Needs uses the MNS or ICD; at Step 2, Performance Objectives uses the ORD-Initial or the CDD; and at Step 3, System-Specific Requirements uses the ORD-Revised or CPD. It is necessary in our study to understand the difference between the RGS and JCIDS, and how the RGP has evolved.

1. Requirements Generation System (Pre-June 2003)

We begin our study chronologically based on time and occurrence within the RGP. The starting point is RGS, outlined in the Chairman of the Joint Chiefs of Staff Instruction (CJCSI) *Requirements Generation System*, or CJCSI 3170.01B (CJCS, 2001), dated April 15, 2001. This was then cancelled by CJCSI *Joint Capabilities Integration and Development System*, or CJCSI 3170.01C (CJCS, 2003), dated June 24, 2003. Additionally, the three DoD decision support systems during this time period, shown in Figure 3, were the RGS, the Acquisition Management System, and the Planning, Programming, and Budgeting System (PPBS; CJCS, 1999). A close and effective

interface among these systems is required to ensure quality products are acquired for the nation's armed forces (Peppe, 2002). The RGS produced information for decision-makers on the projected mission needs of the warfighter and was a bottom-up-driven process, with the lowest level echelon in a particular functional area stating its desired needs and initiating the requirements process.

Figure 6 shows the initiation of the RGS from both the bottom echelon and top echelon of leadership. The top portion of the figure shows the staffing effort, whereas the bottom portion shows the movement of requirements documents for definition, validation and approval.

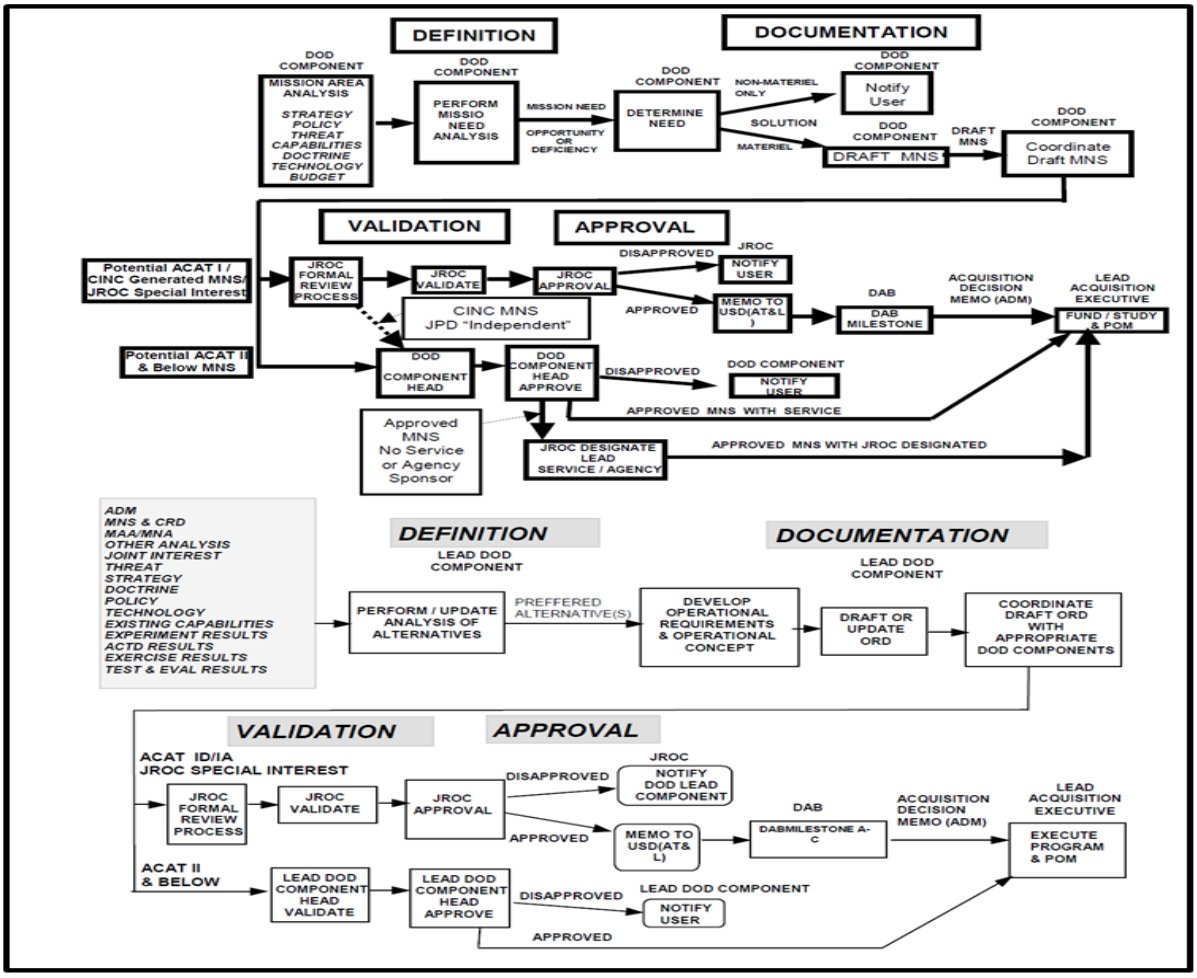


Figure 6. RGS Requirements Documents Approval Process: Requirements and Acquisition Interface Model (From CJCS, 2001, p. C-1, D-1)

The first requirements document aided decision-makers in the RGS by translating the identified mission needs into more broad and generalized operational terms, known as the mission needs statement (MNS; U.S. Army War College, 2002). MNSs document the needs of the Army's operational requirements that could potentially result in a materiel solution and, eventually, in a new defense acquisition program. Validation of the MNS confirms that after much analysis, a non-materiel solution alone cannot satisfy the need, and that a potential "new concept/system" materiel solution should be considered (Peppe, 2002). Subsequently, the needs expressed in the MNS are developed into requirements by the RGP in the form of operational requirements documents (ORDs) or capstone requirements documents (CRDs; CJCS, 2001).

Capstone requirements documents are excluded from the scope of this paper. However, a description of them follows to provide greater understanding of requirements documents and the RGP. CRDs outline the necessary development guidance for ORDs. The guidance provides a means to validate performance-based capabilities for a specific mission area. Additionally, this mission area may form a system of systems (SoS) or family of systems (FoS). CRDs are a combination of two or more MNSs or ORDs, or a combination of both (U.S. Army War College, 2002). ORDs define the MNS and (if applicable) CRD requirements into detailed, refined performance capabilities and characteristics of the proposed system. ORDs provide the specific requirements baseline for the Acquisition Management System (AMS) and the Planning, Programming, and Budgeting System (PPBS; CJCS, 2001).

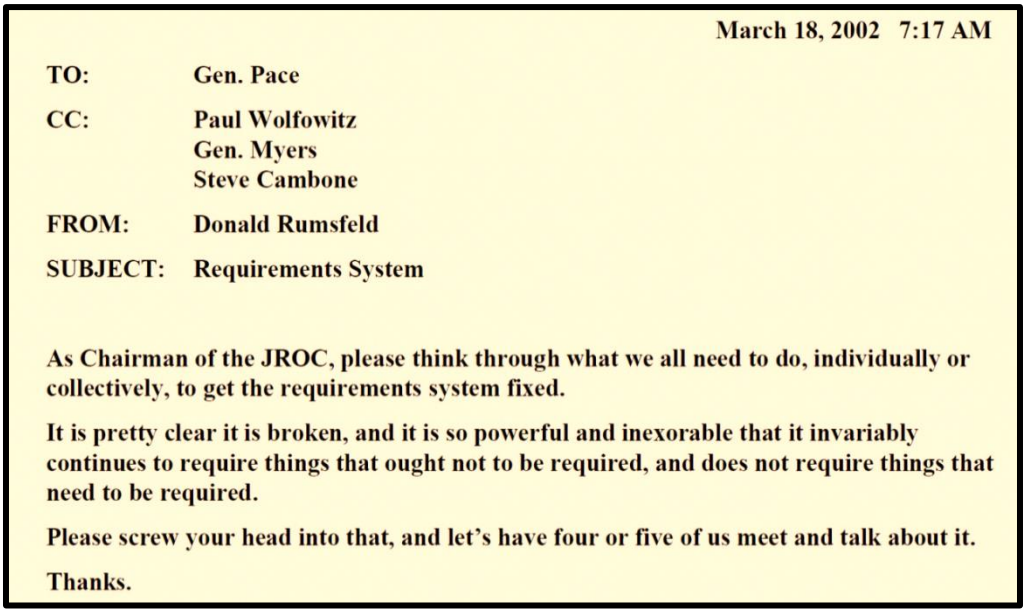
Within the first years after the U.S. deployment into Afghanistan, the RGS reached its culmination and was no longer effective for both the DoD and the Army. The culmination led the DoD to evolve its process for requirements generation from the RGS to the JCIDS.

2. Joint Capabilities Integration Development System (2003–Present)

In 2003, Secretary of Defense (SECDEF) Donald Rumsfeld directed the DoD to change the requirements generation process (Figure 7).

> The Department currently is pursuing transformational business and planning practices such as adaptive planning, a more entrepreneurial, future-oriented capabilities-based resource allocation process, accelerated acquisition cycles built on spiral development, out-put based management, and a reformed analytic support agenda. (DoD, 2003, p. 1)

SECDEF Rumsfeld identified the need for the process to be less Service-centric, while having a greater Joint-centric focus. The intent of the JCIDS concept was to eliminate the unnecessary stove-piped mentality of the Services and write requirements for systems that could be used across all Service. This note may be seen in Figure 7.



March 18, 2002 7:17 AM

TO: Gen. Pace

CC: Paul Wolfowitz
Gen. Myers
Steve Cambone

FROM: Donald Rumsfeld

SUBJECT: Requirements System

As Chairman of the JROC, please think through what we all need to do, individually or collectively, to get the requirements system fixed.

It is pretty clear it is broken, and it is so powerful and inexorable that it invariably continues to require things that ought not to be required, and does not require things that need to be required.

Please screw your head into that, and let's have four or five of us meet and talk about it.

Thanks.

Figure 7. Memo From Secretary of Defense That Began JCIDS (From Force Structure, Resources, and Assessments Directorate [JCS J-8], 2006, p. 5)

The DoD immediately responded to the SECDEF and began planning to quickly change the RGP. Fifteen months after receiving the SECDEF's email, General Peter Pace, the chairman of the Joint Chiefs of Staff, answered with an approved solution. By June 24, 2003, the JCIDS replaced RGS and CJCSI 3170.01C (CJCS, 2003) replaces CJCSI 3170.01B (CJCS, 2001) as the new doctrine. The primary goal of the JCIDS is to provide the Joint Force with the necessary capabilities required to operate in full-spectrum operations. The JCIDS has three founding principles:

1. Description of needs by capabilities instead of systems,

2. Emphasis on needs at the joint level instead of at the level of separated branches [of Service], and

3. One single general or flag officer to manage the separate DoD functional portfolios. (CJCS, 2003)

The evolutionary change from the RGS to JCIDS also changed the range of considerations of non-materiel solutions from DTLOMS (doctrine, training, leader development, organization, materiel, and soldier) to DOTMLPF (doctrine, organization, training, materiel, leadership and education, personnel, and facilities). Essentially, this modification changed *leader development* to *leadership and education*, changed *soldier* to *personnel*, and added *facilities*. Materiel solutions would be pursued if a non-materiel solution could not be identified through the initial DOTMLPF analysis. Four major steps must occur in the analysis prior to the development of a materiel solution. The following list outlines the four steps found in the Defense Acquisition University class "Functionality of the JCIDS Process" (DAU, 2011):

Step 1. Top-down analysis based on the National Security Strategy (NSS), National Defense Strategy (NDS), and the Joint Vision 2020;

Step 2. Integrated architectures of multiple operating systems analysis;

Step 3. Capability gaps/shortcomings and associated risk analysis; and

Step 4. Materiel solution recommendation which would lead to the initiation of an acquisition program. (p. 5)

Figure 8 demonstrates the change implemented through the SECDEF's guidance. The figure shows the change from threat-based to capability-based planning and the movement from a bottom-up approach to a top-down approach. The left side of the figure shows the RGS process while the right side shows the JCIDS process.

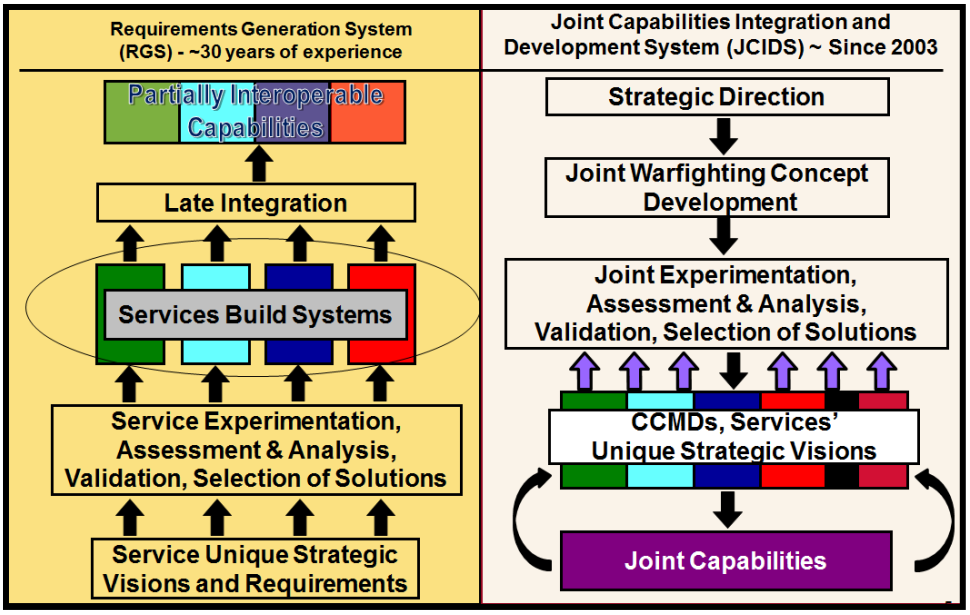


Figure 8. Threat vs. Capability-Based Planning (From Willis, 2012, slide 5)

The JCIDS suspended existing RGS documents, which consisted of the MNS and ORDs with the ICD, CDD, and CPD. Figure 9 outlines each of the JCID documents and shows how each document is intended to fit into the JCIDS process.

The flow shown in Figure 9 occurs from enclosures (boxes) that progress into decision points (diamonds) and then displays appropriate end points dependent on the path followed. The ICD is found at the Enclosure B step. At the Enclosure D and E steps is where requirements documents (ICD, CDD, CPD, JUONS) enter the decision points. The subsequent steps are based on the decision points. A "no" decision leads to the end of the process and possible reworking/correcting of documents. However, a "yes" decision moves the requirements documents into the deliberate acquisition process. This process may be better understood by viewing the flow lines Figure 9.

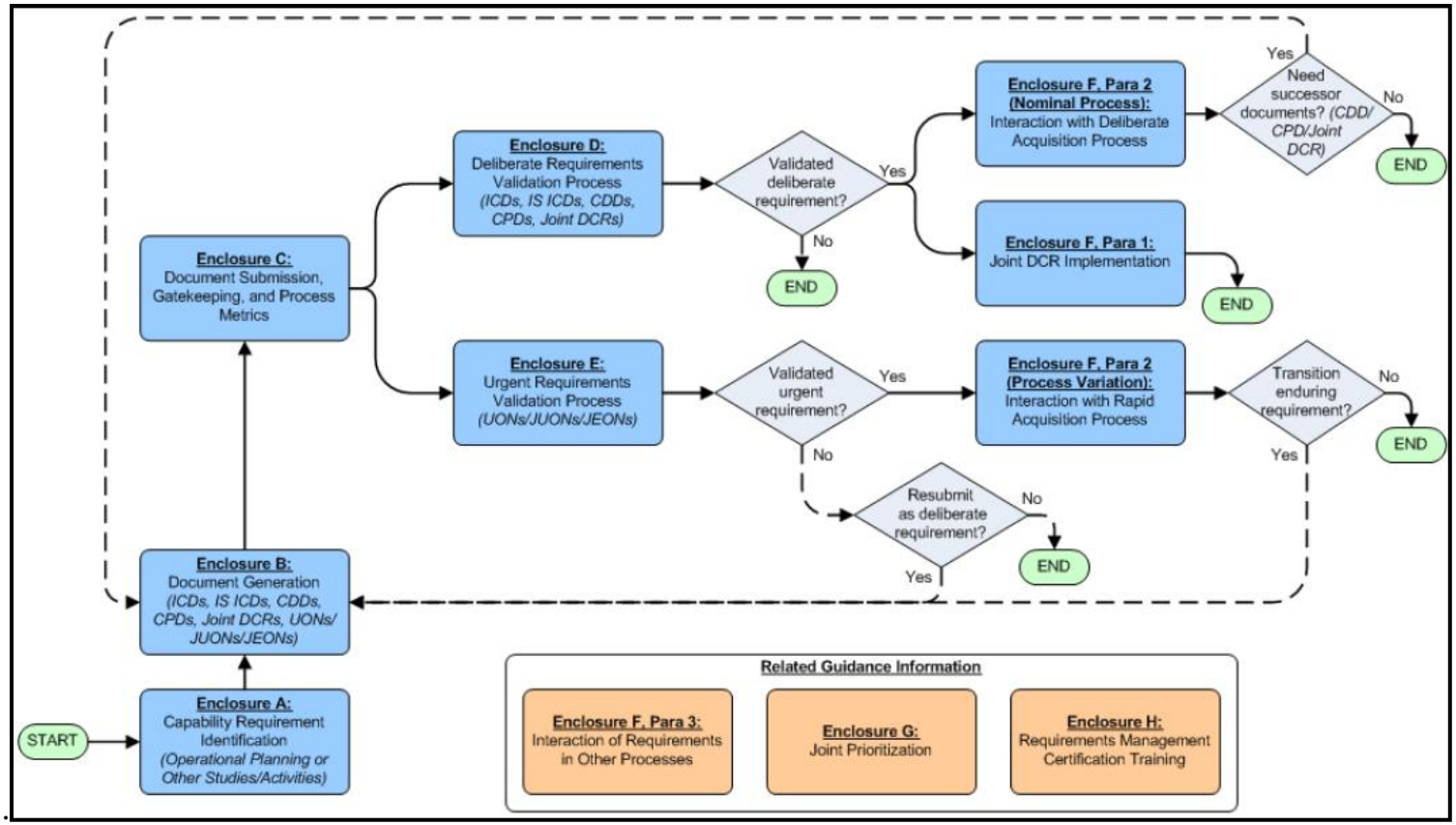


Figure 9. JCIDS Requirements Documents Approval Process
(From Joint Requirements Oversight Council [JROC], 2012b, p. 2)

Since 2003, the JCIDS process has been updated six times from version C through version H, which was published in January 2012 (CJCS, 2012). We now discuss the details for each of the specific documents, after going through an overview for the different materiel requirement processes.

C. REQUIREMENTS GENERATIONS SYSTEM (RGS) MATERIEL REQUIREMENTS DOCUMENTS (MRD)—(1999–JUNE 2003)

The RGS provides information for decision making stakeholders to better understand the warfighter's mission needs. The acquisition process begins once the milestone decision authority (MDA) decides whether or not the need will be met with a material solution. This is based on the materiel development decision that identifies that the operational capability cannot be met a non-material solution. As per CJCSI 3170.01B (CJCS, 2001), requirements are defined as mission needs: "A deficiency in current capabilities or an opportunity to provide new capabilities (or enhance existing capabilities) through the use of new technologies. They are expressed in broad operational terms by the DOD components" (p. 84). The three major requirements documents that were used to fulfill the U.S. Army's RGS from the identified need to LRIP are the mission needs statement (MNS), the operational requirements document (ORD)-Initial, and the ORD-Revised. An additional capstone requirements document (CRD) was only needed as required. The Global Information Grid (GIG), which was approved in JROCM 134-01, dated August 30, 2001 (U.S. Joint Forces Command, 2001), is an example of a requirement that needed a CRD.

> The concept of a "Global Information Grid" (GIG) was born out of concerns regarding interoperability and end-to-end integration of automated information systems. Issues such as streamlined management and the improvement of information infrastructure investment have also contributed to the heightened interest in a GIG. However, the real demand for a GIG has been driven by the requirement for information superiority and decision superiority to achieve full spectrum dominance, as expressed in Joint Vision 2020 (JV 2020). JV 2020 also highlights the importance of a network-centric warfare (NCW) environment, enabled by the GIG by means of dramatically improved information sharing through the robust networking of warfighting forces. (U.S. Joint Forces Command, 2001, p. 2)

CRDs were a means to combine requirements with multi-systems functions. Figure 10 depicts the necessary requirements documents and the interface with the acquisition system.

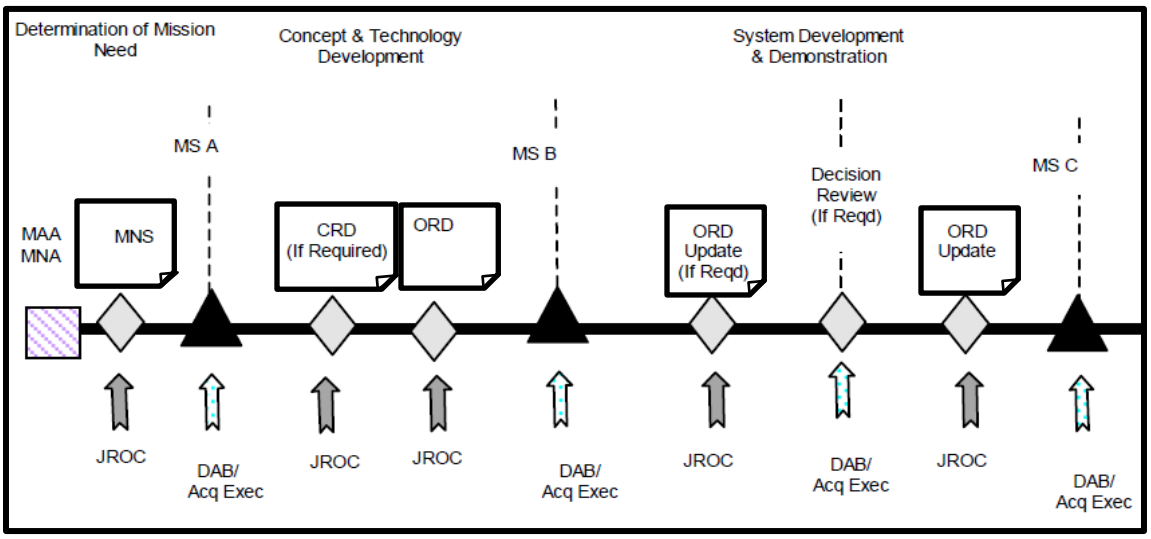


Figure 10. Requirements and Acquisition Interface Model (From CJCS, 2001, p. A-2)

1. Mission Needs Statement

The initial requirements document in the Army's RGS is a mission needs statement (MNS). The MNS is a non-system-specific document that states an operational capability need(s). By this, it is not directed for a specific desired system. The MNS identifies a capability in broad operational terms. The MNS describes the warfighters operational requirements and constraints that must be DOTMLP analyzed, and may result in a materiel or non-materiel solution. The MNS is developed by four distinct phases: (1) definition, (2) documentation, (3) validation, and (4) approval (CJCS, 2001).

The MNS may be initiated by any of the unified commands, military departments, Office of the Secretary of Defense (OSD), or the Joint Staff. However, the Combat Developer (CBTDEV; see Combat Developers/Capability Developers in the stakeholder section) within the U.S. Army Training and Doctrine Command (TRADOC) produces the MNS. The MNS outlines a list of operational capabilities, but does not identify a specific materiel solution or system. A warfighting MNS is approved by the chief of staff of the

Army. A CBTDEV-led integrated concept team (ICT, see Integrated Teams in the stakeholder section) evaluates the capabilities of the MNS. This ICT identifies the strategy to test and evaluate a system of materiel solutions that attempts to answer the MNS.

The Unified Commands, the military departments, OSD, or the Joint Staff identify mission needs. The Army Requirements Oversight Council (AROC), prior to making a recommendation to the chief of staff of the Army, will review all Joint/other Service requirements. The chief of staff of the Army approves all MNSs outlining the warfighters' needs.

As per CJCSI 3170.01B: Appendix A to Enclosure C, dated April 15, 2001 (CJCS, 2001, p. C-A-1), the MNS format consists of the following parts:

Part 1. Defense Planning Guidance Element
Part 2. Mission and Threat Analysis
Part 3. Non-Materiel Alternatives
Part 4. Potential Materiel Alternatives
Part 5. Constraints
Part 6. Joint Potential Designator

2. Operational Requirements Document

The operational requirements document (ORD) follows the MNS. Prior to entry into MS B, the ORD is written to answer the MNS. The ORD is a document that outlines the performance and operational boundaries as a result of the proposed solution for an MNS. The CBTDEV/training developer (TNGDEV, see Combat Developers/Capability Developers in the stakeholder section) defines the objective requirement parameters. The CBTDEV/TNGDEV identifies the significant operational capability. The ORD-Initial must contain the bottom-line thresholds that the capability must meet through KPPs.

The Headquarters, Department of the Army (HQDA) must approve all ORDs before a program is approved. Acquisition programs must also receive HQDA approval for all non-developmental items, commercial items, or items with mature technology. The Joint chief of staff or other Service-specific (JROC approved) leadership may only approve acquisition category (ACAT) ID-level programs. The chief of staff of the Army may approve all Army-specific programs at the ACAT IC level.

The ORD-Revised later redefines the KPP as well as the objective requirements for a materiel solution. ORDs are revised prior to MS C and are required to receive approval to enter MS C. Refinement to ORDs occurs after MS B but prior to MS C if there are any changes in the mission needs.

As per CJCSI 3170.01B: Appendix A to Enclosure E, dated April 15, 2001, (CJCS, 2001, p. E-A-1) the ORD format consists of the following parts:

Part 1. General Description of Operational Capability
Part 2. Threat
Part 3. Shortcomings of Existing Systems and C4ISR Architectures
Part 4. Capabilities Required
- Part 4.a. System Performance
- Part 4.b. Information Exchange Requirements
- Part 4.c. Logistics and Readiness
- Part 4.d. Environmental, Safety and Occupational Health (ESOH) and Other System Characteristics

Part 5. Program Support
- Part 5.a. Maintenance Planning
- Part 5.b. Support Equipment
- Part 5.c. C4I/Standardization, Interoperability, and Commonality
- Part 5.d. Computer Resources
- Part 5.e. Human Systems Integration
- Part 5.f. Other Logistics and Facilities Considerations
- Part 5.g. Transportation and Basing
- Part 5.h. Geospatial Information and Services
- Part 5.i. Natural Environmental Support

Part 6. Force Structure
Part 7. Schedule
Part 8. Program Affordability

3. Capstone Requirements Documents

We do not analyze the capstone requirements document in our study. However, understanding the CRD is necessary for the overall understanding of the purpose of requirements documents. CRDs are the combination of more than one MSN, ORD, or program developed as a family-of-systems (FoS) or systems-of-systems (SoS). The CRD links MSNs or programs into one synchronized ORD for future production of a materiel solution. Nonetheless, CRDs are capabilities-based requirements that combine requirements documents and provide a means to merge the framework of multiple operational initiatives and create the standards for the development of materiel solutions.

CRDs are the overarching requirements documents that tie multiple needs together in order to meet core capabilities, such as a vehicle requiring a specific level of survivability, which also possesses communication, protection, transportability, power, and maneuverability capabilities to meet a need.

CRDs are approved by HQDA unless they are ACAT ID, Joint, or other Service-specific (JROC approved). As per CJCSI 3170.01B: Appendix A to Enclosure D, dated April 15, 2001 (CJCS, 2001, p. D-A-1), the CRD format consists of the following parts:

Part 1. General Description of Operational Capability
Part 2. Threat
Part 3. Shortcomings of Existing Systems and C4ISR Architectures
Part 4. Capabilities Required

D. JCIDS MATERIEL CAPABILITIES DOCUMENTS (MCD)—(POST JUNE 2003–PRESENT)

In 2003, the Joint Capabilities Integration and Development System (JCIDS) replaced the RGS. There were some very noteworthy changes that took place outside of merely the processes and documentation. Concepts and terminology were also changed. The Materiel Capabilities Document replaced the term Materiel Requirements Document. Doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) replaced DTLOMS. "Mission Needs," a term commonly used in CJCSI 3170.01B, was no longer a term in CJCSI 3170.01C; and the term "Capability Gaps" was added. Capability gaps are "those synergistic resources (DOTMLPF) that are unavailable but potentially attainable to the operational user for effective task execution" (CJCS, 2003, p. GL-4). By CJCSI 3170.70H (January 10, 2012), capability gaps had evolved into the following definition: "the inability to execute a specified course of action. The gap may be the result of no existing capability, lack of proficiency or sufficiency in an existing capability solution, or the need to replace an existing capability solution to prevent a future gap" (CJCS, 2012, p. 31). In addition, DOTMLPF was replaced by DOTmLPF-P (doctrine, organization, training, materiel, leadership, policy and education, personnel, facilities, and policy).

Part of our analysis has been to understand why CJCIS 3170.01 has undergone so many evolutionary changes. This is consistent with the concept of the evolutionary

changes to the RGP. In fewer than nine years, the JCIDS has had to evolve and adapt to the changing environment of the GWOT. Within this time period, the DoD has adapted and evolved the JCIDS process to improve efficiency or effectiveness and continues to reevaluate its overall process. This has caused the JCIDS process to undergo six revisions from CJCSI 3170.01C (CJCS, 2003) through CJCSI 3170.01H (CJCS, 2012). Table 2 shows the length of time between each change. However, this evolutionary change may have been necessary because of the revolutionary change experienced from moving from RGS to JCIDS. Regardless, a revolutionary change for JCIDS has not been planned or executed but evolutionary changes to the process have been redundantly implemented. This is not so much a fault of the DoD, but a necessary evil of the situation. We have analyzed whether a recurring evolution will be efficient and effective for JCIDS in the future. A revolutionary change to JCIDS may be necessary if the process is no longer effective and efficient, like its predecessor, the RGS. Plus, another consideration for implementing changes is if materiel solutions are not meeting warfighters' expectations in a timely manner.

Table 2. JCIDS Amendments and Number of Months Amendment Was Valid

Publication	Date of Publication	Number of Months Until Changed
CJCSI 3170.01C	June 24, 2003	Approximately nine Months
CJCSI 3170.01D	March 14, 2004	Approximately nine Months
CJCSI 3170.01E	May 11, 2005	Approximately 11 Months
CJCSI 3170.01F	May 1, 2007	Approximately 24 Months
CJCSI 3170.01G	March 1, 2009	Approximately 22 Months
CJCSI 3170.01H	January 10, 2012	Ongoing

Each change brought a new publication or update to the existing CJCSI for the RGP. However, the one constant that remained amongst each of the changes was documents and their timing within the JCIDS. Figure 11 shows the alignment of the different materiel requirements documents (ICD,CDD,CPD), the associated review/approval authority (triangles), and the MS review boards for entering into the specific MS phase of the RGP (MS-A, MS-B, MS-C). The flow of the figures

demonstrates the movement and use of documents as an acquisition program approaches its MS and then transitions to the next phase within its timeline. An example of this is moving from MS A to MS B. The acquisition program exits MS A with the appropriate approval, transitions from using the ICD to using the CDD at MS B, as depicted in the below.

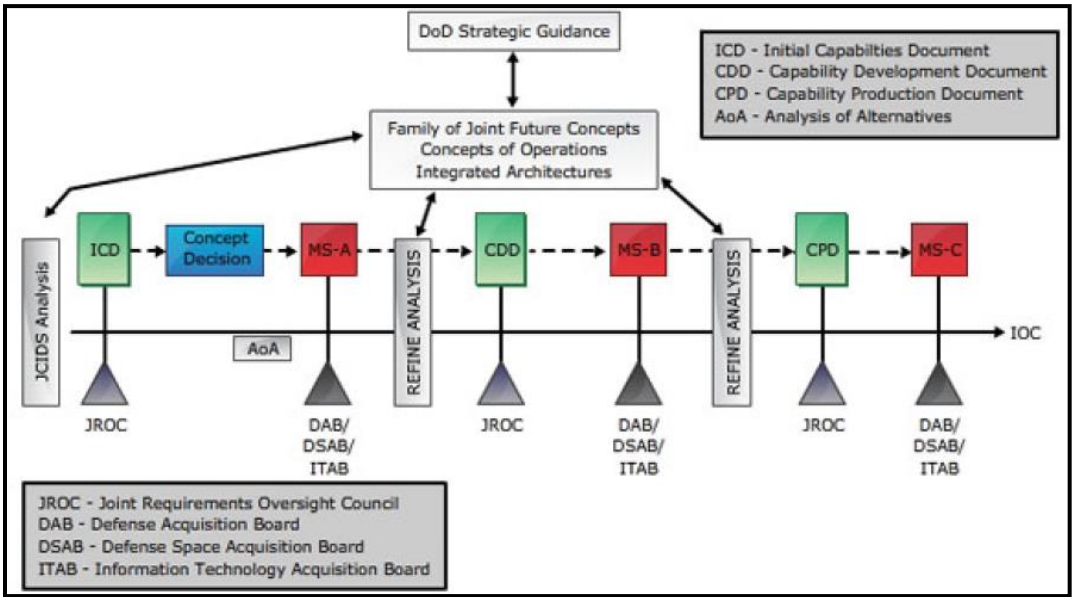


Figure 11. Flow of Materiel Capabilities Documents in the JCIDS Process (From DAU, 2011, p. 2)

1. Initial Capabilities Document

The initial capabilities document (ICD) replaced the MNS. This document is required at the decision point prior to moving into the materiel solution analysis phase. The purpose of the ICD is to document the possible non-materiel or materiel solution or a mixture of both to satisfy an identified capability gap. The ICD is similar to its predecessor, the MNS, because it is not system specific. The ICD only describes the capability needed or a capability gap. However, if a materiel solution is approved by the MDA then an analysis of alternatives (AoA) might be required. The AoA would be used to support an MS A decision (Headquarters, Department of the Army [HQDA], 2009).

In CJCSI 3170.01C (CJCS, 2003), ICDs were defined as follows:

> Documents the need for a materiel approach to a specific capability gap derived from an initial analysis of materiel approaches executed by the

> operational user and, as required, an independent analysis of materiel alternatives. It defines the capability gap in terms of the functional area, the relevant range of military operations, desired effects and time. The ICD summarizes the results of the DOTMLPF analysis and describes why non-materiel changes alone have been judged inadequate in fully providing the capability. (p. GL-6)

In CJCSI 3170.01H (CJCS, 2012), ICDs is redefined as follows:

> Summarizes a CBA and justifies the requirement for a materiel or non-materiel approach, or an approach that is a combination of materiel and non-materiel, to satisfy specific capability gap(s). It identifies required capabilities and defines the capability gap(s) in terms of the functional area, the relevant range of military operations, desired effects, time and doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) and policy implications and constraints. The ICD summarizes the results of the DOTMLPF and policy analysis and the DOTMLPF approaches (materiel and non-materiel) that may deliver the required capability. The outcome of an ICD could be one or more joint DCRs or recommendations to pursue materiel solutions. (p. GL-5)

Initially in 2003, CJCSI 3170.01C outlined that the documents were focused on a materiel solution to meet a capability gap. This would often result in the creation of new programs. The intent evolved over nine years as CJCSI 3170.01 was modified through versions C, D, E, F, G, and H. CJCSI 3170.01H outlined a more revised approach for the ICD. The definition for the most recent ICD still includes a possible materiel solution, but also includes non-materiel solution, changes to policy, changes to DOTMLPF, or variations of combining these to fill a capability gap. This shift in intent for changes to the purpose of the ICD is a result of changes in the DoD's budget, organizations, operations, and considerations of the future state of the DoD in downsizing.

The ICD provides an overview of the capability-based assessment where a non-materiel solution has been identified not to exist or to be inadequate to meet the needs of a capability gap. The ICD must consider DOTMLPF non-materiel solutions. The ICD also proposes a materiel approach and must justify why the proposed materiel approach best meets the needs to solve the required capability gap. Once the document has been written and approved it can lead to one or more DOTMLPF Integrated Capabilities Recommendation (DICR), DCR, CDD, or CPD (HQDA, 2009).

As per the JCIDS Manual, (CJCS, 2012, p. B-1), the ICD format consists of the following parts:

Part 1. Length (Part 3 and Appendix A may not exceed 10 pages)
Part 2. Cover Page
- Part 2.a. Classification
- Part 2.b. Title. The title must start with the phrase "Initial Capability Document for…"
- Part 2.c. Sponsoring organization
- Part 2.d. Date submitted by the sponsoring organization
- Part 2.e. Points of contact (primary and secondary)
- Part 2.f. Proposed validation authority
- Part 2.g. Proposed milestone decision authority
- Part 2.h. Proposed joint staff designator

Part 3. Executive Summary (Seven primary sections)
- Section 1. Contingency operations (CONOP) summary
- Section 2. Joint Capability Area (JCA) and identified Integrated Security Construct (ISC)
- Section 3. Capability requirements
- Section 4. Capability gaps and overlaps/redundancies
- Section 5. Threat and operational environment
- Section 6. Assessment of non-materiel approaches
- Section 7. Final recommendation

Appendix A. Architecture data
Appendix B. References
Appendix C. Acronym List
Appendix D. Glossary

2. Capability Development Document

This document replaced the ORD-initial. The capability development document (CDD) is developed during MS A and is required prior to the MDA's decision for approval for moving into MS B. The ICD develops and guides the CDD. A CDD is not submitted until the AoA is complete, unless there is an approved justification regarding why an AoA is not required. The CDD is the document that allows the sponsor(s) to further refine the required capabilities. These capabilities are expressed as performance attributes that contain threshold and objective values (HQDA, 2009). The sponsor enhances the capability required by defining the KPPs, key system attribute (KSA), or other descriptors. CDDs must be updated with any changes to the KPPs. Additionally, the KPPs contained in the CDD are taken verbatim into the acquisition program baseline (APB) and are validated by the JROC (HQDA, 2009).

Since the CDD serves as the next main step for MCDs, there is no surprise that it contains information necessary for the development of the proposed program. Plus, it routinely follows an incremental acquisition strategy. To aid in this process, "the CDD outlines an affordable increment of militarily useful, logistically supportable, and technically achievable or mature capability" (HQDA, 2009, p. 20). In addition to this, the CDD can be used for multiple increments if sufficient performance attributes are properly defined. One or more CDDs may be developed to provide support for multiple or complex capability gaps that are identified and explained within a single ICD (HQDA, 2009).

As per the JCIDS Manual, Enclosure B (CJCS, 2012, pp. B-29–B-37), the CDD format consists of the following parts:

Part 1. Length. (Part 3 and Appendix A may not exceed 45 pages)
Part 2. Cover Page.
Part 2.a. Classification
Part 2.b. Title. The title must start with the phrase "Capability Development Document for…"
Part 2.c. Sponsoring organization, and signature authority who authorized the submittal into JCIDS. New CDDs, and modifications to previously validated CDDs, must be endorsed by the Service, CCMD, or other DoD Component J8 equivalent or higher
Part 2.d.
(d) Date submitted by the sponsoring organization.
(e) Primary and secondary POCs for the document sponsor. Include name, title/rank, phone, and both Non-Classified Internet Protocol (IP) Router Network (NIPRNET) and Secure IP Router Network (SIPRNET) email addresses. POCs must have completed the appropriate level of RMCT in accordance with Enclosure H.
(f) Proposed validation authority
(g) Proposed MDA
(h) Proposed JSD
Proposed Acquisition Category (ACAT)
(3) Executive Summary. An executive summary, not to exceed one page, shall follow the cover page and precede the body of the CDD.
c. Section Descriptions. The CDD shall have the following 16 sections, followed by four appendices.
(1) Capability Discussion
(a) Discuss the operating environment of the system.
(b) If the CDD is part of an FoS or SoS solution, identify the source ICD and related CDDs and CPDs.

(2) Analysis Summary
(3) CONOPS Summary
(4) Threat Summary
    (a) Summarize the projected threat environment and the specific threat capabilities to be countered to ensure the capability gap can be mitigated.
    (b) Programs designated as ACAT I/ID (or potential ACAT I/ID) must incorporate DIA-validated threat references.
    (c) During staffing, documents with JSDs of JROC Interest, JCB Interest, and Joint Integration will be subject to Defense Warning Office (DWO) threat validation in accordance with reference pp.
(5) Program Summary
(6) Development KPPs, KSAs, and additional performance attributes
    (a) Sponsors must consider the six "required" KPPs detailed in Appendix A to this Enclosure.
    (b) Sponsors should avoid over specification of KPPs/KSAs, or inclusion of technical specifications as KPPs/KSAs, unless essential to addressing a specific capability gap.
    (c) Provide a description of each attribute and list each attribute in a separate numbered subparagraph.
    (d) Present each attribute in output-oriented, measurable, and testable terms.
    (e) Provide tables summarizing specified KPPs, KSAs, and additional performance attributes in threshold/objective format, as illustrated in Tables B-6 through B-8.
(7) SoS Synchronization. In SoS capability solutions, the CDD Sponsor is responsible for ensuring that related capability solutions, identified in other CDDs and CPDs, remain compatible and that the development is synchronized.
    (a) Discuss the relationship of the system described in this CDD to other systems contributing to satisfying the capability requirements.
    (b) Provide a table that briefly describes the contribution this CDD makes to the fulfillment of capability requirements and closing of capability gaps described in the applicable ICDs, and the relationships to other CDDs and CPDs that also support these capability requirements, as illustrated in Table B-9.
(8) Spectrum Requirements

(9) Intelligence Supportability
    (a) Identify, as specifically as possible, all projected need for intelligence support throughout the expected acquisition life cycle in accordance with reference pp.
    (b) During staffing, documents with JSDs of JROC Interest, JCB Interest, and Joint Integration will be subject to Joint Staff J-2 intelligence certification in accordance with reference pp.
(10) Weapon Safety Assurance. In accordance with reference tt, all munitions capable of being handled, transported, used, or stored by any Service in joint warfighting environments are considered to be joint weapons and require a joint weapons safety review in accordance with Appendix A to Enclosure D of this Manual and references tt through vv.
    (a) System Safety
    (b) Insensitive Munitions
    (c) Fuze Safety
    (d) Explosive Ordnance Disposal
    (e) Demilitarization/Disposal
    (f) Laser Safety
(11) Technology Readiness Assessment
(12) Assets Necessary to Achieve IOC
(13) IOC and FOC Schedule Definitions
(14) DOTmLPF-P Considerations
    (a) Discuss any additional DOTmLPF-P implications associated with fielding the system, to include those approaches that would impact CONOPS or plans within a CCMD Area of Responsibility (AOR).
    (b) Highlight the status (timing and funding) of the other DOTmLPF-P considerations.
    (c) Describe, at an appropriate level of detail, the key logistics criteria, such as system reliability, maintainability, transportability, and supportability that will help minimize the system's logistics footprint, enhance mobility, and reduce the total ownership cost.
    (d) Detail any basing needs (forward and main operating bases, institutional training base, and depot requirements).
    (e) Specify facility; shelter; supporting infrastructure; and Environment, Safety, and Occupational Health (ESOH) asset requirements, and the associated costs, availability, and acquisition MS schedule(s) related to supporting the system.

(f) Describe how the systems will be moved either to or within the theater, and identify any lift constraints.

(15) Other System Attributes

(a) Anti-tamper, embedded instrumentation, electronic attack (EA), and wartime reserve mode (WARM) requirements.

(b) Human Systems Integration (HSI) considerations that have a major impact on system effectiveness and suitability.

(c) Natural environmental factors (climatic design type, terrain, meteorological and oceanographic factors, impacts and effects).

(d) Expected level of capability provided in various mission environments, if degraded relative to KPPs, KSAs, and additional performance attributes articulated in Section 6 of the CDD.

(e) Physical and operational security needs.

(f) Weather, oceanographic and astro-geophysical support needs throughout the program's expected life cycle, including data accuracy and forecast needs.

(g) For intelligence, surveillance, and reconnaissance (ISR) platforms, issues relating to information security and protection standards.

(h) For systems that may be used in combined allied and coalition operations, issues relating to applicable U.S.-ratified international standardization agreements which will be incorporated in the derived system requirements, in accordance with references ggg and hhh.

(i) Whether or not the system must be able to survive and operate through chemical, biological, radiological, and nuclear (CBRN) environments in accordance with reference iii.

(16) Program Affordability. Show total cost as shown in Table B-10, including cost by FY and type of funding based upon threshold levels of performance.

d. Appendices

(1) Appendix A: Net-Ready KPP (NR KPP) Architecture Data

(2) Appendix B: References

(3) Appendix C: Acronym List

(4) Appendix D: Glossary

3. Capability Production Document (CPD)

This document replaced the ORD-revised just prior to LRIP. The capability production document (CPD) can also be an amended version of the CDD, which is useful since these documents have a similar format (HQDA, 2009). "The CPD addresses the production elements specific to a single increment of an acquisition program resulting from an approved CDD or mature existing technology" (HQDA, 2009, p. 20). A key difference between the CDD and the CPD is the use of performance attributes. The CPD transforms the performance specification threshold and objective values into production threshold and objective values (HQDA, 2009). Another difference between the two documents is that a CPD is required for any acquisition program to enter into production, whereas the CDD is needed for an acquisition program that still needs to develop mature technology before proceeding into production. Additionally, the document is used to move beyond MS C, enter into the production phase, and address the production elements of a specific increment of an acquisition program (HQDA, 2009).

As per the JCIDS Manual, Enclosure B, dated January 19, 2012 (CJCS, 2012, pp. B-41–B-49), the CPD format consists of the following parts:

Part 1. Length. The body of a CPD—consisting of the 16 primary sections and Appendix A—shall be no more than 40 pages long.

Part 2. Cover Page. The cover page of a CPD shall include the following information.

- Part 2.a. Classification
- Part 2.b. Title, starting with the phrase "Capability Production Document for…"
- Part 2.c. Sponsoring organization, and signature authority who authorized the submittal into JCIDS. New CPDs, and modifications to previously validated CPDs, must be endorsed by the Service, CCMD, or other DoD Component J8 equivalent or higher.
- Part 2.d. Date submitted by the sponsoring organization
- Part 2.e. Primary and secondary POCs for the document sponsor
- Part 2.f. Proposed validation authority
- Part 2.g. Proposed Milestone Decision Authority (MDA)
- Part 2.h. Proposed Joint Staffing Designator (JSD)
- Part 2.i. Proposed Acquisition Category (ACAT)

Part 3. Executive Summary. An executive summary, not to exceed one page, shall follow the cover page and precede the body of the CPD.

Part 4. The CPD shall have the following 16 sections followed by four appendices.

Part 4.a. Capability Discussion

Part 4.a.1. Discuss the operating environment of the system.

Part 4.a.2. If the CPD is part of an FoS or SoS solution, identify the source ICD and related CDDs and CPDs.

Part 4.b. Analysis Summary

Part 4.c. CONOPS Summary

Part 4.d. Threat Summary

Part 4.d.1. Summarize the projected threat environment and the specific threat capabilities to be countered to ensure that the capability gap can be mitigated

Part 4.d.2. Programs designated as ACAT I/ID (or potential ACAT I/ID) must incorporate DIA-validated threat references. All other programs may use DoD Component intelligence center-approved products and data.

Part 4.d.3. During staffing, documents with JSDs of JROC Interest, JCB Interest, and Joint Integration will be subject to Defense Warning Office (DWO) threat validation.

Part 4.e. Program Summary

Part 4.f. Production KPPs, KSAs, and additional performance attributes

Part 4.f.1. Sponsors must consider the six “required” KPPs.

Part 4.f.2. As in the CDD, care must be taken to stabilize and not over specify attributes in the CPD. Only the most significant items should be designated as performance attributes with threshold and objective values.

Part 4.f.3. Provide a description for each attribute and list each attribute.

Part 4.f.4. Present each attribute in output-oriented, measurable, and testable terms.

Part 4.f.5. Provide tables summarizing specified KPPs, KSAs and additional performance attributes in threshold/objective format.

Part 4.g. SoS Synchronization

Part 4.g.1. Discuss the relationship of the system described in this CPD to other systems contributing to satisfying the capability requirements. Discuss any overarching DOTmLPF-P changes needed to make the SoS an effective military capability solution.

Part 4.g.2. Provide a table that briefly describes the contribution this CPD makes to the fulfillment of capability requirements and closing of capability gaps described in the applicable ICDs, and the relationships to other CDDs and CPDs that also support these capability requirements.

Part 4.h. Spectrum Requirements

Part 4.i. Intelligence Supportability

Part 4.i.1. Identify, as specifically as possible, all projected requirements for intelligence support throughout the expected acquisition life cycle in accordance with the format and content prescribed.

Part 4.i.2. During staffing, documents with JSDs of JROC Interest, JCB Interest, and Joint Integration will be subject to Joint Staff J-2 intelligence certification.

Part 4.j. Weapon Safety Assurance. The CPD will address the following:

Part 4.j.1. System Safety

Part 4.j.2. Insensitive Munitions

Part 4.j.3. Fuze Safety

Part 4.j.4. Explosive Ordnance Disposal

Part 4.j.5. Demilitarization/Disposal

Part 4.j.6. Laser Safety

Part 4.k. Technology and Manufacturing Readiness

Part 4.l. Assets Required to Achieve FOC. Describe the types and quantities of assets required to attain FOC.

Part 4.m. IOC and FOC Schedule Definitions

Part 4.n. Other DOTmLPF-P Considerations

Part 4.n.1. Discuss any additional DOTmLPF-P implications associated with fielding the system, to include those approaches that would impact CONOPS or plans within a CCMD AOR. Describe the implications for all recommended changes.

Part 4.n.2. Highlight the status (timing and funding) of the other DOTmLPF-P considerations.

Part 4.n.3. Describe, at an appropriate level of detail, the key logistics criteria, such as system reliability, maintainability, transportability, and supportability that will help minimize the system's logistics footprint, enhance mobility, and reduce the total ownership cost. Also discuss energy demand impacts, including fuel and/or electrical power, if applicable.

Part 4.n.4. Detail any basing needs (forward and main operating bases, institutional training base, and depot requirements).

Part 4.n.5. Specify facility, shelter, supporting infrastructure, and ESOH asset requirements, and the associated costs, availability, and acquisition MS schedule(s) related to supporting the system.

Part 4.n.6. Describe how the system will be moved either to or within the theater. Identify any lift constraints.

Part 4.o. Other System Attributes. Address any other attributes not previously identified, especially those that tend to be design, cost, or risk drivers, including but not limited to the following:

Part 4.o.1. Anti-tamper, embedded instrumentation, EA, and WARM requirements.

Part 4.o.2. HSI considerations that have a major impact on system effectiveness, suitability, and affordability.

Part 4.o.3. Natural environmental factors (climatic design type, terrain, meteorological and oceanographic factors, and impacts and effects).

Part 4.o.4. Expected level of capability provided in various mission environments, if degraded relative to KPPs, KSAs, and additional performance attributes articulated in Section 6 of the CPD. Include applicable safety parameters, such as those related to system, nuclear, explosive, and flight safety.

Part 4.o.5. Physical and operational security needs.

Part 4.o.6. Weather, oceanographic and astro-geophysical support needs throughout the program's expected life cycle, including data accuracy and forecast needs.

Part 4.o.7. For ISR platforms, issues relating to information protection standards.

Part 4.o.8. For systems that may be used in combined allied and coalition operations, issues relating to the potentially applicable U.S.-ratified international standardization agreements. Provide an initial indication of which ones will be incorporated in the derived system requirements.

Part 4.o.9. Whether or not the system must be able to survive and operate through CBRN environments.

Part 4.p. Program Affordability

Part 5. Appendices

(1) Appendix A. Net-Ready KPP Architecture Data

(2) Appendix B. References

(3) Appendix C. Acronym List

(4) Appendix D. Glossary

E. STAKEHOLDERS

Every requirements document has a vast network of personnel who have specific responsibilities associated with a particular document. This begins at conception as a document comes into existence, all the way through staffing and approval, and eventually onto execution. Knowing the stakeholders involved throughout the review and approval process leads to an understanding of the efficiency and effectiveness of the documents. Additionally, this provides the ability to analyze what changes are needed to aid a specific set of stakeholders for the lifespan of the document.

Determining specific stakeholders first requires defining the term "stakeholder." In addition, the term "stakeholder" is commonly used in conjunction with the term "user." Generally, the term "user" in the DoD refers to the "warfighter." The warfighters are the personnel that directly use the product produced from an acquisition program guided by requirements documents from the old RGS and the new JCIDS processes. In this paper, the term "user" applies to materiel developer and the acquisition program office. These are the entities that use the requirements documents to produce a material solution. Whereas, the term "stakeholder" applies to the multiple entities, person or office, that have roles dealing with the development and writing, review and approval, and ultimately the execution of a requirements document.

Warfighters are both the stakeholders and users in the RGP. As a user, they are the beginning and end point for the use of a product produced from the acquisition process. CJCSI 3170.01C defines user and user representatives as follows:

> user - An operational command or agency that receives or will receive benefit from the acquired system. Combatant commanders and their Service Component commands are the users. There may be more than one user for a system. Because the Service Component commands are required to organize, equip and train forces for the combatant commanders, they are seen as users for systems. The Chiefs of the Services and heads of other DOD Components are validation and approval authorities and are not viewed as users.
>
> user representative - A command or agency that has been formally designated by proper authority to represent single or multiple users in the capabilities and acquisition process. The Services and the Service Components of the combatant commanders are normally the user representatives. There should only be one user representative for a system. (CJCS, 2012, p. GL-11)

These quotes show how the warfighter is viewed as the overall user for an acquisition program. However, we are looking at the warfighter in a stakeholder perspective. As a stakeholder, they initiate the acquisition process by stating and identifying a need for some solution to an existing capability gap that prevents them from completing their mission. Warfighters submit their request for a desired need to the CMBTDEV, providing the first requirement to the RGP. From this point forward, the CMBTDEV

develops and writes the requirements for the warfighter/combatant commanders. Additionally, field commanders submit an ONS/UONS to request a solution for a capability gap (HQDA, 2009).

Stakeholders involved in a specific requirements document can be identified. Stakeholders are those entities directly associated with the development, staffing, approval, and execution of the requirements documents. Many stakeholders have multiple roles within requirements documents. In the following sections, all stakeholders are described and their involvement and responsibilities with a particular requirement document are explained. However, the order of presented stakeholders does not signify a specific priority or level of importance for the stakeholders.

In 2003, a revolutionary change was identified to support the warfighters involved in the GWOT. "What's taking place in the conflict [Afghanistan], in the global war on terrorism, and the distinctively new threats we're facing, [provides] the impetus to transformation" (Lucas, Sanchez, Thomas, & Ipekci, 2003, pp. 1–2). As the Army and the DoD close the GWOT in Afghanistan, a change may be required to support future initiatives of the National Defense Strategy of the RGP. The future RGP must undergo changes, whether these changes are evolutionary or revolutionary, to adapt to this future environment and must consider budget, downsizing, technology, and future capability gaps. The greatest questions are based off lessons learned from the past, and what measures are required in order not to repeat the shortfalls of these lessons learned. Ultimately, the question is this: Should the future of the RGP be an additional fragmentary order (FRAGO), quick revision/alteration of a base policy/plan/procedure, of JCIDS, or should the U.S. Army write a new operation order (OPORD), policy/plan/procedure, that creates a new process and different documents? Stakeholders were integral in the RGP's evolutionary changes to produce both efficient and effective MCDs.

1. Integrated Teams

Various types of teams conduct an array of missions throughout the RGP. Each team performs functions that are essential to the efficiency of the defense acquisition system. Functions range from roles that are directly associated with requirements documents to roles that transform requirements into useable performance specifications for industry.

Integrated concept teams (ICTs) are teams of personnel that have specific skill sets within their discipline. Personnel serving on ICTs include program managers, doctrine writers, combat developers, action officers from branch proponent schools, and representatives from the Office of the Secretary of Defense, HQDA, industry, national laboratories, and potential users. Personnel serving on ICTs serve to bring many disciplines and forms of expertise to the table to be able to review the identified capability gap or specified need, and develop the requirements to be incorporated in the appropriate requirements documents. ICTs are used for the development and writing of each requirement document, both with the previous RGS and now with JCIDS.

Integrated product teams (IPTs) come in the form of overarching integrated product teams (OIPTs) and working-level integrated product teams (WIPTs). Both teams are comprised of SMEs from several functional disciplines to build a successful and balanced program. Additionally, they identify and resolve issues, and provide recommendations to decision-makers. OIPTs focus on strategic guidance, program executability (cost, schedule, risk), and issue resolution (U.S. Army War College, 2011). Additionally, OIPTs are used as subordinates of the Defense Acquisition Board (DAB) reviews. They analyze material alternatives and recommend study efforts before the DAB convenes (HQDA, 2009). All of this occurs prior to the MS A decision for approval and review of concept studies. The documents used by the OIPT to execute their responsibilities are the initial requirement documents, the MNS or ICD (HQDA, 2009). However, WIPTs focus on particular topics, such as T&E, cost/performance, and risk management (U.S. Army War College, 2011). Focusing on the topics allows WIPTs to identify and resolve issues, determine a program's status, and seek opportunities for acquisition reform (U.S. Army War College, 2011). Members of the WIPT come from HQDA or Service/functional action officers, and the WIPT is chaired by the PM or a selected designee. WIPTs provide advice and aid the PM to prepare a program's plan and strategy (U.S. Army War College, 2011).

2. Combat Developers/Capability Developers

This entity is the direct representative for the warfighter. The individuals that compose these entities can be acquisition personnel, branch-specific personnel for the acquisition program, or personnel completely outside of the branch that are tasked to develop and write the materiel requirements documents. All of these personnel are within the U.S. Army Training and Doctrine Command (TRADOC). Additionally, two Army manuals provide different titles for the same position that accomplishes the same mission while following the same responsibilities. Army Regulation 71-9, *Warfighting Capabilities Determination* (HQDA, 2009), clearly identifies CMBTDEV as the requirements writer for the warfighter who resides within TRADOC. However, *How the Army Runs* (2011–2012 ed.; U.S. Army War College, 2011) identifies this entity as the Capability Developer (CAPDEV). The only distinction between the two entities is their title. For this project, we use the term *CBTDEV*. AR 71-9 (HQDA, 2009) states CBTDEV's responsibilities as the following:

> 1. Utilize Army and Joint capstone concepts to develop operating and functional concepts detailing how the Army will operate as part of a Joint warfighting force. Link the concepts to Joint capability areas (JCAs) for relevancy to Joint capability needs. Develop component cost position (CCP) as required to define/refine operational, warfighting requirements for a particular warfighting function or capability area. When CCP are required, CCP developers will outline the basic capability requirements to provide enough detail to initiate a capabilities-based assessment as outlined in the JCIDS Manual. All concepts must illustrate how future forces will operate, describe the capabilities required to carry out a range of military operations against adversaries in the expected Joint operational environment, and how a commander, using military art and science, might employ these capabilities to achieve desired effects and objectives.
>
> 2. Utilize the contemporary operational environment and Joint Operating Environment. The operational environment must describe the composite of conditions, circumstances, and influences that affect employment of military forces and bear on the decisions of commanders. It depicts the challenging, adaptive global setting the U.S. Army military will encounter over the next 20 years and beyond, and provides the fundamental context for Army and Joint experiments and training. It must provide the essential foundation for developing concepts and writing requirements; define the threat and environment for individual and collective training across schools and combat training centers (CTCs); and provide benchmarks for

comparing risk, effectiveness, and cost in potential DOTMLPF solutions and for testing materiel solutions to ensure efficiency and effectiveness.

3. Ensure only validated threat assessments are used in concept development and any modeling efforts supporting capabilities determination.

4. Ensure the appropriate experimentation is conducted to validate concepts. (HQDA, 2009, p. 8)

CBTDEVs are involved in the process of developing and writing the MNS and ORD from the RGS process. During the development of the ORD, they serve as the leader from the ICT through program initiation, which includes being responsible for the mission area where the deficiency or opportunity was identified. After MS C, the CBTDEV is responsible for determining if a need exists or if a change is required in the performance envelope within the threshold values for a materiel solution captured in the ORD.

As documents changed during the transition from the RGS to the JCIDS, so did the CBTDEV's responsibilities for documents. CBTDEVs retained the same developmental responsibilities for documents as in the RGS. However, in JCIDS they are responsible for the previously listed development responsibilities, but the input medium of requirements documents shifted from the old RGS documents to the ICD and CDD.

3. U.S. Army Training and Doctrine Command

As the main developers and implementers for training and doctrine, they also have a role within the process of developing requirement documents. TRADOC examines the possibility for non-material solutions, material solutions, or some combination of both to satisfy a specified capability gap. Their decision is based on DOTmLPF-P. In this regard, TRADOC examines a capability gap in terms of functional area, the relevant range of military operations, desired effects, time, DOTMLPF, and policy implications and constraints (HQDA, 2009). The analysis requires the development KPPs. These are the essential attributes to achieve the desired capability. The attributes are expressed in terms and values of thresholds and objectives. The values are the required minimum and desired maximum capability for an attribute's stated performance within a given performance specification. This creates a small range of

flexibility in capability that the program manager can use as trade space between performance and cost. Additionally, KPPs are identified in the CDD/CPD directly traceable to attributes identified within the ICD.

All of the analysis, such as the capabilities based assessment, from TRADOC is captured in the ICD. The ICD serves as the medium for the TRADOC commander to submit an evaluation and or recommendation to Headquarters, Department of the Army (HQDA) for approval (U.S. Army War College, 2011). TRADOC also assumes the responsibility for submitting additional documents throughout the RGP. One such document is the Joint Capabilities Document (JCD), submitted to the Army deputy chief of staff (DCS), G-3/5/7 (HQDA, 2009). TRADOC outlines KPPs, key system attributes, and other attributes within the document (HQDA, 2009). Finally, TRADOC uses the CDD to develop and write the CPD, which is submitted to the DCS, G-3/5/7 (HQDA, 2009). The formats for the documents are similar, and the CPD provides the number of items to be produced for fielding based on the analysis of what is needed within Army units' MTO&Es.

4. Army Deputy Chief of Staff (DCS), G-3/5/7

The DCS, G-3/5/7 serves as the "current and Future Warfighting Capabilities Division Gatekeeper for staff coordination, validation, and approval, and forwarding to Joint staffing" (HQDA, 2009, p. 20). As per Army Regulation 70-1, DCS, G-3/5/7 is to "develop Army policy and guidance for materiel requirements and capabilities development programs, to include the development and integration of capabilities documents and horizontal requirements integration processes" (HQDA, 2011a, p. 19). The DCS, G-3/5/7 performs the gatekeeper role for the ICD, CDD, and CPD. The gatekeeper role is the single point of entry and exit for requirements documents. "Army Gatekeepers manage the CAMS [capability and AROC management system tool] to ensure consistency of staff coordination as JCIDS proposals progress through the validation and approval process" (HQDA, 2009, p. 15). All requirements documents that are submitted for review and approval are required to go through the DCS, G-3/5/7. This is the entity responsible for validating and integrating a DOTmLPF-P review (HQDA,

2011a). Additionally, the DCS, G-3/5/7 conducts an evaluation of materiel requirements and critical operational issues and criteria for all ACAT programs (HQDA, 2011a).

5. Headquarters, Department of the Army

This entity was responsible for managing the requirements determination process during the RGS. It served as the approval authority for materiel requirements through the Army Requirements Oversight Council (AROC). Additionally, HQDA validated and approved all RGS documents (MNS, CRD, and ORD). As the approval authority, it also examined and identified possible alternatives to meet a capability gap prior to entering MS A. However, the Joint Requirements Oversight Council (JROC) approves Acquisition Category (ACAT) ID or Joint or other Service-specific programs (HQDA, 2009). Although the JROC serves as the approval authority for main ACAT programs, some approval is left with the Services. Some capability documents are validated by the Services based on the level of the ACAT program, which also takes into account the cost of the particular acquisition program.

6. Army Requirements Oversight Council

The Army Requirements Oversight Council (AROC) is responsible for reviewing all requirements that went into the materiel requirements documents. For the RGS process, this was the MNS document and now for the JCIDS process this is the ICD. Additionally, the AROC approves the CDD and CPD as well. Plus, the Council is responsible for evaluating the relevancy of materiel requirements for the Army's needs. The Vice Chief of Staff of the Army (VCSA) serves as the AROC's chair during both the JCIDS and the previous RGS process. The council considers requirements in terms of affordability and interoperability. Additionally, the AROC advises the Chief of Staff of the Army (CSA) on warfighting requirements. The AROC consists of the following permanent principal members:

Vice Chief of Staff, Army (Chair)

Military Deputy, Office of the Assistant Secretary of Army (Acquisition, Logistics, and Technology)

Chief Information Officer (CIO)/Deputy Chief of Staff, G-6

Deputy Chief of Staff, G-1

Deputy Chief of Staff, G-2

Deputy Chief of Staff, G-3/5/7 (Secretary)

Deputy Chief of Staff, G-4

Deputy Chief of Staff, G-8

Director, Army Capabilities Integration Center (ARCIC)

Deputy Assistant Secretary of the Army, Cost & Economics

CG, Army Test and Evaluation Command (ATEC). (U.S. Army War College, 2011, p. 217)

7. Joint Requirements Oversight Council

The Council reviews and validates that a mission is incapable of being satisfied through a non-material solution. In this role, the Council recommends warfighting capabilities and requirements for acquisition programs. Additionally, the Joint Requirements Oversight Council (JROC) assigns Joint priorities among major programs with valid requirements identified by CCDRs, Services and others. Based on assigned priorities, the Council identifies, evaluates, and designates potential candidates for Joint acquisition programs while resolving requirement issues across the Services. One of the more critical functions of the JROC is to "review military needs and acquisition programs with emphasis on ensuring interoperability, pursuing opportunities for Joint or multi-Service applications, eliminating unnecessary duplication, and promoting cost savings" (HQDA, 2009, p. 18).

During the RGS, the JROC's role was slightly different when dealing with the requirement documents. The JROC would examine the validity of the identified need, assign joint priority when appropriate, and forward the MNS to the USD(AT&L) for action. However, the JROC was the approval authority for the ORDs for ACAT ID programs.

The JROC's focus for documents changed as the transition to the JCIDS occurred. In JCIDS, the JROC is responsible for identifying and prioritizing warfighter requirements. As the council validates and approves KPPs, even when the authority for the capabilities documents has been delegated to the Army (HQDA, 2009). Additionally, the JROC ensures the KPP attributes are expressed with a threshold and objective values. In addition to KPP approval, the JROC has "…advisory responsibilities to the CJCS in identifying, assessing, validating, and prioritizing joint military capability requirements" (JROC, 2012b, p. 2). Additionally, the JROC became the approval authority for the ICD. Approval of the capability document does not mean the JROC has the ultimate decision on whether a non-materiel or a materiel solution should be pursued. Instead, they provide advice to the MDA on an approach that best satisfies the capability requirement (JROC, 2012b). The MDA is the ultimate approving authority to pursue a materiel solution or to go with a non-materiel solution.

The main differences for the JROC's responsibilities between the RGS and the JCIDS are identified in Table 3. The table shows the JROC's actions for each of the processes. Although some of the processes and responsibilities changed, one main responsibility remained intact. The JROC was and still is the reviewing and approving authority for requirements documents.

Table 3. JROC Responsibilities in the RGS and JCIDS Processes

RGS	JCIDS
Validates need and assigns priority	Identifies and prioritizes requirements
Forwards MNS to USD(AT&L)	Provides approval authority for ICD
Approves ACAT ID ORDs	Recommends materiel/non-materiel solutions
	Validates KPPs
	Ensures attributes have thresholds & objectives

Figure 12 displays the flow of the documents from each of the stakeholders to the approval authority. The starting point is with TRADOC, where the CBTDEVs reside, and the final approval ends with the JROC. The figure can be found in Army Regulation 71-9, *Warfighting Capabilities Determination* (HQDA, 2009).

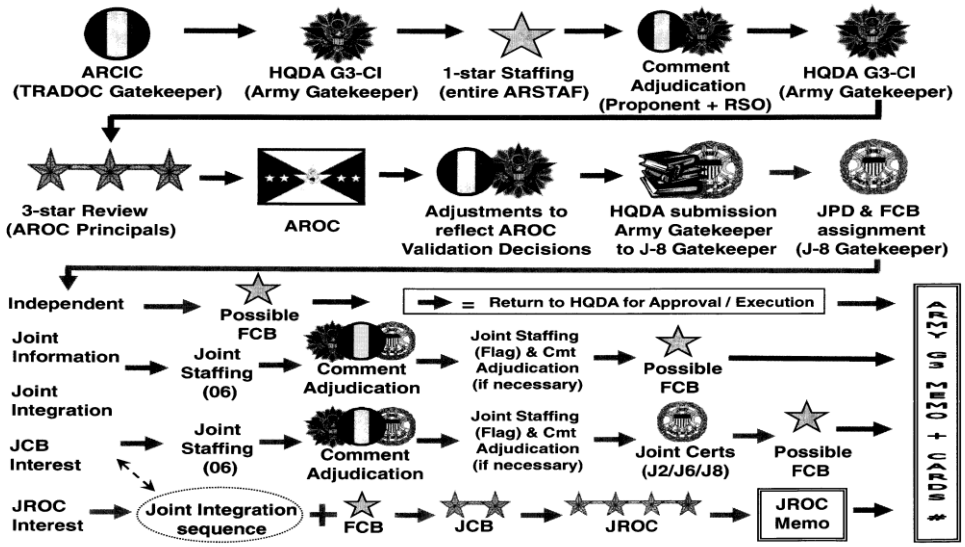


Figure 12. JCIDS Validation and Approval Process (From HQDA, 2009, p. 18)

8. Milestone Decision Authority

The milestone decision authority (MDA) serves as the main approval authority for an acquisition program to begin or proceed to the next phase within the acquisition life cycle. The MDA is responsible for reviewing and evaluating requirements and documents, while paying particular attention to military needs and risk, synchronization with Army Modernization and Transformation Campaign plans, and affordability and interoperability (U.S. Army War College, 2011). Additionally, the MDA is responsible for issuing the acquisition decision memorandum (ADM) at the material development decision (MDD). The ADM determines at what phase an acquisition program enters into the acquisition life cycle, whether that is at MSA, TD, EMD or P&D. Entry into the MSA phase requires the following to occur: concept studies are initiated, a lead agency is designated, and concept exploration exit criteria are approved (U.S. Army War College, 2011). Starting in the EMD or P&D phases is based on the MDA's decision from provided reviews of technology readiness levels (TRLs) and based on whether component development is still needed (U.S. Army War College, 2011). In conjunction with all of these responsibilities, the MDA identifies the minimum documentation for milestone review (U.S. Army War College, 2011).

9. Materiel Developer

The personnel that compose this entity are normally within the acquisition program's office. This body used the ORD, and now uses the CDD, for developing system performance requirements for contract specifications during each acquisition phase. The materiel developer (MATDEV) translates the CBTDEV requirements, based on the warfighter's needs, into performance requirements or specifications from the requirements listed in the ORD and CDD.

10. Program Executive Office, Program Manager, and Other Associated Managers

Several echelons of personnel exist within any given program office. Using the Ground Combat System (GCS) program office as an example, we show how the hierarchy appears in a program. The program executive officer (PEO) is the main person in charge of the overall program. Program managers (PMs) fall into the next level. PMs are in charge of specific vehicle platforms such as the Joint Lightweight Tactical Vehicle (JLTV) or the Stryker vehicle. Other associated managers are the different product managers. In the case of the Stryker vehicle program, this is the person in charge of the infantry carrying vehicle (ICV) variant or the mobile gun system (MGS) variant. Serving as the leaders of the program/product causes each of these personnel to have many assigned responsibilities within JCIDS. However, we will focus on their roles and responsibilities with requirements documents. The main role PEOs, PMs, and others serve is as the executor of approved requirements documents.

One of their foremost responsibilities with requirement documents is to assist the CBTDEV with developing CDDs and CPDs. They aid in providing schedule, performance, estimated materiel acquisition cost, availability, and technical information (HQDA, 2009). Additionally, they incorporate capabilities for system training into the materiel system in compliance with the approved CDD and CPD, while integrating involvement from the CBTDEV and TNGDEV (HQDA, 2009). Another responsibility is the creation of the request for proposal (RFP) based on the approved CDD and CPD. This occurs through coordination with the CBTDEV and by conducting a crosswalk of the CDD and CPD to ensure all specifications and statements of work (SOWs) accurately

reflect the operational requirements. Once this occurs, the CBTDEV then certifies the RFP prior to the program or OIPT review (HQDA, 2009).

Although many of the roles of the PEO, PM, and others occur with the CDD and CPD, they do have a role earlier in the process. They lead the IPT for cost performance. Additionally, they institute cost as an independent variable. Cost as an independent variable allows the managers to examine what the associated cost would be for a specific level of performance stated within the requirements documents. This allows the ability to monitor cost and possibly produce savings by mapping out the associated costs at the threshold and objective levels of performance. The PM can then conduct analysis on how to best achieve the requirements expressed within the documents to achieve cost savings to the government. Cost savings is achieved by the tradeoff space between the threshold and objective values. Another responsibility they have with the ICD and CDD is to translate the requirements in these documents into system specifications and designs that are testable and verifiable (U.S. Army War College, 2011). Plus, the personnel give the MATDEV perspective when providing recommendations to Army Modernization Plans (HQDA, 2009).

11. Summary

In summation, many stakeholders are involved throughout the development of any one materiel requirement document. Special care of the information placed in a requirement document is a necessity. Both the stakeholders and the users use this information. A lack of information or poor quality of information can pose a severe strain on the users as they execute the documents for their acquisition program. Table 4 captures the stakeholders and users and displays their role(s) for a particular document. This is a helpful visual aid to see how entities have multiple roles for a particular document.

Table 4. Stakeholders and Their Roles for Materiel Requirement Documents

	Developer / Writer	Input / Guidance	Reviewer	Approver	Executer
Individual Stakeholders					
CBTDEV / TNGDEV (TRADOC)	**X**		**X**	**X**	
DCS, G-3/5/7			**X**	**X**	
CSA / VCSA				**X**	
MATDEV		**X**	**X**		**X**
PM			**X**		**X**
PEO			**X**		**X**
Groups / Council Stakeholders					
ICT	**X**	**X**	**X**		
IPT		**X**	**X**		**X**
OIPT			**X**	**X**	
AROC			**X**	**X**	
HQDA – CSA / VCSA				**X**	
JROC			**X**	**X**	

In addition, Table 4 helps illustrate the multiple connecting roles that exist and how important the correct information is within each requirement document. Stakeholders, such as the MATDEV and PM, are involved with each of the requirements documents throughout the entire JCIDS process. Thus, correct, concise, and clear information allows for a successful acquisition program that provides the warfighter with a system or piece of equipment that meets its desired need.

F. CHAPTER SUMMARY

Overall, CJCSI 3170.01 has evolved from CJCSI 3170.01C (CJCS, 2003) to CJCSI 3170.01H (CJCS, 2012). The requirements documents have continuously evolved with more precise regulations and formats. CJCSI 3170.01 version C was published in 2003, verision D in 2004, version E in 2005, version F in 2007, version G in 2009, and the most recent version H in 2012. These evolutionary changes were refinements to the JCIDS process over a span of nine years to improve efficiency in the RGP. The intent to redefine these requirements documents has been to systematically focus the requirements

of the warfighter in order to accommodate the rigors of the Army's acquisition process. A change was necessary to shift concepts from requirements based to capabilities based. Emerging capability gaps were rapidly being identified as materiel and non-materiel solutions attempted to keep up with the inflow. The key stakeholders involved in the RGP did not need to know what warfighters wanted, but the capability that the warfighters needed to execute their missions.

The next chapter reveals our comparative analysis of ground vehicle programs that have been developed under both the RGS and the JCIDS. We have conducted qualitative analysis of materiel requirements documents on pre-GWOT platforms, GWOT platforms, and future post-GWOT platforms. Additionally, we draw conclusions about future considerations for efficient and effective materiel requirements documents.

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III. RESEARCH METHODOLOGY

In this chapter, we outline the detailed research methodology that we selected in order to execute and meet the project's intent. The research methodology was constructed based on the data provided in Chapter II, Background, and on the documents related to three specific Army vehicle programs: HMMWV, M-ATV, and JLTV. Furthermore, our methodology leads into the comparative analysis we implemented that, ultimately, allowed us to formulate our conclusions and recommendations.

A. RESEARCH PURPOSE

The purpose of our research is to propose future changes to enhance the efficiency and effectiveness of the U.S. Army's materiel capabilities documents (MCDs) used to facilitate materiel solutions. Our recommendations are developed by a comparative analysis of the Army's past and present MCDs and their efficiency in their respective requirements generation processes (RGPs). "Like other analytical methods in qualitative research, document analysis requires that data be examined and interpreted in order to elicit meaning, gain understanding, and develop empirical knowledge" (Bowen, 2009, p. 27).

A comparative analysis of MRDs from the RGS period, prior to June 2003, to MCDs from the current JCIDS period, provided us with the necessary data to gain understanding and develop recommendations for change. The evaluation compares the RGS's primary MRDs (MNS, ORD-Initial, and ORD-Revised) to the JCIDS' primary MCDs (ICD, CDD, and CPD). Inclusive to the assessment are the implementation of other MRDs/MCDs used for a more rapid procurement of an identified materiel solution. These documents are the ONS, UONS, and JUONS.

Our comparative analysis identifies the strengths and weaknesses of each document in relation to the stakeholders, associated timelines, and redundancies within the RGP. Additionally, we have identified benefits and types of change required for implementation of our recommendations. Our project's predominant purpose is to provide recommendations for enhanced MCDs for the future Army's RGP. To accomplish this purpose, we have used a six-step research methodology based on the Client Opinions

Model (Client Opinions, n.d.), and may be better comprehended with the aid of Figure 13. Additionally, we have tailored this model to project to enhance our analysis.

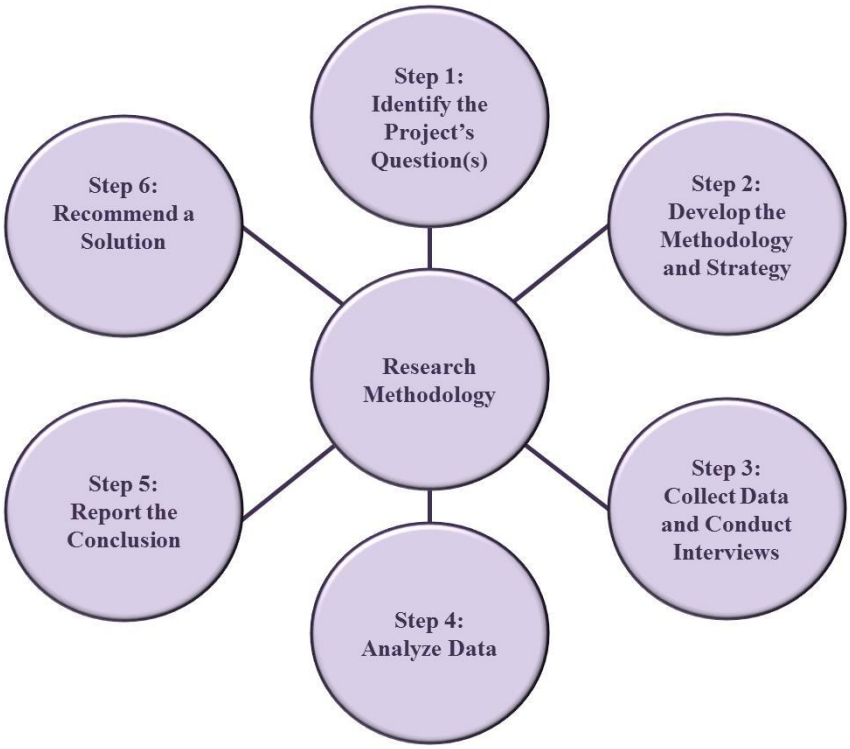

Figure 13. Six Steps of Research Methodology (After Client Opinions, n.d.)

B. APPROACH TO RESEARCH

Our research project used qualitative data, gathered from key stakeholders and subject-matter experts who have either undergone or are undergoing the implementation of MRDs/MCDs throughout the life cycle of ACAT I programs. We have conducted a comparative analysis of MRDs/MCDs from three Army vehicle programs.

Our research is broken down by five distinctive qualitative approaches based on qualitative research designs from Lindquists (n.d.): (1) Historical, (2) Phenomenology, (3) Grounded Theory, (4) Ethnography, and (5) Case Study.

An historical approach examines key activities and events from the past of the RGP. We have been able to understand the evolution of the RGP to the present JCIDS process, as well as project the potential evolution of future RGP initiatives. We have

been able to gain this understanding by studying past DoD policies, documents, regulations, doctrine, studies, reports, and programs. The historical data have allowed us to develop our research questions and ideas. We have analyzed the quality and reliability of this data and developed an opinion on what has been beneficial in the past, and what factors have constrained the RGP. By doing so, we have also been able to develop and refine the organization of our research methodology and how we have continued to gather additional data that we formulated in our interview questions. The historical approach has also allowed us to recognize contradicting data necessary to analyze the evolution of the RGP that was crucial to reaching our recommendations in this project. Ultimately, this approach defines our ability to present our information in the most effective order.

The stakeholders primarily drive the phenomenology approach. We have utilized this approach to construct our list of interviewees and interview questions, and to guide conversations with our selected stakeholders. Our goal with the approach is to understand the experiences of those who have had key roles in past MRDs and who are currently executing MCDs, and to project the effects of future changes to MCDs. These stakeholders are defined by their uniqueness. Uniqueness is identified by the stakeholders' relationship to and level of involvement with requirements documents. The phenomenology approach has allowed us to maximize our creative methods and has required the most personal interaction in our research methodology. We have had to understand not only the data collected from recorded interviews but also our interviewees' duty positions and levels of responsibilities to truly understand their points of view. Patterns, habits, and themes are the primary outcomes from this qualitative approach. We are better able to reach our recommendations and conclusions by comprehending the outcomes of this analysis.

The grounded theory approach allows us to develop our understanding of the RGP that inevitably led us to our recommendations. This approach identifies what the standard should be that benefits the preponderance of the stakeholders' needs. By understanding what should be the standard, we have been able to identify the deviations from the standard, to understand why the deviations exist, and to recommend how to

minimize these deviations. Much of our use of grounded theory is focused on the staffing and bureaucracy internal to the RGP. Grounded theory requires a continuous cycle of comparative analysis between documents, processes, stakeholders, and collected data. All of this comparative analysis is nested to the core concepts and intent of the RGP. Our approach to grounded theory has been based on our evolving observations and opinions of the key stakeholders. We have been able to scope down and modify our recommendations by using this qualitative approach.

The ethnography approach has allowed us to understand the characteristics of the RGP culture, both internal and external to the DoD. Using the ethnography approach, we have developed our understanding of the organization of the DoD RGP from authors, staffers, approvers, and executers of MRDs/MCDs. We have also been able to recognize the efficiencies and effectiveness of processes from the past and the present, and to project recommendations for the future. Evolutionary and revolutionary changes are the concepts we have derived from this approach, and implementation of changes is the result of this method. The ethnography approach has provided us with the necessary comprehension of the required culture changes that must occur to improve MCDs.

The case study approach has been our overarching method to tie in all of the other four approaches. This approach guided us to choose our three ground vehicle platforms of the HMMWV, M-ATV, and JLTV. We are able to focus our analysis by interviewing those stakeholders involved with these three platforms. The case study approach has allowed us to synthesize the experience of these platforms' life cycle within the limitations of their supporting MRDs/MCDs. This has provided us with the necessary in-depth understanding that has allowed us to define our conclusions and recommendations.

In understanding the efficiency and effectiveness of MRDs/MCDs, we utilize the five distinctive approaches. We analyze the RGP's MRDs/MCDs, the MRDs/MCDs efficiency to facilitate past and present materiel RGPs, and data collected through interviews with subject-matter experts. "The qualitative researcher is expected to draw upon multiple (at least two) sources of evidence; that is, to seek convergence and corroboration through the use of different data sources and methods" (Bowen, 2009, p. 28). We selected multiple sources based on the acquisition programs we analyzed.

Data gathered during our initial research for background information provided support and understanding for our analysis of the collected data. Background information provides the basis for the evaluation and critique when analyzing requirement documents from the different periods of the RGP. In addition, the RGS and JCIDS processes are differentiated in order to gain a better understanding of how the different materiel solution requirements documents nest within the two separate processes for requirements generation. Army and Joint policies' purposes and required formats for MRDs and MCDs are discussed to provide detailed information on each document and process. Finally, stakeholders are identified. Information on stakeholders provides insight for those responsible for generating, staffing, validating, approving, and executing the MRDs/MCDs. Researched background information is essential for conducting the evaluation and analysis of these crucial documents.

Interviews from subject-matter experts and stakeholders were used to gain the insights of those directly associated with the documents. The interviewees varied from those stakeholders who have been directly involved with the MRDs/MCDs to stakeholders currently executing the approved MRDs/MCDs. Individuals were selected from Program Management (PM) Offices for the HMMWV, JLTV, and M-ATV. We also interviewed key leaders associated with the overall acquisition processes from the Program Executive Office Combat Support and Combat Service Support (PEO CS&CSS) and from the Pentagon that are associated with the Chief of Capabilities and Acquisition Division Joint Staff J8. Opinions from interviewees provided insight for the concepts we assessed in our examination of the requirement documents.

Each vehicle program is used as a case study, and provided requirement documents used during a particular period of the RGP. Compiling the documents into a case study provided the necessary data for reviewing and analyzing each of the different MRDs/MCDs.

C. INTERVIEWS

One part of being able to understand and analyze requirement documents is drawing on the experience of subject-matter experts (SMEs) currently in the program

office and other areas of the acquisition community. SMEs are stakeholders for the requirement documents that are specific to the HMMWV, JLTV and MRAP / M-ATV programs as well as other individuals that are or were directly involved with the Army RGPs. Interviews were conducted with personnel serving as leaders in the upper echelons of the acquisition career field and personnel directly associated with the vehicle programs. This information provided experience, insight and opinions on what makes a requirement document "good" through the interviewed SME's eyes. Additionally, the SMEs for each of the vehicle platforms were able to provide insight and experience on the efficiency and effectiveness of the requirements documents for their programs. The SMEs also provided the necessary information to rate the efficiency and effectiveness of the requirements documents for their respective vehicle platforms and how well the requirements documents met the Better Buying Power (BBP) 2.0 initiatives.

The SMEs selected for this project came from past and present professionals from three vehicle programs as well as the upper echelon leadership who have been directly involved with the RGP. However, limitations in our research did not afford the opportunity to interview the CBTDEV from TRADOC to fully encompass all stakeholders. The interviews and our analysis were primarily from the program offices' perspective. For the HMMWV program, Brad Naegle, Senior Lecturer at the Naval Postgraduate School and former PM for HMMWV, and COL Kevin Peterson, Chief of Capabilities and Acquisition Division Joint Staff J8, former military deputy program manager and program manager for MRAP and former product manager for HMMWV, were interviewed. M-ATV interviews came from Dave Krawchuk, chief engineer for the JPO MRAP and former deputy program manager for the M-ATV, Michelle Minto, Lead Systems Engineer for the MRAP program and MAJ Anh Ha, former assistant product manager for M-ATV. The program manager for tactical vehicles and the former joint project manager for JLTV was interviewed, COL David Bassett. Additionally, Kevin Fahey, PEO for Combat Support and Combat Service Support vehicles was interviewed. People outside of the acquisition program offices interviewed for information pertaining to the RGS and JCIDS processes were: Major General Harry Greene, Deputy for Acquisition and Systems Management (U.S. Army) and Assistant Secretary of the Army for Acquisition, Logistics, and Technology, Paul Mann / SES, OUSD(AT&L)/ Assistant

Director, Land Warfare & Munitions and former MRAP program manager, Timothy Goddette, U.S. Army Director Combat Sustainment Systems, and Michael Aldridge, J8 staff (Requirements Analyst, JUONS/JEONS, Joint Capabilities Division).

Interview questions used to collect data for the qualitative analysis can be found in the Appendix. The following SMEs were interviewed using Appendix A: Major General Harry Greene, Paul Mann, Timothy Goddette, and Michael Aldridge. Appendix B interview questions were used for these SMEs: Brad Naegle, COL Kevin Peterson, Dave Krawchuk, Michelle Minto, MAJ Anh Ha, COL David Bassett, and Kevin Fahey.

Each person selected as a possible interviewee participated voluntarily and was not coerced into conducting the interview. Interviewees received no compensation or reimbursement of any kind for participating in the research. The Naval Postgraduate School's Acquisition Research Program has provided full transcription of the interviews conducted by the research team with selected interviewees. No alteration of interview results occurred.

D. CASE STUDIES

We used existing acquisition programs as our sources to obtain requirements documents. Additionally, we used the requirements documents from these programs to conduct an analysis and answer the proposed primary and secondary research questions. Due to this, the term *case study* refers to the selected acquisition programs and the data obtained and reviewed for each specific program. The selected three vehicle programs provided us with the desired requirement documents. In Chapter IV, we present a discussion of each vehicle's acquisition program. Using this discussion, we have been able to lay out where the vehicles are within their respective acquisition cycle, the RGP by which they were initiated, the system they are currently following, the requirement documents used in the vehicle's program, and any successes or challenges the vehicle has experienced.

The first case study is the HMMWV. From this case study we extracted requirements documents related to the RGP period prior to 2003. This is the period when the RGS was in effect and was enhanced when the JCIDS process came into effect. Second, the M-ATV case provides MCDs after the 2003 RGP period. The M-ATV

program also provides documents related to the JUONS process. Last, the JLTV acquisition program came into existence prior to 2003 and reached MS B after the implementation of the JCIDS. The program has crossed over both the RGS and JCIDS processes. Due to the cross over, we analyzed documents written for both processes. These three ground wheeled-vehicle programs are the source of our understanding of the efficiency of MRDs/MCDs.

E. DOCUMENT ANALYSIS AND COMPARISON

Our document analysis and comparison occurred according to the five principles outlined and extracted from Glenn Bowen's (2009) article "Document Analysis as a Qualitative Research Method."

> First, as indicated above [in a previous section of Bowen's article], documents can provide data on the context within which research participants operate—a case of text providing context, if one might turn a phrase.
>
> Second, information contained in documents can suggest some questions that need to be asked and situations that need to be observed as part of the research.
>
> Third, documents provide supplementary research data.
>
> Fourth, documents provide a means of tracking change and development.
>
> Fifth, documents can be analyzed as a way to verify findings or corroborate evidence from other sources. (2009, pp. 29–30)

Each step provides us with the necessary technique to generate useful and relevant data from our analysis of the documents. A thorough and useful analysis is provided because we have followed each of these principles.

Additionally, we have linked our analysis to the BBP 2.0 initiatives. We identified five key initiatives directly related to the generation of requirements to the requirements documents used in our case studies. The correlation between the documents and the BBP initiatives in order to assess efficiencies and effectiveness helped us arrive to our conclusion and recommendations.

F. CHAPTER SUMMARY

In this chapter, we outlined the methodology we used for this project. In Chapter IV, we present the case studies of the three vehicle platforms used for this project. We also provide an overview of each platform's mission, the associated requirements documents used for each platform, and data collected from stakeholders who have been directly involved in the creation of the wheeled vehicles. Finally, we provide a rating of the requirements documents used in each vehicle platform and a summarized comparison for efficiency, effectiveness and BBP 2.0 initiatives.

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IV. CASE STUDIES AND ANALYSIS

In this chapter, we display our analysis and the findings from our research. We have used the techniques outlined in our third chapter, Methodology, which described the five distinctive qualitative approaches we are focusing on, which are (1) Historical, (2) Phenomenology, (3) Grounded Theory, (4) Ethnography, and (5) Case Study. First, for the historical approach we have collected data from past reports, requirements documents, records, and other professional studies. Second, we have conducted multiple interviews with SMEs and stakeholders (refer to interview section in Chapter III.C), and have assessed our own personal experience to gather information to support the phenomenology approach. Third, we used the baseline of the RGS and its supporting requirements documents to assist us in our analysis on why the JCIDS and its supporting capabilities documents were created. We extended our research with a secondary baseline of the initial JCIDS document and its several modifications over the past decade to analyze why modifications were necessary. An outlying factor we considered throughout our analysis was the state of the nation throughout these modifications and the effects on the MRDs/MCDs. Fourth, we examined the culture of the key stakeholders' execution of the requirements documents and reviewed initiatives to refine the culture for better efficiency. Finally, we focused our research on three case studies of existing program offices with similar ground vehicle platforms that have undergone different phases of the RGP. We compared and contrasted their requirements documents to identify strengths and weaknesses of requirements documents apparent in these acquisition programs based on the efficiency and effectiveness of the MRDs/MCDs.

We have taken the data from these five distinct qualitative approaches and have methodically tailored our analysis towards the key concepts of efficiency and effectiveness, change management, areas of the BBP initiatives, and the core ideals of the future NSS. By doing so, we have been able to arrive at our conclusions, recommendations, and benefits, which we outline in our final chapter of this project.

A. ANALYSIS CRITERIA

1. BETTER BUYING POWER

On September 14, 2010, the Honorable Ashton Carter, Under Secretary of Defense for Acquisition, Technology, and Logistics [USD(AT&L)] from 2009–2011, issued his guidance known as Better Buying Power (BBP; USD[AT&L], 2010a). The purpose of the BBP initiative was to rapidly establish ideals for improved efficiencies within the DoD, primarily in the acquisition community, as the defense budget was slowly being reduced. The USD(AT&L)'s guidance comprised 23 key principles separated by five major areas: (1) target affordability and control cost growth, (2) incentivize productivity and innovation in industry, (3) promote real competition, (4) improve tradecraft in services acquisition, and (5) reduce non-productive processes and bureaucracy.

In the fifth major area, one of the sub-principles was to "reduce the number of OSD-level reviews to those necessary to support major investment decisions or to uncover and respond to significant program execution issues" (USD[AT&L], 2010a, p. 14). BBP acknowledged that there were areas of opportunities for better efficiency within the DoD's process for producing a materiel solution. Carter understood that the process had often become cumbersome and inefficient. If the goals of his BBP initiatives were to be achieved, he would have to assemble a group to analyze the process and, among other things, eliminate waste in requirements generation.

Carter believed that in order to prepare his workforce and industry partners for the inevitable reduction in the defense budget, the efficiency of the clearly defined requirements would be an essential element for DoD acquisition operations.

> When requirements and proposed schedules are inconsistent, I will work on an expedited basis with the Services and the Joint Staff to modify requirements as needed before granting authority for the program to proceed. In particular, I will not grant authority to release requests for proposals until I am confident requirements and proposed schedules are consistent. (USD[AT&L], 2010a, p. 5)

One of the core concepts of Better Buying Power looked internally to the acquisition workforce and how they conducted their operations. Carter recognized that he would

also have to make dramatic changes in-house as well. The acquisition processes would have to eliminate redundancies in materiel solutions and "counterproductive overhead" (USD[AT&L], 2010a, pp. 4 and 13) if the DoD was to continue its mission and meet the needs of the NSS.

The defense industry is also a key stakeholder within the DoD RGP. The relevance of the defense industry was apparent when a representative of the collective defense industry reached out in a letter to the Honorable Frank Kendall, the then newly appointed and present USD(AT&L). Stan Soloway, president and CEO of the Professional Services Council (PSC), wrote to Kendall to emphasize the defense industry's recommendations for consideration during the development of the key principles of the next iteration of BBP. Soloway (2012) stated in his letter,

> The key to driving quality competitions lies in the quality of the requirements, far more so than the frequency with which competitions are held. Thus, it is important that Better Buying Power 2.0 stress to DoD components the importance of focusing on their requirements and on seeking and rewarding new solutions and innovation. (p. 1)

On November 13, 2012, Kendall issued his updated key guiding principles in BBP 2.0. Kendall still echoed the same crucial themes as his predecessor. BBP 2.0 comprised 36 key principles that are separated in seven major areas: (1) achieve affordable programs, (2) control costs throughout the product life cycle, (3) incentivize productivity and innovation in industry and government, (4) eliminate unproductive processes and bureaucracy, (5) promote effective competition, (6) improve tradecraft in acquisition of services, and (7) improve the professionalism of the total acquisition workforce (Kendall, 2012). The principles complement each other.

The importance of requirements was one theme that is emphasized in multiple areas. Four of BBP 2.0's key principles that focused on the requirements generation process are (1) eliminate redundancy within warfighter portfolios (sub-initiative to the "control costs throughout the product life cycle" initiative), (2) build stronger partnerships with the requirements community to control costs (sub-initiative to the "control costs throughout the product lifecycle" initiative), (3) reduce cycle times while ensuring sound investment decisions (sub-initiative to the "eliminate unproductive

processes and bureaucracy" initiative), and (4) improve requirements definition; prevent requirements creep (sub-initiative to the "improve tradecraft in acquisition services" initiative—this principle focuses on the writing of performance work statements, quality assurance surveillance plans, and performance requirements summaries) (Kendall, 2012). Additionally, BBP 2.0 reinforces and provides further guidance for information found in the *Product Support Manager (PSM) Guidebook* (Assistant Secretary of Defense for Logistics and Materiel Readiness [L&MR], 2011) to elaborate on future evolving strategies of the DoD. Figure 14 places the warfighter's requirements at the pinnacle of the Product Support Strategy Process Model.

Figure 14. DoD Product Support Strategy Process Model (From Assistant Secretary of Defense [L&MR], 2011, p. 34)

It is vital that requirements are well defined in order to support future initiatives that affect the development of materiel solutions.

a. Efficiency vs. Effectiveness

Efficiency and effectiveness are often misconstrued as similar means of measurement. However, they are vastly different. An example of this comes from a battlefield scenario. For example, infantry soldiers are maneuvering across a danger area, preparing to assault on the main objective. Their supporting 60-mm mortar team has trained to quickly fire their 60-mm rounds accurately with a high rate of speed. The mortar team's purpose during this mission is to destroy bunkers surrounding the primary objective and facilitate the infantry's mission to destroy the main objective. The mortar team hits the bunkers with superior accuracy while utilizing a minimum of 60-mm mortar rounds to zero in on their targets. However, these bunkers are constructed very well with reinforced cover. The enemy in the bunkers continues to lay down a strong base of fire, pinning the infantry soldiers down and denying the main assault. The mortar team is efficient in its execution of its operations, but it is not effective in accomplishing its mission to destroy the bunkers.

This cannot be assessed by looking at individual components or teams involved in the mission. Both the mortar teams and each infantry squad must contribute to the mission as key stakeholders to be effective. The lack of effectiveness is based on whether all stakeholders are able to efficiently conduct their roles to meet the overall mission success, intent, and end state. A high level of efficiency equates to achieving the maximum outcome while utilizing the minimum resources. The more the mortar team executes their roles correctly during the operation, the higher their efficiency. A high level of effectiveness is seen by the outcome of the mortar team's mission. The more bunkers that are destroyed, the more the mortar team is effective. Ultimately, the mortar team wants not only to execute their mission with accuracy, precision, and speed, but also to successfully accomplish their mission and allow the infantry soldiers to maneuver onto the main objective.

Figure 15 depicts our baseline chart for efficiency and effectiveness of MRDs/MCDs. The efficiency axis identifies low efficiency as simply "Doing Things." We apply that to the documents that allow the program offices in this project to do things. High efficiency then is "Doing Things Right." We apply that to the MRDs/MCDs, which

allow the program office to do things right. Additionally, low effectiveness is also "Doing Things." We apply that to program offices doing things to produce a materiel solution. High effectiveness is "Doing the Right Things." We apply that to the MRDs/MCDs, which facilitate program offices' ability to do the right things. Hence, maximum efficiency and effectiveness is "Doing the Right Things Right." Figure 15 is the basis of the model that we use to identify how well the documents allowed to the program offices use the least amount of resources required to produce the best materiel solution for the warfighter.

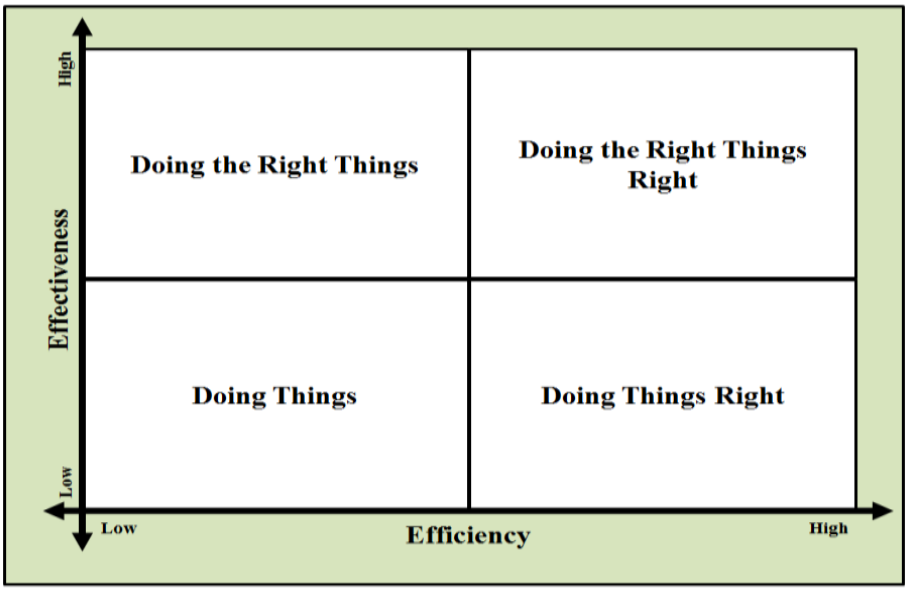


Figure 15. Efficiency and Effectiveness Model (From Grüter & Boerendans, 2013)

The following five key initiatives of BBP 2.0 are what we focused our analysis on, per the BBP 2.0 memorandum (Kendall, 2012). We separated these five initiatives linked to the requirements documents into two categories, the initiatives that supported efficiency and those that supported effectiveness.

b. Efficiency Initiatives

In our analysis, efficiency is qualitative. Our study focuses on SMEs' opinions on how well the requirements documents facilitated efficiencies in their mission to use the least amount of resources to produce a materiel solution with minimum

modifications. Additionally, efficiency is based on the stakeholders and the individuals who were directly involved in the execution of the MRDs/MCDs. We measured efficiency against two initiatives. The first measures the efficiency of stakeholders' collaboration to produce the documents and maximize buy-in. This aspect deals with efforts between the program office and the CBTDEV to work towards establishing acceptable trade-offs for requirements. The second factor deals with cycle time from paper to product. Time is an essential factor to efficiency as it focuses on the program's time to execute their mission based off the MRDs/MCDs.

We measure efficiency based on two BPP initiatives: (1) Build Stronger Partnerships With The Requirements Community to Controls Costs and (2) Reduce Cycle Times While Ensuring Sound Investment Decisions.

(1) Build Stronger Partnerships With The Requirements Community to Control Costs.

> This is an area of continuing emphasis in which good progress has been made, but more needs to be done. More than anything else, requirements drive costs. The requirements and acquisition communities must cooperate more closely and continuously to ensure that requirements are technically achievable and affordable so that operational and Service leadership can make informed decisions about the costs associated with varying levels of performance. For Major Programs, the DAE is working closely with the VCJCS and the JROC, and each Service has taken steps in the right direction. However, more needs to be done to ensure well informed requirements decisions that balance cost and performance throughout product lifecycles. (Kendall, 2010, p. 3)

This initiative emphasizes the importance of the collaboration of those key stakeholders involved with requirements. Building stronger partnerships with those who define requirements allows the program offices to minimize the resources needed to execute their operations. It is essential that the program offices are aligned with other external stakeholders to fully understand and clearly define requirements to execute their mission with the utmost efficiency.

(2) Reduce Cycle Times While Ensuring Sound Investment Decisions.

> This initiative will assess the root causes for long product cycle times, particularly long development cycles, with the goal of significantly reducing the amount of time, and therefore cost, it takes to bring a product from concept to fielding. A full range of factors—oversight activities, funding stability, contracting lead time, requirements processes, technical complexity, use of risk reduction activities, and testing requirements—will be considered as possible contributing factors. (Kendall, 2010, pp. 4–5)

This initiative also is inclusive to the MRDs/MCDs. We analyzed the documents to understand the effects of their impact on cycle time. Efficient MRDs/MCDs would allow cycle time to either decrease or remain constant. Clarity and specificity allow requirements to be thoroughly understood and efficiently guide the program office to manage the development of the materiel solution. Furthermore, MRDs/MCDs with a low efficiency can result in increase of a program's cost, schedule, and performance due to misinterpretation of the requirements. For example, if a CDD is not clearly understood by the program office because of lack of collaboration, the program office may dedicate resources towards a materiel solution that does not fill the capability gap, thus, resulting in a decrease in efficiency.

c. Effectiveness Initiatives

In addition, the warfighter requires materiel solutions to effectively overcome their capability gaps. Three measures were used to analyze the effectiveness of the MRDs/MCDs in the creation and production of a materiel solution. For the first measurement, we evaluated the effectiveness of the documents by identifying whether redundancy has been created within the Army's portfolio. The second measurement was based on the quantity of modifications required within the program after the MRDs/MCDs. The final measurement for effectiveness was establishing stronger qualification requirements for those involved with the execution of the MRDs/MCDs. This provided the ability to measure the level of effectiveness for MRDs/MCDs that allow key stakeholders to operate within their own organizations and successfully complete their respective missions.

Effectiveness is represented by two other initiatives: (1) Eliminate Redundancy within Warfighter Portfolios and (2) Improve Requirements Definition; Prevent Requirements Creep.

(1) Eliminate Redundancy Within Warfighter Portfolios.

> Duplicate or redundant efforts occur at the program level due to constraints in the component requirements process. The Department will identify synergies for existing and planned programs across the Services during MDD reviews, Program Budget Reviews (PB build), and across all levels of the buy. (Kendall, 2012, p. 2)

This initiative is our first measure of effectiveness. A program office is able to produce a more effective product if the warfighter portfolio is reduced to those capabilities the warfighter needs to fill the identified capability gaps. This requires clearly defined requirements in MRDs/MCDs. The MRDs/MCDS are then effective when the program office prevents programs from developing systems with similar capabilities.

Mr. Robert L Gustavus, a certified public accountant and faculty member of the Defense Acquisition University (DAU), elaborates further in DAU class entitled, "Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending." Gustavus explains that this initiative exists because the future budget of the DoD cannot effectively support capabilities that are duplicated. The DoD must minimize redundancy with the warfighter portfolio to maximize cost-effectiveness. Gustavus outlines that by eliminating unnecessary capabilities that are duplicative, acquisition and procurement costs will reduce by 30% of total cost, and 70% of the total costs of sustainment. Furthermore, he elaborates that this must be conducted, managed, and tracked across all Services. Lastly, Gustavus recognizes that this is not a simple process, however it is key to success in effectively implementing this initiative (Gustavus, 2012, slides 33 and 34).

An example illustrating his explanation is the M-ATVs KPP capabilities outlined in the CPD. These programs expected C4ISR performance to support both interoperability and open architecture for existing products. However, the M-TAV was integrated with service specific jammers and internal communication

technologies. By the capabilities not clearly defined in the MCD, PM M-ATV was required to engineer multiple capabilities integration. This created to separate platform configurations. A base model M-ATV, after it received CONUS integration, could not be fielded to the warfighters, but had to be fielded to a service specific warfighter due the redundancies within the platform's portfolio. A USMC configured M-ATV could not be fielded to Army units. This also added increase cost and planning to deliver service specific M-ATVs to the best location.

Thus, MRDs/MCDs that clearly define requirements minimize redundancies in a final materiel solution and allows program offices to define their goals necessary to meet the expectations of the capabilities gap, and be more effective in the finalized materiel solution.

(2) Improve Requirements Definition; Prevent Requirements Creep.

This initiative is located under the heading "Improve Tradecraft in Acquisition Services" (Kendall, 2010). This point focuses on the writing of performance work statements, quality assurance surveillance plans and performance requirements summaries (Kendall, 2010). However, in Mr. Kendall's memorandum in 2010, subject: Improving DoD Acquisition Requirements Development, he states this he has put together a panel to review the "…progress made by the Department of Defense (DoD) to eliminate areas of vulnerability…" (USD[AT&L], 2010b, p. 1). He then explains what the panel determined from these reviews:

> The need to address requirements development, which has been identified as a weakness in the Department and has led to cost and schedule overruns on many programs. Requirements development is paramount to successful acquisition outcomes. Properly developed requirements enhance competition, ensure sound business strategies, provide the basis for realistic Government estimates, mitigate requirements creep, and help enable the Department meet critical acquisition timelines. (USD[AT&L], 2010b, p. 1)

While this specific initiative may be focused on the domain of acquiring services such as LOGCAP or analytical support services, the initiatives still is linked to Mr. Kendall's emphasis the effects of requirements creep on producing a

materiel solution. We analyzed this initiative to study the concept that if MRDs/MCDs are not written effectively enough to consider and project future capabilities, an increase of requirements creep will ultimately decrease the effectiveness of MRDs/MCDs.

The Department will continue this initiative. We have developed tools to assist users in writing Performance Work Statements, Quality Assurance Surveillance Plans, and Performance Requirements Summaries, and we will increase the training of cross-functional teams involved in formulating requirements for service contracts. (Kendall, 2010, p. 6)

This statement reinforces Kendall's emphasis on developing quality requirements for all stakeholders. This initiative provides guidance to continue due diligence to produce clear requirements within the MRDs/MCDs, and to prevent programs from continually executing capability insertions. Programs with expanding requirements increase the risk of issues arising later on in their acquisition life cycle, which inevitably leads to increased program cost, schedule, and performance. Even though this BBP initiative came after many of the programs, we analyzed the concepts of BBP 2.0 in our case study to understand how well these programs adhered to this initiative.

We analyzed this initiative and focused on the aspect of preventing requirements creep. Requirements creep takes away from the effectiveness of approved MRDs/MCDs. Approved MRDs/MCDs generate the forward momentum to begin development of a materiel solution. Additional requirements outside of the scope of the MRDs/MCDs creates requirements creep, which impacts the program through the means of engineering change proposals (ECP) and modifications to the platform. Additionally, MRDs/MCDs can mitigate requirements creep by identifying requirements and capabilities up front. This mitigation may occur by conducting analysis in the form of past DOTMLS and DOTMLP-F, or the present DOTmLTF-P. Effective analysis provides the means to identify and address needs and future capabilities, such as interoperability and open architecture, to be fully considered in MRDs/MCDs. Thus, the more requirements added outside of the scope of the MRDs/MCDs, the less these documents are effective.

Based on these initiatives, we rate an alternative as "poor," "average, or "excellent" based on comments received from SMEs in relation to the definitions of each BPP initiative during our interviews. A poor rating indicates the requirement documents did not sufficiently support the program office in meeting the intent of the initiative. Average means that the requirements documents had minimal impacts on the program office meeting the intent of their initiative. Finally, an excellent rating was assigned to requirements documents that did not impact a program's performance in meeting the BBP initiative.

Figure 16 is the scorecard that we used in each of our case studies. We assessed each wheeled vehicle platform's MRDs/MCDs in relation to efficiency and effectiveness. Later, Figure 16 is combined with Figure 18 to provide our analysis results.

BBP 2.0 Principles and Initiatives			
Initiative \ Rating	Poor	Average	Excellent
Efficiency Initiatives			
(1) Build Stronger Partnerships With The Requirements Community To Control Costs			
(2) Reduce Cycle Times While Ensuring Sound Investment Decisions			
Effectiveness Initiatives			
(1) Eliminate Redundancy Within Warfighter Portfolios			
(2) Improve Requirements Definition And Prevent Requirements Creep			

Figure 16. BBP 2.0 Scorecard

In our research, we conducted interviews with stakeholders from three program offices as well as others within the acquisition community. We tailored our questions to the efficiency and effectiveness of MRDs/MCDs linked to BBP 2.0. Even though these programs were initiated prior to the BBP 2.0, the SMEs provided their

insights on how they felt their documents adhered to these initiatives. Additionally, they provided opinions on the effects of the documents in regards to efficiency and effectiveness.

2. CHANGE: EVOLUTIONARY VERSUS REVOLUTIONARY

Dr. H. James Harrington, a business consultant for quality improvement and change management within organizations, described the ability to improve quality and to reach change:

> [M]easurement is the first step that leads to control, and, eventually, to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it. If you can't control it, you can't improve it. (Harrington & McNellis, 2006)

Change is absolutely imperative to process improvement and improvement of the MRDs/MCDs that support the RGP. However, change is often a very difficult task, especially in well-established organizations with developed processes, history, and traditions, like the DoD. Constructive change comes from the recognition of the current state of an organization or process, the necessity to alter that current state for improvement and better efficiencies, and implementation of appropriate modifications to better the current state. Change management is the art of planning a strategy for change, effectively employing that strategy, and sustaining the change until it becomes the new current state. Additionally, change may also come in two different forms, evolutionary or revolutionary.

The two changes evaluated in our study are evolutionary change and revolutionary change (Cunningham & Harney, 2012). Evolutionary change is reactive change. It is the continual adjustment or modification to the existing process. Evolutionary change is directed when there is the desire to be more efficient. Since the establishment of the JCIDS in 2003, CJCSI 3170.01 has undergone eight evolutionary modifications to improve the JCIDS process and its associated requirements documents. This is seen in CJCSI 3130.01 versions C–H.

Alternatively, revolutionary change is proactive change that is necessary to adapt to a new environment once the current reality has changed. The switch from the RGS to

the JCIDS was a revolutionary change when SECDEF Donald Rumsfeld identified that a new method was needed in order to meet the current challenges of the warfighter as well as the future challenges presented in the NSS. Revolutionary change often encompasses an overhaul in strategy, structure, processes, and culture (Cummings & Worley, 2008).

We have analyzed the efficiency and effectiveness of requirements documents, not the efficiency and effectiveness of the vehicle platforms themselves, within their respective RGP. We have identified whether the MRDs/MCDs efficiently served their purposes during the RGS and whether the JCIDS documents are currently serving their purposes. We implemented consideration on why the RGS MRDs lost their effectiveness and were replaced by the JCIDS MCDs. Additionally, we have tried to determine whether the current JCIDS requirements documents have reached the end of their effectiveness and whether new revolutionary change is needed. We have accomplished this by reviewing the MRDs/MCDs from three vehicle program offices and by conducting interviews with the SMEs who were directly involved with the execution documents for each platform.

In the chapter conclusion and from each of the individual case studies, we analyzed the type of change that may be needed based on the MRDs/MCDs' placement on the efficiency and effectiveness model. Figure 17 depicts the integration of change with the previous efficiency and effectiveness model shown in Figure 15.

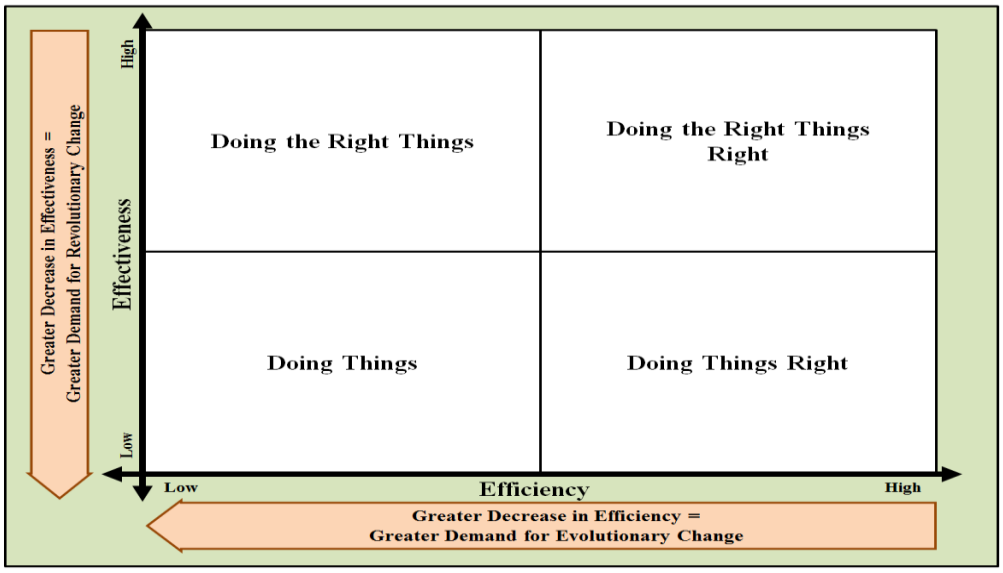


Figure 17. Efficiency and Effectiveness Linkage to Evolutionary and Revolutionary Change Linkage (After Grüter & Boerendans, 2013)

The enlarged block arrows show that a need for evolutionary change increases as efficiency decreases. Conversely, the enlarged, block arrows show that a need for revolutionary change increases as effectiveness decreases. The less efficient the MRDs/MCDs were for a program office to execute their mission to produce a materiel solution, the greater the need for evolutionary change. On the other hand, as RGS MRDs' effectiveness decreases, the more the need for revolutionary change increases to create the JCIDS MCDs. Therefore, we analyzed the reasons that both MRDs and MCDs have evolved, as well as the reasons MRDs were revolutionized into MCDs.

3. RATING SCHEME

The final compilation of our analysis is with the efficiency and effectiveness model and the integration of a rating scheme. These ratings are tied into our concepts of efficiency and effectiveness, evolutionary and revolutionary change integration, and Better Buying Power 2.0 initiatives. Figure 18, below, is the model we used to evaluate three vehicle programs in two different acquisition processes.

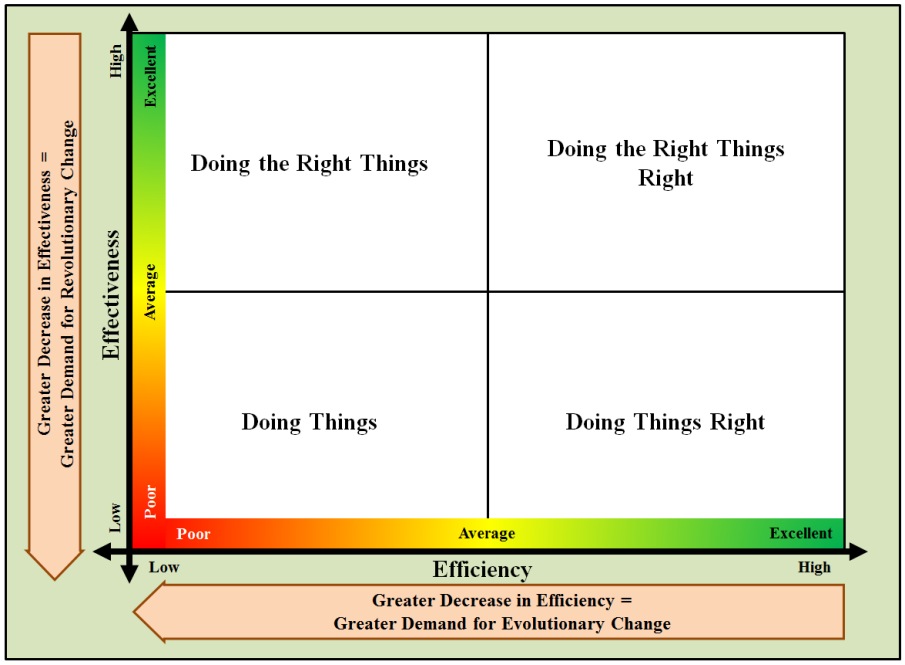


Figure 18. Efficiency and Effectiveness, Revolutionary and Evolutionary Change, and Rating Model (After Grüter & Boerendans, 2013)

We examined the MRDs/MCDs of the HMMWV, M-ATV, and JLTV and how well they rank in terms of efficiency and effectiveness according to BPP initiatives. For efficiency, we assign a qualitative measure based on SME responses across the two BBP 2.0 initiatives noted above. For effectiveness, we assign a qualitative measure based on SME responses to the three BPP initiatives mentioned earlier. Figure 19 shows the criteria we use to assess efficiency and effectiveness.

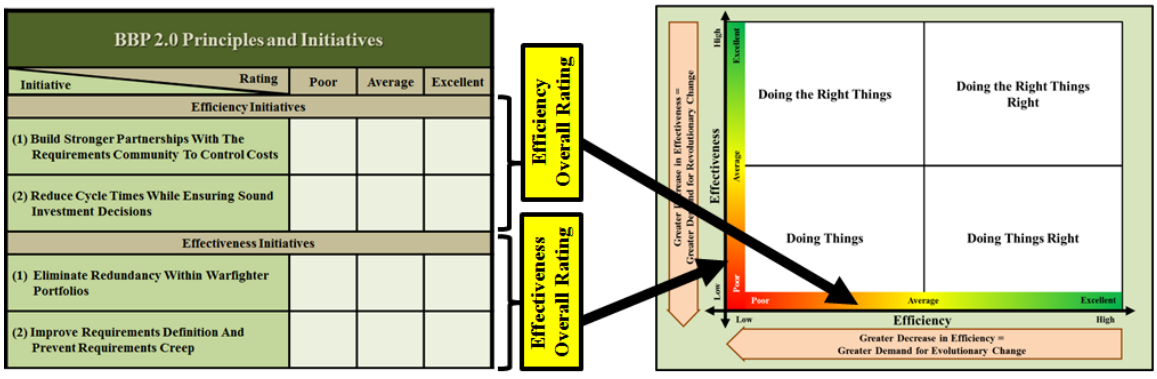


Figure 19. Overall Rating Model (After Grüter & Boerendans, 2013)

B. CASE STUDIES

1. High Mobility Multipurpose Wheeled Vehicle (HMMWV)

An image of the M1151 model of the HMMWV FoV is shown in Figure 20 below.

Figure 20. M1151 HMMWV (From Banyai-Riepl, n.d.)

a. Mission

"To develop, acquire, produce, field, and sustain safe, reliable, effective and supportable light tactical vehicles for the joint war fighting community" (Product Manager Light Tactical Vehicles [PM LTV], 2013).

b. Vision

"Providing our war fighters with superior and comprehensive program management services, world class light tactical vehicles, and responsive life cycle support" (PM LTV, 2013).

c. Focus

"Close capability gaps, while increasing performance and protection, to meet our customer's needs" (PM LTV, 2013).

d. HMMWV Background

The HMMWV began as a joint Service program in support of the Army, Air Force, and USMC and was led by the U.S. Army as an ACAT IC program. The initial intent for the HMMWV was to replace some of the family of tactical vehicles such as the M151 Jeep, M880 and M561 Utility Trucks, and the M792 Ambulance. The HMMWV program's purpose was to provide commonality for a chassis to minimize future life-cycle sustainment costs.

The HMMWV program took five years from MNS approval to full-rate production, excluding time required to draft the MNS. Also known as the Joint Mission Element Needs Statement (JMENS), the MNS for the HMMWV was approved on July 8, 1980. On July 1, 1981, one year after the approved MNS, the Program Office of HMMWV awarded contracts for prototype to three vendors: AM General, General Dynamics, and Teledyne Continental. Prototypes came one year after the contracted was awarded. At MS C, in 1983, AM General received the award for a multiyear contract to produce approximately 55,000 HMMWVs. Not long after, the requirement increased to 70,000 HMMWV for production and the cost grew from $1.2 billion to $1.6 billion. Then, an additional three years of testing, source selection, contract award, and ORD approval occurred before first HMMWV was produced. Finally, in the year 2000, all of the HMMWVs produced reached the end of their project 15-year life cycle. By 2001, the HMMWV fleet's "average age was approximately 10.8 years old" (DAU, 2005, p. 1).

The aging HMMWV fleet brought about the recapitalization effort for the vehicles that were approaching the end of their life cycle. Recapitalization efforts were a recognized need as the HMMWV fleet was becoming costly in terms of operation and support (O&S) and maintainability. The recapitalization program for the HMMWV meant that the truck would have to meet new conditions of zero hours and miles. This would require a new engine and drive train, as well as 50 new modernized parts. The

cost estimated by the PM offices was $42,000 to recapitalize a $48,000 truck. The PM HMMWV did not find it cost-effective to recapitalize a HMMWV when it would cost $6,000 more for a new truck. Investing in a new truck seemed to make more sense. Investing in a production line that was still producing HMMWVs, versus competing a new contract for tear-down and reassembly of an old HMMWV, was the preferred approach (DAU, 2005). Investment in the recapitalization program was also desired from the influence of generated ONSs to support the warfighter in the GWOT.

In the beginning of the GWOT, the threat of IEDs was increasing in Iraq. This threat would later increase in Afghanistan as well. By September 2003, add-on armor kits for HMMWVs were acquired in response to an ONS from theater. The original ONS request was for 8,400 kits. In July 2004, the ONS requested an additional 4,760 kits to meet the CENTCOM AOR requirement. The PM HMMWV assisted the CMBDEV in writing another ORD in support of the block upgrades and new HMMWVs to their family of vehicles (FoV). This ORD was approved by JROC in September 2004. Even though the JCIDS had already been implemented, the existing approved ORD was still valid through 2005. These additional HMMWVs are seen on the bottom row of Figure 21. In January 2005, the first five add-on armor kits were delivered to Iraq, and one month later, the AOR commander implemented a policy that no HMMWVs were allowed to leave a forward operating base without an add-on armor kit installed on the vehicle (A. H. Ha, personal communication, April 13, 2013).

Figure 21. HMMWV Family of Vehicles (From Bassett, 2011, p. 6)

To place this program in perspective, the HMMWV is a materiel solution that existed through the RGS, and its life cycle continued through the inception of and modifications to the JCIDS. Although the JCIDS was enacted in June 2003, as per CJCSI 3170.01C (CJCS, 2003),

> [d]ocuments that were approved under the Requirements Generation System remain valid, except as detailed below:
>
> (2) Mission Need Statements (MNSs) that have initiated staffing in the JCPAT will continue through the normal staffing process. No new MNSs will be accepted for staffing. Initial Capabilities Documents (ICD), developed in accordance with this instruction, will be used instead. Programs that have already completed acquisition Milestone A or beyond are not required to update the MNS with an ICD. No MNS greater than 2 years old will be used to support a Milestone A (or programs proceeding directly to Milestone B or C) acquisition decision.
>
> (3) Operational Requirements Documents (ORD) will be accepted for Joint Staff review for a period of 6 months after approval of this document. After the 6-month period, only ORD updates/annexes, CDDs and CPDs developed in accordance with this instruction will be accepted. A validated and approved ORD, developed under a previous version of this instruction, may be used to support a Milestone B or C decision in lieu of a CDD or CPD for up to 2 years following approval of this instruction. (p. 3)

The PM HMMWV continued to use RGS documents to support their program even after the JCIDS was enacted. Up-armored HMMWV were an urgent and compelling need by 2004 due the growing threat of the GWOT. The following requirements documents have been used to support our analysis: JMENS, ORD-Initial, and ORD-Revised.

e. HMMWV Better Buying Power 2.0 Efficiency Analysis

(1) Build Stronger Partnerships With the Requirements Community to Control Costs.

Rating: Poor

Initial stages of the HMMWV program could have benefited from stronger communications between PM HMMWV and the CBTDEV to define the requirements in the MRDs. Requirements outlined in the initial HMMWV MRDs were mission-focused to serve the warfighter in a tactical capacity. There was minimum consideration for cost.

> The requirements generation process for the HMMWV were [*sic*] conducted well before there was any cost consideration by the user community. The requirements were transmitted to the PM with the performance level the user specified. The PM was nearly solely responsible for cost control and only rarely went back to the user for changes in performance requirements to achieve any affordability goals. Funding levels typically dictated procurement quantities, not design decisions. (B. Naegle, personal communication, April 26, 2013)

A stronger partnership between the program office and the CBTDEV would have allowed for more trade-offs to have more efficiently executed their mission to serve the warfighter. Later, in the program's life cycle, during the GWOT, a communication system was established to help develop efficiencies.

Additionally, PM HMMWV wanted to collaborate with a user representative from the combat arms community to ensure they were meeting the expectations of the warfighter. However, "the TRADOC system manager (TSM) for the HMMWV was an O-6, Army branched Quartermaster by trade and still serving the Quartermaster Branch" (B. Naegle, personal communication, April 26, 2013). PM HMMWV recognized the importance of the TSM to clearly ensure that the CBTDEV

authored effective MRDs. The TSM had a key role in the requirement generation and refinement process.

> The TSMs represented all major weapon and materiel systems in development and functioned with power and authority comparable to those of the program and project managers within the U.S. Army Materiel Command (AMC). (Harris & Robertson, 2011, p. 67)

> TSMs served as user advocates—the "voice" of the warfighter—and worked in complement with the system developers. (Harris & Robertson, 2011, p. 67)

The PM HMMWV found it very difficult to produce the vehicle to satisfy the requirements documents. Requirements documents must have full attention by all stakeholders throughout each step of the RGS process in order to be efficient.

PM HMMWV reassessed what they believed needed to take place to establish collaboration and took the initiative to seek out feedback from the combat arms branches. This became even more prevalent as the ONS came down to produce an up-armored HMMWV in support of Kosovo and eventually Iraq and Afghanistan. The original ORD called for an up-armored platform. However, the ONS brought a requirement to increase survivability for up-armored HMMWVs that was specifically shaped towards the ongoing combat operations in Iraq and Afghanistan. "Capabilities delivered in response to ONS documents that required significant research and development efforts included armor solutions, such as body armor and HMMWV fragmentation kits…" (Office of the USD[AT&L], 2009, p. 13). The PM office's intent was to get the right solution based on the users that would utilize the vehicle for combat operations.

> We ramped up the production line for an up armor HMMWV. We had to design, develop, test, modify and field an add-on armor kit, and then just a series of upgrades. It's been a case of where you get a basic capability to the field as quickly as possible, have some type of feedback mechanism forward in the field, you know, once the soldiers tell you what works and what doesn't and the threat continues to evolve and you've got to have a system to set up here and upgrade. (K. Peterson, personal communication, October 23, 2012)

Nonetheless, even feedback from the mounted combat arms community to the PM office was limited. At the time, there seemed to be more focus on their primary platforms, such as the Bradley fighting vehicle and Abrams tanks, and preparing for combat.

As a result, the HMMWVs produced would not meet the needs of combat arms personnel. In Kosovo, there were many places mounted warfighters could not take their Bradley fighting vehicles and tanks. They would have had to rely on the lighter and more maneuverable platform of the HMMWV if they wanted to successfully traverse the terrain. However, they were not satisfied with the performance of the HMMWV and requested additional modifications and capabilities. Years later, this predicament surfaced again in both Afghanistan and Iraq during the GWOT. These capabilities could have been better projected had the collaboration between the right stakeholders occurred with the generation of the requirements. As a result, the HMMWV's cost increased throughout its life cycle to accommodate these many modifications and retrofits (B. Naegle, personal communication, April 26, 2013).

(2) Reduce Cycle Times While Ensuring Sound Investment Decisions.

Rating: Average

In the 1980s, there was no urgent need for materiel solutions. Pressures to fulfill urgent and compelling needs to meet the demands of war were not great. Thus, there was not a great deal of pressure to rapidly produce a materiel solution. This did afford the program the opportunity to execute the materiel solution in a steady state environment. The MRDs provided clear requirements to the program office to identify the ability to use a non-developmental item for the materiel solution. "HMMWV was a non-developmental item (NDI) procurement, leveraging as much automotive maturity as possible. This made it possible to truncate the process, with parts of phases and events eliminated, speeding the development process" (B. Naegle, personal communication, April 26, 2013). Non-developmental items yield the opportunity to proceed through the acquisition life cycle quicker than developmental programs.

The MRDs fostered the program's acquisition cycle to reach FRP in five years. This short timeframe fosters cost savings for the program compared to other large ACAT I programs from the 1980's. A report from the President's Blue Ribbon Commission on Defense Management provides the information for the time period.

> But a much more serious result of this [acquisition] management environment is an unreasonably long acquisition cycle – ten to fifteen years for our major weapon systems. This is a central problem from which most other acquisition problems stem:
>
> - It leads to unnecessarily high costs of development. Time is money, and experience argues that a ten-year acquisition cycle is clearly more expensive than a five-year cycle.
> - It leads to obsolete technology in our field equipment. We forfeit our five-year technological lead by the time it takes us to get our technology from the laboratory into the field
> - And it aggravates the very gold-plating that is one of its causes. Users, knowing that the equipment to meet their requirements is fifteen years away, make extremely conservative threat estimates. Because long-term forecasts are uncertain at best, users tend to err on the side of overstating the threat. (1986, p. 47)

The commission provides analysis on the impacts of long-term programs. The HMMWV's MRDs provide efficiency to the program by keeping the program from having a long acquisition cycle. This also keeps the program from wasting money on requirements for expired technologies.

Factors such as oversight, contracting lead time, requirements generation, complexity of the system, and testing requirements were more methodically thought out with little pressure to minimize cycle time. Requirements documents took a long time to write, staff, finalize, and approve. CJSCI 3170.01B directs that the time period required to process and approve MRDs should not surpass 121 days (CJCS, 2001, p. B-10). However, in the newer versions of CJSCI 3170.01C–H there is no reference to outline time required for MCDs to be processed and approved. This provided a standard time for program offices to expect to receive approved MRDs during RGS. The program

office would know, within reason, the length of time to receive approved MRDs and have a greater opportunity for staying on their program's projected schedule.

Then in 1996, the DoD put guidance out to the acquisition community to reduce program costs by 10% while maintaining the same required number of platforms. The PM HMMWV conducted an additional analysis for cost savings. This analysis provided two examples of requirements in the MRD that could be eliminated to increase efficiencies for cycle time and cost. One example is a requirement for tire jacks. Each HMMWV was issued a tire jack but was not issued a spare tire. An efficiency that could have been gained from the removing the requirement was cost savings. Since there is no requirement for a spare tire, the requirement for a jack should be removed. Recovery support would be needed to bring a new tire, and the same support could also provide the jack, thus producing cost savings in PM HMMWV by not having to purchase jacks for each vehicle. Costs are being created for a requirement that does not directly associate to a need for the warfighter operating the vehicle. This cost translates into an unsound investment by purchasing unneeded tire jacks for each HMMWV which detracts from efficiency for the program.

The HMMWV also had the requirement to be painted with a special coating that makes it resistant to chemical agents (B. Naegle, personal communication, April 26, 2013). Unlike the armored-track vehicles, the paint is ineffective for the HMMWV. It serves to make the body of the HMMWV resistant to chemicals, but the rest of the HMMWV could not be decontaminated with its rubber wheels, exposed wires, and open engine system (B. Naegle, personal communication, April 26, 2013). This example shows an increase in program cost and time required to produce a vehicle. Had collaboration occurred to produce a more efficient MRD there would have been benefits to costs and time. The example demonstrates that the inability to remove the chemical paint requirement continued to maintain a program at the same level of costs, when there could have been savings by removing the paint. Additionally, the paint process increases the cycle time for the vehicle to be ready to be released to the warfighter. Thus, this reduces the efficiency, in the form of cost savings and time, by being unable to eliminate the requirement for tire jacks and the special paint coating.

The PM HMMWV recognized the constraints of the requirements outlined in the documents. In many cases, the PM worked within these constraints to make sound investments and avoid costs. However, the same responsibility exists with all other stakeholders in the requirements process to examine the requirements to determine whether cost savings are achievable.

f. HMMWV Better Buying Power 2.0 Effectiveness Analysis

(1) Eliminate Redundancy Within Warfighter Portfolios

Rating: Poor.

The HMMWV accomplished the initial intent of the requirements documents. The M151 Jeep, M880 and M561 Utility Trucks, and the M792 Ambulance were all decommissioned from the active Army fleet as the HMMWV FoV were fielded to units.

> HMMWV was a joint program from the beginning as it replaced 1 1/4 ton trucks, 3/4 ton trucks, and the "1/4 ton light truck, General Purpose," or GP (Jeep) which were ubiquitous through all of the [S]ervices. The multi-purpose moniker is real, and numerous different vehicles were replaced with the HMMWV. (B. Naegle, personal communication, April 26, 2013)

The requirements document outlined four land warfare mission areas of close combat, fire support, ground air defense, and land combat support. The HMMWV program provided variants for each of these needs while maintaining commonality of the chassis and adhering to its functional objectives of mobility, payload, survivability, and transportability.

The issue with the HMMWV was the additional utilization as it became the largest wheeled vehicle fleet in the military for its time. The more the HMMWV was being used by the Army, the more the warfighters needed the HMMWV to do in order to meet their various missions. The warfighters began to push the limitations of the HMMWV to augment other areas within the warfighter portfolio. The logistics community continued to load the HMMWV beyond its initial payload for resupply operations. The HMMWV could not meet this need. Requirements expansion continued to the point where a 2-1/2–ton truck was considered by the PM Light Tactical

Vehicles to meet the additional needs of the logistics community (B. Naegle, personal communication, April 26, 2013). The HMMWV was no longer relevant to the needs of the logistics community. However, that platform consideration was cancelled. Had the program not been canceled, then redundancy would have been created from the existence of two programs with similar requirements for managing materiel solutions. Instead, greater increases in the HMMWV's requirements, such as payload capabilities, occurred to meet the emerging capabilities of the warfighter.

The PM HMMWV conducted interchange conferences with the other PM offices that wanted to integrate their product on the HMMWV. However, once the HMMWV was in the fleet, the PM HMMWV soon lost control of configuration management. The PM HMMWV began to receive redundant requirements, such as additional lighting, improved global positioning system (GPS), jammers, and improved armor capabilities. Thus the program had to continually conduct new testing that absorbed a great deal from their budget. As the new capabilities were integrated into the system the older capabilities were still being used. For example, company commanders could use a PLGR (precision lightweight GPS receiver) in one vehicle or use a DAGR (defense advanced GPS receivers) in a different vehicle within their company's vehicle fleet (Aboona, 2007). TRADOC, external PM offices, and PM HMMWV efforts were not coordinated in managing or developing the requirements. The other PM offices no longer needed to go to PM HMMWV to acquire a vehicle to conduct integration. The other PM offices could easily acquire a HMMWV almost anywhere and conduct their own integration, Figure 22, without fully understanding many important aspects of the HMMWV, such as its power capacity.

Figure 22. M1114 Golden HMMWV Power (From Aboona, 2007, slide 1)

The issue of configuration management was compounded once soldiers could purchase commercial off-the-shelf (COTS) products and conduct their own integration of whatever they wanted, such as loudspeakers and reinforced bumpers.

(2) Improve Requirements Definition; Prevent Requirements Creep.

Rating: Poor

The MNS and ORDs' requirements for the HMMWV were outlined by the CBTDEV; however, the HMMWV became the victim of being the platform of choice. This resulted in PM HMMWV continuously inserting capabilities to fill additional capability gaps. The HMMWV fleet eventually reached approximately 100,000 trucks used in full spectrum operations across the Army and the other Services. "We could not control the appetite for people wanting to change the HMMWV," stated Brad Naegle (personal communication, April 26, 2013). Moreover, as the CBTDEV

identified capability gaps, and new requirements were generated for PM HMMWV to integrate into the material soution, (B. Naegle, personal communication, April 26, 2013).

The PM HMMWV was constantly catching up to everything that was being integrated on their vehicles. The PM could not fully identify what was in the warfighter's portfolio or the many capabilities being used on the platform. Moreover, as the CBTDEV identified capabilities, it would write new requirements for the PM HMMWV to integrate. One such requirement was to increase the payload capability of the platform (B. Naegle, personal communication, April 26, 2013).

Much like the BBP 2.0 initiative of building stronger partnerships with the requirements community to control costs, the CBTDEV needed to assist the program office in defining the requirements and minimizing requirements creep. TRADOC had established guidance that units could not modify the HMMWV. Instead, they leveraged these HMMWV modifications to produce new requirements. That is not to say that the warfighter does not produce great ideas for modification. Soldier innovations have proven this time and time again. Nevertheless, requirements creep must be identified and not perpetuated.

Cross-functional teams did not exist to formulate and manage requirements. The PM HMMWV was overwhelmed by the constant flow of additional requirements. This issue was only exacerbated as the HMMWV was being used more and more in the GWOT. Another ONS was submitted in 2003, for a modified HMMWV with additional protection. The 2004 ORD in response to the ONS was as follows:

> Overall Mission Area. The HMMWV mission is to provide a light tactical wheeled vehicle for command and control, troop transport, light cargo transport, shelter carrier, ambulance, towed weapons prime mover, and weapons platform throughout all areas of the battlefield or mission area (e.g., peacekeeping). For units that require specific vehicle configurations, the detailed requirements will be provided in kit form, capable of being installed at GS maintenance level or below, or by incorporation of Component of Major End Items (CMEI)/Component of End Items (COEI) by the system integrator. (JROC, 2004, p. 1)

The 2004 ORD based on the receipt of the ONS drove the production of upgrades to produce a desired survivability capability. However, this capability continued to grow and evolve with the enemy threat, as expected.

> We ramped up the production line there from a [*sic*] up armor Humvee. We had to design, develop, test, modify and field an add-on armor kit, and then just a series of upgrades. It's been a case of where you get a basic capability to the field as quickly as possible, have some type of feedback mechanism forward in the field, you know, once the soldiers tell you what works and what doesn't and the threat continues to evolve and you've got to have a system to set up here and upgrade. (K. Peterson, personal communication, October 24, 2012).

The MRDs, on the other hand, did not capture the growing requirement all at once.

Within the ORD, there were no requirements for electronic warfare systems, Objective Gunner's Protective Kit (OGPK), additional radio mount, navigation system, driver's vision enhancement systems, automatic fire extinguishing systems, air conditioning, or other additional requirements. "Some things [requirements] have the right traceability, but you'll see other things like a gunner protection kit on top of a HMMWV and there's no requirement for that where it started" (K. Peterson, personal communication, October 24, 2012). These additional requirements were the products of warfare, emerging warfighter needs, other PM initiatives, and ever-changing threats on the battlefield. These requirements were not anticipated in the writing of the 2004 ORD because the CBTDEV was not aware of the requirements for these special items.

In spite of this, in the race to contribute to GWOT, requirements creep grew at an uncontrollable rate for the HMMWV. Every additional requirement added to the HMMWV's size, weight, and power requirements. Eventually, the HMMWV would fail in many of its requirements. It was no long air transportable by any aircraft or air droppable by any rotary-wing asset during sling-load operations. It met the requirements of the initial documents but simply could not keep up with requirements creep from new and emerging technologies.

The HMMWV would be replaced in Iraq and Afghanistan by the MRAP because the HMMWV platform could not meet the challenges of creeping requirements. The warfighters needed a more survivable and maneuverable platform that could handle the size, weight, and power requirements of both theaters of war. This revolutionary change was necessary because the HMMWV was no longer efficient in meeting the challenges of the GWOT. The HMMWV met its initial mission to replace older vehicles in the DoD's fleet, although it was never designed for the requirements that continued to grow during the GWOT. It is essential that performance requirements are scrutinized and that cross-functional teams are created in order to better manage emerging capability gaps and prepare more requirements documents. Figure 23 is the HMMWV's MRDs scorecard.

g. HMMWV Efficiency and Effectiveness Analysis

BBP 2.0 Principles and Initiatives – HMMWV

MRDs

Initiative \ Rating	Poor	Average	Excellent
Efficiency Initiatives			
(1) Build Stronger Partnerships With The Requirements Community To Control Costs	✓		
(2) Reduce Cycle Times While Ensuring Sound Investment Decisions		✓	
Effectiveness Initiatives			
(1) Eliminate Redundancy Within Warfighter Portfolios	✓		
(2) Improve Requirements Definition And Prevent Requirements Creep	✓		

Figure 23. HMMWV Overall Rating Scorecard

Overall Score

Efficiency: 1 × Poor, 1 × Average

Effectiveness: 2 × Poor

Figure 24 depicts our overall rating of the HMMWV's MRDs.

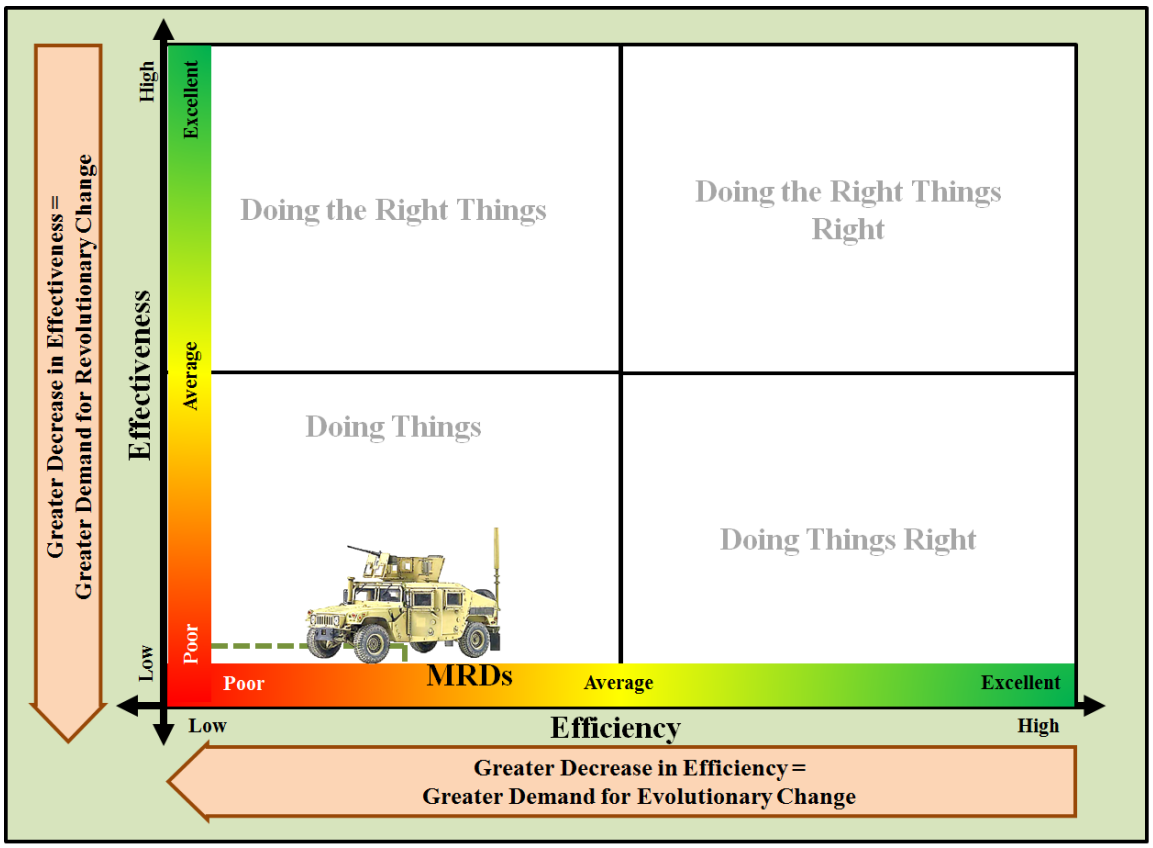


Figure 24. HMMWV Efficiency and Effectiveness Analysis (After Grüter & Boerendans, 2013)

Overall Rating

Efficiency: Poor–Average

Effectiveness: Poor

The HMMWV MRDs receives an efficiency rating of poor–average. Our analysis reveals that efficiency was gained by the HMMWV's acquisition cycle. The program's acquisition cycle was less than half the time of other ACAT I programs during

the 1980's. Additionally, efforts between key stakeholders were poorly synchronized and the PM office had difficulty establishing collaboration. Their initial relationship with their requirements' partners could have been improved to be more synchronized. Better collaboration between stakeholders would have increased the efficiency of the partnership between the user community and the program office required to meet the needs of the warfighter. Lines of communication between the stakeholders started out with little collaboration and eventually transitioned to receiving direct feedback from the warfighter. Thus, MRDs yielded low efficiency for PM HMMWV to execute their mission and make sound investments with their funding.

The HMMWV receives a rating of poor for effectiveness. The HMMWV provided a truck that effectively replaced the M151 Jeep, M880 and M561 Utility Trucks, and the M792 Ambulance with commonality based off its requirements documents. However, requirements creep and redundancy became an issue for the platform as changes and modifications were being made to the platform. The HMMWV MRDs began creating redundancy for the program through the analysis of adding the 2 ½ ton truck program. Requirements creep also emerged in the form of increased capabilities in response to the 2 ½ ton truck program and the vehicles role and utilization within GWOT. Each of these instances produced the MRDs effectiveness rating observed in Figure 24.

The HMMWV has been in the Army's fleet for nearly three decades and has undergone the experience of both the RGS and the JCIDS. While the PM HMMWV has never had to execute the documents of the JCIDS, it has experienced the dynamics of a new requirements generation process. Also, many of the additional retrofits integrated on the platform have had to undergo these new requirements documents. The transition between RGS and JCIDS has often made it difficult for the HMMWV to adapt to the many emerging requirements. The RGS had been a well-established process adopted by the workforce. The HMMWV was in the transition between one RGP to the next.

2. Mine Resistant Ambush Protected All-Terrain Vehicle (M-ATV)

Of note, some information was drawn directly from the researcher's (Anh Ha) personal experience serving as the APM M-ATV prior to this project. Information referenced from the researcher was done in an objective manner only to provide information about specific sub-systems integrated onto the M-ATV platform. An image of the M-ATV is shown in Figure 24 below.

Figure 25. M-ATV (A. H. Ha, personal communication, April 13, 2013)

a. Mission

"The MRAP All-Terrain Vehicle (M-ATV) is used in small unit combat operations in highly restricted rural, mountainous, and urban environments. Missions include mounted patrols, reconnaissance, security, convoy protection, communications, command and control, and combat service support" (PM M-ATV, 2013).

b. Vision

"We are a cohesive, people-oriented, rapid-response, jointly coordinated program, focused on new technologies, organized and coordinated to efficiently provide effective capabilities to Warfighters and customers" (PM M-ATV, 2013).

c. Focus

> The Product Manager MRAP All-Terrain Vehicle (PdM M-ATV) manages the M-ATV, designed to provide MRAP levels of protection with greater off-road mobility in the Afghanistan theater of operations. The first M-ATVs were issued to combat units in Afghanistan in December 2009, just 160 days after contract award. The fielding of these lifesaving vehicles marked a significant milestone achieved by the MRAP Joint Program Office (JPO) to protect the Warfighters with a highly survivable and off-road–capable vehicle. In addition to its ability to traverse a wide variety of terrain, its speed transforms it from simply a means of transportation to an offensive capability. The lighter weight and smaller size also lend the vehicle to somewhat easier transportability. The M-ATV can carry up to five personnel—four plus a gunner. (PM M-ATV, 2013)

d. M-ATV Background

The M-ATV was acquired and fielded as a result of rapid acquisition initiatives in support of the GWOT. In September 2008, the capability need for the M-ATV came from Operation Enduring Freedom in Afghanistan. The M-ATV was developed from the minimum amount of requirements documents due to the urgent and compelling needs of the warfighter. The M-ATV program was an amendment to the original JUONS CC-0326 from November 2006 and did not require a CDD since it was a COTS materiel solution and used an amended CPD V1 approved in May 2007 for production.

By December 2008, a request for proposal was released, and source selection was completed by the end of June 2009. Oshkosh Defense was awarded the initial contract for over 5,000 vehicles. CPD 1.1 for the M-ATV was approved in the beginning of July 2009 and the start of work began by the end of July. The M-ATV received its first major ECP in order to support the Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) upgrade, after the first 200 M-ATVs had already been accepted by the government in mid-August. The approved solution was tested and cut into integration at SPAWAR (Space and Naval Warfare

Systems Command) South Carolina by the end of September 2009. In the beginning of October 2009, the first M-ATV arrived in Afghanistan and was fielded to the warfighter. Figure 26 outlines the life cycle of the M-ATV and the MRAP Programs' requirements documents. The squares outlined in red show the events specific to the M-ATV.

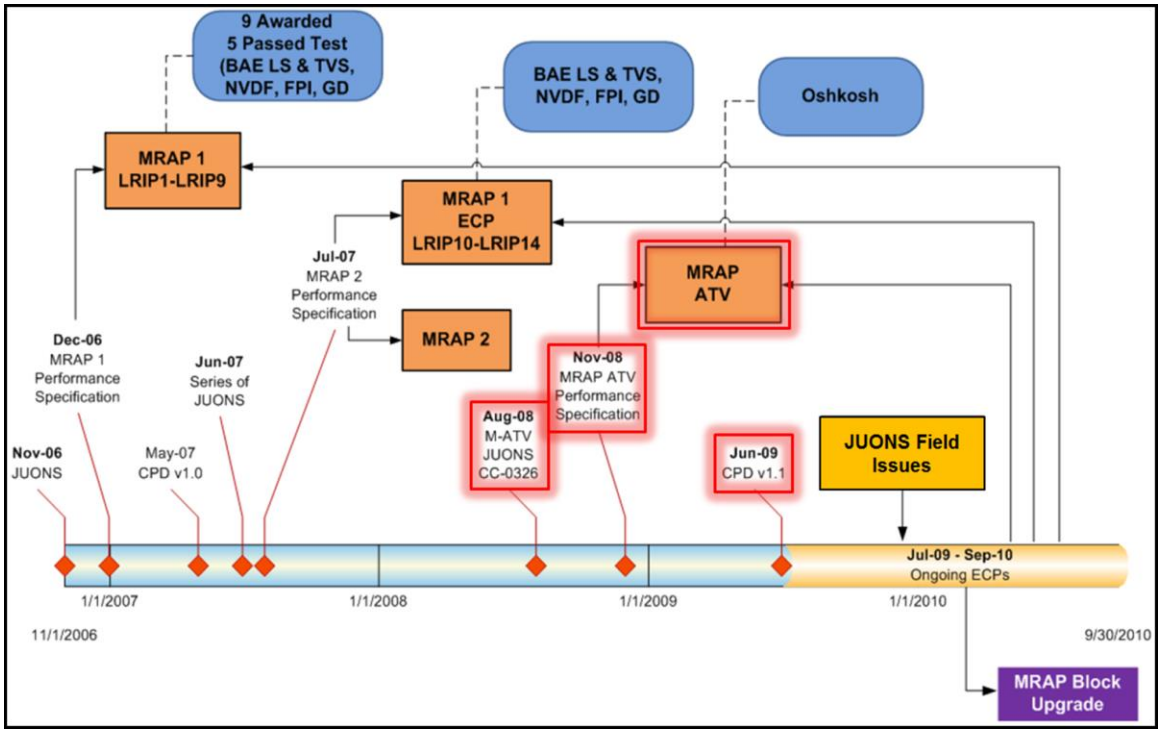


Figure 26. MRAP Requirements Timeline (After Johnson & Iovannitti, 2010, p. 8)

The JPO MRAP used many tools to ensure the vehicle met the desired capabilities and requirements of the warfighters during its development. One of the main tools used by the program office was a requirements traceability matrix (RTM). The RTM provides a way to ensure traceability of all requirements for the specific product or system (Ofni Systems, n.d.). This traceability allows the ability to trace each requirement to a measureable factor that can be tested (Ofni Systems, n.d.). This allows for validation and verification of each requirement and capability.

While the M-ATV has never undergone full-rate production, the program has produced over 8,000 M-ATVs in five separate LRIPs. The M-ATVs were produced

in LRIPs 15, 16, 17, 21, and 22. The JUONS and CPD were the requirements documents we evaluated in our analysis.

The M-ATV is a materiel solution that existed after the inception of the JCIDS. The M-ATV's life cycle continues through the modifications of the JCIDS. While the JCIDS was enacted in June 2003, as per CJCSI 3170.01F (CJCS, 2007),

> c. JCIDS recognizes that there are many sources for capability needs including: Joint Urgent Operational Needs (JUONs)…for immediate needs, combatant commander's integrated priority lists (IPL), lessons learned, transitioning improvised explosive device (IED) initiatives …, etc. Once these sources have been reviewed and approved by the JROC, they will enter the JCIDS and acquisition processes at Milestone B or C. (p. A-1)

Additionally,

> (10) Other sources may be used to justify entering the JCIDS process without a JCD or ICD. These sources include combatant commander IPL, joint and Service lessons learned, joint assessments (e.g., War on Terrorism), JUONs, Service urgent needs, IED defeat initiatives, JCTDs/ACTDs, qualified prototype projects, and quick reaction technology projects. Once the JROC has validated the gap identified in the source, the sponsor can initiate development of a CDD or CPD as appropriate. (CJCS, 2007, pp. A-7–8)

Requirements/Capabilities Documents

ICD: None. The M-ATV initial capabilities document was an amendment to JUONS CC-0326. The M-ATV went from JUONS to CPD.

General Description

JUONS CC-0326 was the document that facilitated the MRAP family of vehicles (FoV). The JUONS identified the urgent need for a protected vehicle capability that increased survivability and mobility of forces operating in a hazardous fire area or combat zones against threats that included mines, IEDs, Explosively Formed Penetrators (EFP), RPGs, RKG-3 grenades and small arms fire (SAF) in the Area of Operations (AO). *The Army Tactical Wheeled Vehicle Strategy* shows the development of the current M-ATV from its operational requirements that were contained in the original JUONS.

> M-ATV—Used for combat operations in complex and highly restricted rural, mountainous, and urban terrain. The M-ATV provides better overall mobility characteristics than the original CAT I, II, and III MRAP vehicle variants and provides better survivability characteristics than any variant of HMMWV. The M-ATV supports mounted patrols, reconnaissance, security, convoy protection, casualty evacuation, DI and C2 functions; carries up to five personnel. (Office of the Vice Chief of Staff, 2010, p. 12)

Because the enemy exploits known ground lines of communications (GLOCs) with ambushes and IED and small arms fire, Joint Forces need vehicles that enable them to survive the first attack and counter attack (JPO MRAP, 2010).

The amendment to JUONS CC-0326 requested a smaller variant of the MRAP in support of OEF. The warfighter needed a lighter vehicle platform with the capability to traverse the rigorous terrain of Afghanistan. The PM M-ATV continues to use the JCIDS documents to support their program.

e. M-ATV Better Buying Power 2.0 Efficiency Analysis

(1) Build Stronger Partnerships With the Requirements Community to Control Costs.

Rating: Average

Initially, the requirements community and the PM office were well synchronized in producing the MCD for the base model of the M-ATV (D. Krawchuk, personal communication, April 13, 2013). Everyone at every echelon understood the urgency of the capabilities needed by the warfighters in Afghanistan and that a quality CPD was needed to maximize the efficiency of the M-ATV's production. The requirements of the base model were dutifully coordinated and portrayed by the CBTDEV to the JPO MRAP. Most discrepancies were quickly defined by the CBTDEV in order to ensure the right solution would be fielded in OEF.

> I would say the only ones that we saw staffed and we had an opportunity to chop off on was the MATV CPD. I mean we did go back and forth with them so that—because they were writing it very performance oriented. So that was a good thing. Some of the performance that they had in and their thresholds were kind of beyond what we believe the state of the art to be, so we negotiate with them so that it wasn't. That was kind of

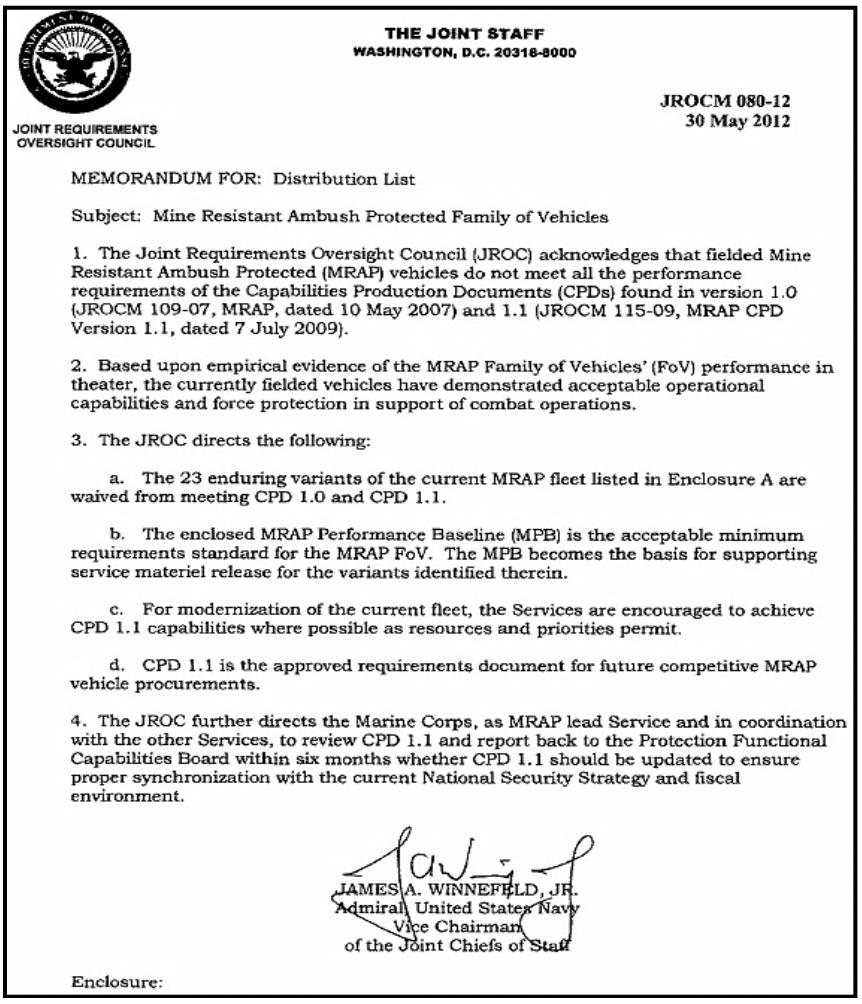
> the whole staffing part of it. We will try to get you as much as we can within the confines of what is written, but we don't want to agree at a threshold level to give you something that we do not know can be met. (D. Krawchuk, personal communication, February 13, 2013)

Additionally, the CBTDEV assisted in the source selection process to represent the requirements community. This is a one of the biggest reasons that M-ATVs were able to be fielded in 16 months (D. Krawchuk, personal communication, February 13, 2013).

However, the CBTDEV continuously received capability gaps from theater and contacted the program office for a potential solution to meet each capability gap. The JPO MRAP and the CBTDEV did have an open line of communication between their organizations; although the lack of fully understanding the dynamics of each other's organizational processes inhibited them from fully efficiently developing requirements for both stakeholders. The program office did not fully understand the operations of TRADOC, nor did the CBTDEV understand the acquisition process that a program office must follow. Although TR 71-20 outlines the process for requirements determination, the actual process was not strictly adhered to due to the lack of knowledge and understanding. However, MRAP CBTDEVs did their due diligence and wanted to meet the warfighter's needs as quickly as possible.

As mentioned previously, the CPD v2 was amended for the M-ATV and was based on the experiences with the original MRAP CPD v1. PM M-ATV and the MRAP office were persistently doing more with less. It was difficult for them to train sufficient personnel for translating user requirements into system specifications since their workforce was so overstretched with ongoing operations to meet the warfighter's continuously growing needs. The JPO MRAP relied heavily on those with past experience. Many of these personnel were also in key leadership positions, and writing the system specifications was an additional duty to their daily roles. The lack of a knowledgeable acquisition workforce from the younger generation limited their collaboration with the CBTDEV. The collaboration between the program office and the CBTDEV was crucial for all stakeholders to clearly meet the needs of the warfighter from inception to materiel solution.

The memorandum on the MRAP FoV, shown in Figure 27, shows the DoD's acceptance of the requirements documentation of the MRAP thus far.



THE JOINT STAFF
WASHINGTON, D.C. 20318-8000

JOINT REQUIREMENTS OVERSIGHT COUNCIL

JROCM 080-12
30 May 2012

MEMORANDUM FOR: Distribution List

Subject: Mine Resistant Ambush Protected Family of Vehicles

1. The Joint Requirements Oversight Council (JROC) acknowledges that fielded Mine Resistant Ambush Protected (MRAP) vehicles do not meet all the performance requirements of the Capabilities Production Documents (CPDs) found in version 1.0 (JROCM 109-07, MRAP, dated 10 May 2007) and 1.1 (JROCM 115-09, MRAP CPD Version 1.1, dated 7 July 2009).

2. Based upon empirical evidence of the MRAP Family of Vehicles' (FoV) performance in theater, the currently fielded vehicles have demonstrated acceptable operational capabilities and force protection in support of combat operations.

3. The JROC directs the following:

a. The 23 enduring variants of the current MRAP fleet listed in Enclosure A are waived from meeting CPD 1.0 and CPD 1.1.

b. The enclosed MRAP Performance Baseline (MPB) is the acceptable minimum requirements standard for the MRAP FoV. The MPB becomes the basis for supporting service materiel release for the variants identified therein.

c. For modernization of the current fleet, the Services are encouraged to achieve CPD 1.1 capabilities where possible as resources and priorities permit.

d. CPD 1.1 is the approved requirements document for future competitive MRAP vehicle procurements.

4. The JROC further directs the Marine Corps, as MRAP lead Service and in coordination with the other Services, to review CPD 1.1 and report back to the Protection Functional Capabilities Board within six months whether CPD 1.1 should be updated to ensure proper synchronization with the current National Security Strategy and fiscal environment.

JAMES A. WINNEFELD, JR.
Admiral, United States Navy
Vice Chairman
of the Joint Chiefs of Staff

Enclosure:

Figure 27. Memo on the JPO MRAP From the Vice Chairman of the Joints Chiefs of Staff (From JROC, 2012c, p. 1)

As the JPO MRAP grew as an organization, the workforce's expertise also grew from both adaptable senior leadership as well as a new and talented workforce across several generations.

Other non–programs of record may want to emulate what JPO MRAP has done to validate their requirements by reaching approval through a program-created tool, a "Performance Baseline Matrix." This was a tool used by the program to

explain what requirements each vehicle within the MRAP FoV met. Overall, the shortfalls and best practices of the JPO MRAP must be recognized for future evolution of requirements generation and validation processes. The M-ATV program has been identified as being very costly but necessary for preserving life.

The MRAP team was already overtasked. The MRAP FoV had the largest footprint in both Afghanistan and Iraq. The program office was working all five phases of the DAS simultaneously. They were constantly receiving new requirements from both theaters of Iraq and Afghanistan, they were conducting technology development for additional capabilities required for the MRAP FoV, they were executing additional testing on new capability insertions, they were still in production of many of their different variants, and they were fielding and sustaining the MRAPs in both theaters as well as home station training (M. Minto, personal communication, February 13, 2013). Since 2004, the JPO MRAP has had to respond and answer nearly 50 JUONS to enhance the MRAP FoV and balance their efforts with multiple OEMs (D. Krawchuk, personal communication, February 13, 2013). Figure 28 shows the MRAP FoV.

Figure 28. MRAP Family of Vehicles (From Johnson & Iovannitti, 2010, p. 9)

From CPD V1 to CPD V2, the JPO MRAP incorporated over 30 additional JROC approved requirements (D. Krawchuk, personal communication, February 13, 2013). These additional requirements were above and beyond the initial JUONS and CPD. The JPO MRAP conducted its own case study in order to assist the DoD and CBTDEV in divesting its FoV to meet the needs of Army MTO&E (Office of the Vice Chief of Staff, 2010). Traditional programs of record must follow the process of the life cycle management system. If the JPO MRAP were to become a program of record, they realized that all required documentation would have to be completed. This meant that the MRAP program would have to start from the beginning of the life cycle management system to validate their program.

The JPO MRAP and M-ATV executed requirements validation. The JPO MRAP and the CBTDEV accomplished this by cataloging and identifying the requirements outlined in multiple documents to meet definitive requirements as a result of requirements creep (D. Krawchuk, personal communication, February 13, 2013). The JPO MRAP would strategically analyze their governmental emails, orders, requirements, presentations, papers, and studies to understand what was expected from the program by the JROC and CBTDEV. The purpose of their study was to leverage current acquisition best practices to understand their own developmental challenges and constraints. The JPO MRAP objectively examined its program and created its own path on how to defeat the bureaucracy and rigors of the RGP (M. Minto, personal communication, February 13, 2013). There was no need to reaffirm the DAS since the platform was already showing success in a combat environment (M. Minto, personal communication, February 13, 2013).

Steps taken by the program office and the CBTDEV to begin remedying the situation included providing a validation matrix for existing MRAP platforms to receive the Vice Chairman of the Joint Chiefs of Staff's approval for future procurements (D. Krawchuk, personal communication, April 13, 2013). In our analysis, this may have increased the efficiency to solve an issue to JROC approved requirements. However, this alternative technique did not adhere to the outlined process of JCIDS or allow the MCDs to prevail. This produces inefficiencies through means of circumventing

steps that have been developed to ensure proper collaboration and vetting with all necessary stakeholders.

The JPO MRAP produced capabilities documents that validated vehicles already produced and utilized by the warfighter. The JPO MRAP outlined what they understood to be 47 performance criteria required to meet the capability gap (D. Krawchuk, personal communication, February 13, 2013). The program office identified what capability gap that each platform specifically met. In summation, JPO MRAP did not have to spend time and effort in order to reach the end-state of all of its efforts over the past decade. It received approval that it had met the JCIDS requirements (JROC, 2012c). This was a revolutionary change where the JPO MRAP was the first of many programs that were initiated by the JCIDS rapid acquisition process.

The PM M-ATV and the requirements community did not agree on many requirements. First, the CBTDEV continued to push for a TOW/ITAS variant of the M-ATV. The CBTDEV believed it was as simple as integrating the TOW/ITAS OGPK turret with mount onto an M-ATV. The requirements for TOW/ITAS outlined by the CBTDEV were to provide an M-ATV where the missiles were stored in an enclosed ballistic case and the missile loader did not have to dismount the truck to load the missile or clear the back-blast area, while at the same time not taking away from the base model's survivability and maneuverability.

In reality there were safety issues, the need to maintain the integrity of the hull, and space availability constraints that would not allow these requirements to be met. When filled with the basic standard load of water, food, ammo, medical supplies, and nuclear, biological and chemical equipment, the only place to safely store missiles, especially when considering the threat of IEDs, was in the bed of the M-ATV (A. Ha, personal communication, April 13, 2013). To meet the ballistic requirement to enclose the missiles would require an enclosure of the bed area. This would take away from the truck's maneuverability and add additional constraints to the already heavily tasked size, weight and power (SWAP; A. Ha, personal communication, April 13, 2013). A back hatch at the rear of the hull would have to be integrated in order to meet the requirements of the loader to egress the vehicle without dismounting the

truck. This would take away from the integrity of the M-ATV's capsule-like hull and degrade its survivability.

Additional research revealed that these vehicles would not be widely used in Afghanistan for either the TOW/ITAS or the ambulance variant of the M-ATV. The only units with MTO&Es that required TOW/ITAS were Infantry Brigade Combat Teams (IBCT), and even then there were only a few companies that had the TOW/ITAS. If there were two IBCTs simultaneously deployed in Afghanistan, and they were to mount all MTO&E TOW/ITAS systems on their trucks, there would be a requirement for approximately 50 M-ATVs to have this capability. The IBCTs seldom mounted their TOW/ITAS on patrols, even when they had the capability on the HMMWV.

There was a great deal of conceptual separation between the warfighter, the CBTDEV, and the program office. This separation could have been prevented by performing an overarching DOTMLPF analysis when writing the requirement. A great deal of efficiency was lost by the failure to have a better partnership in terms of time, funding, and efforts. Neither the TOW/ITAS nor the ambulance platforms were effective.

(2) Reduce Cycle Times While Ensuring Sound Investment Decisions.

Rating: Average

The objectives of the initiative were met for all stakeholders in many aspects. The JPO office, TACOM's contracting office, the testing community, and the original equipment manufacturer (OEM) were well synchronized in order to quickly meet the needs of the warfighter. The acquisition strategy of the PM M-ATV ensured that few discrepancies existed in the capabilities documents based on the PM's understanding on what was required and of the CBTDEV's writing of the CPD. The PM M-ATV used many of the same personnel to assist the CBTDEV who had written the original CPD V1 on the amended CPD V2.

> November 1, 2006 was our original JUONS. We were already under contract award by the end of January. Again, the beginning of May was when we had our CPD 1.0. We have a CPD 1.0, the first one, which was 1 May 2007 and our CPD 1.1, the second version, was July 7, 2009. (D. Krawchuk, personal communication, February 13, 2013)

They leveraged the experience of those key stakeholders from original the MRAP CPD and had undergone the JROC approval process.

Many of these personnel also had already built the essential relationships with stakeholders in the Pentagon.

> As for CPDs running through the JCIDS process, I don't know what you have seen, but prior to MRAPs and some other programs I was on, we were looking at a year or a year plus to get a CPD written, staffed and approved. Since we had contractors who happened to understand the JCIDS process. We went from a contract with WBB [Whitney, Bradley and Brown, Inc.] to say, "Help us get a CPD written and approved," to an approved CPD within two months. It was on an ultra-short fuse that we got this stuff approved in no time at all. The good thing is yes, you got it done in two months. (D. Krawchuk, personal communication, February 13, 2013)

WBB is a consulting firm that provides contracted services to the government and private-sector companies. One service that is provided and used by the JPO MRAP was consulting provided within WBB's acquisition management function.

> As part of our customer support, we have developed every type of program document, analysis, and briefing required by governance, acquisition, budgeting, and requirements processes. Because of our experience and current involvement at all levels of the acquisition and requirements chains of command, we know who to talk to and how coordination processes work. So we can efficiently help program managers successfully navigate through the acquisition life cycle. (Whitney, Bradley and Brown, Inc., n.d.)

WBB specializes in providing assistance to programs throughout the entire acquisition life cycle. Additionally, they are not a company that competes for the contract to produce a materiel solution for an acquisition program.

The use of consultants increased the efficiency of the MCD. Cycle times were reduced for the development, staffing and approval of the document.

Additionally, the consultants would ensure the developed MCD would meet the desired needs of all involved stakeholders. Benefits gained from using consultants whose focus was on JROC approval during the JCIDS, resulted in a significantly decreased MCD approval cycle time and the development of a sound requirements document. Additionally, this supported the CBTDEV's efforts of their MCDs by providing an additional advocate that assisted in the JROC approval.

In our analysis, essential collaboration and maximizing resources facilitates efficiencies in cycle time. However, this technique is not outlined in regulations or policy. It falls outside the scope of traditional methods. The use of contracted consultants for the assistance of writing and staffing of requirements documents may have increased the efficiency, but it does not provide justification for a rating of excellent since it is not adhere to policy and regulations.

Nonetheless, defining the requirements up front reinforced this initiative. The M-ATV base model was created from the needs of the warfighter. The base model of the M-ATV was to provide a lightweight survivable platform. All other requirements were not KPPs but additional modifications that may have enhanced the platform. The M-ATV was built capsule first. The frame and engine were built around the capsule. The idea was to preserve those who were in the vehicle. Both the requirements authors and those on the source selection board focused on the requirements to meet the warfighter's needs. Force protection and survivability were the priorities in their analysis. The M-ATV was the approved solution and vehicle of choice in Afghanistan.

The base model M-ATV was built upon the basics of commonality in order to minimize logistics demands and maximize sustainability. Oshkosh Defense had already provided the medium tactical vehicle for the DoD. They utilized many of the parts and products that were already in the DoD's supply system.

The M-ATV government-furnished equipment (GFE) were all existing items in the Army's inventory, and each item had already met a Technology Readiness Level (TRL) of nine or an actual application of the technology during mission

operations (TEC-SHS, 2008). This includes using the system under operational mission conditions. The GFE only had to be integrated on the M-ATV. For example, wiring harness lengths and human factors needed to be considered to ensure the warfighter could fit in the M-ATV and still operate comfortably. This was a lesson learned from the PM HMMWV.

f. M-ATV Better Buying Power 2.0 Effectiveness Analysis

(1) Eliminate Redundancy Within Warfighter Portfolios

Rating: Average.

The requirements were well defined in the original approved JUONS. The warfighter asked for an MRAP-like vehicle based on the same capabilities of the existing MRAP FoV. However, the JUONS did require SWAP analysis. The GFE that existed on all other MRAP trucks (such as the Army's Force XXI Battle Command Brigade and Below [FBCB2], radios, jammers, and anti-IED Rhinos, and SPARKS II Mine Roller) became standard issue with the M-ATV. There was no other ground tactical vehicle that matched the maneuverability and survivability within the warfighter's portfolio.

> Key attributes—the [S]ervices did do a better job of laying out some KPP type things for in that JUONS. So not that they were all realistic, but then we worked with them to help determine that. (M. Minto, personal communication, February 13, 2013)

This determination allowed the key stakeholders to minimize the redundancies within the M-ATV's portfolio.

The M-ATV was frontloaded with GFE that initially provided the warfighter with capabilities that were commonly provided as MTO&E. Figure 29 shows all the requirements by Service that the capabilities documents detailed.

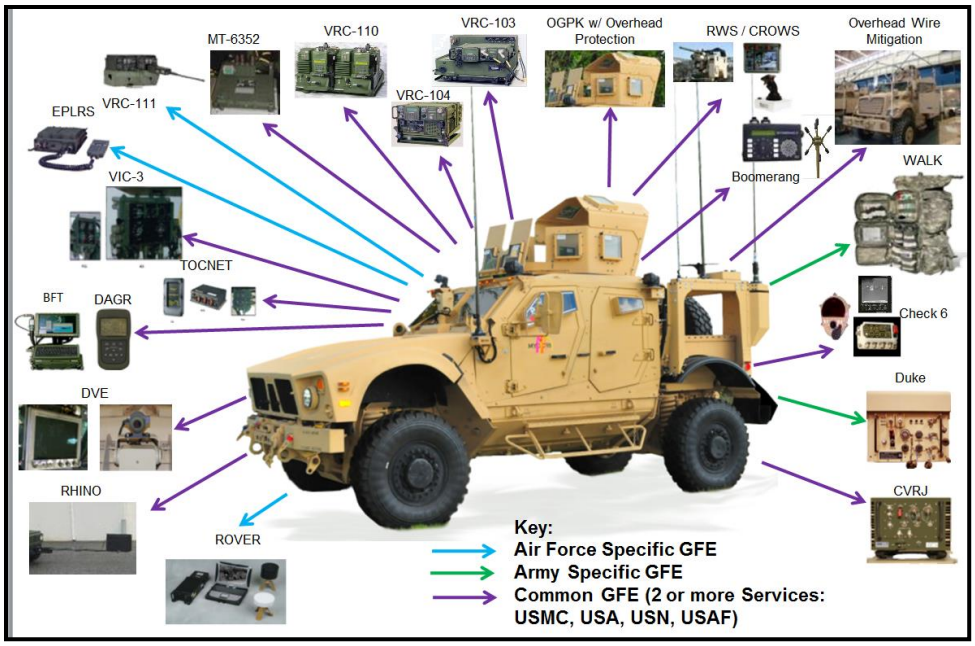


Figure 29. M-ATV Government-Furnished Equipment Requirements (From A. Ha, personal communication, April 13, 2013)

New technologies were introduced at the same time the first M-ATV was coming off the production line. Configuration management became a greater challenge as USFOR-A(U.S. Forces-Afghanistan) identified the M-ATV as the warfighter's vehicle of choice. The M-ATV was the platform that filled the JUONS capability gaps that enhanced the ability for warfighters to conduct their missions.

Another example involved the Army Medical Department (AMEDD). There was also a requirement for an ambulance variant of the M-ATV. The requirement was for the M-ATV to carry seven personnel: one driver, one truck commander, one medic, three walking wounded who could sit up, and one litter ambulatory who could lie down on a stretcher. The M-ATV would need a device to lift a stretcher with a person on it. Personnel standing on the ground could not do this safely because the upward reach was too high. The PM M-ATV received a prototype of the ambulance variant and began testing. The M-ATV failed testing with horrible results. The M-ATV ambulance extended the cab over the wheel base (A. Ha, personal communication, April 13, 2013). Extension of the cab of the base model M-ATV's capsule would not meet the survivability KPP. Explosion impacts over the rear axle

caused injuries to the personnel because it overextended the capabilities of the original capsule. An effective capsule could not meet the needs of the medical community for an M-ATV ambulance. Nonetheless, the AMEDD continued to push the requirement.

Additional studies also revealed that the maneuver units in sector were not taking their HMMWV ambulances on patrols. It had become the overwhelming necessity to air MEDEVAC/CASEVAC casualties off the battlefield as this was the quickest means for casualties to receive medical attention. Air assets could get the casualty to the required level of care in a more expedited manner. MEDEVAC pilots were receiving the training to identify the nearest level of care for casualties within their area of operation. Ultimately, the JROC identified that the AMEDD's requirement could not be met and cancelled the requirement.

The CBTDEV executed due diligence in their roles and continued to seek out new solutions for non-validated requirements. The CBTDEV sought existing systems to incorporate into the M-TAV platform in order to reduce redundancy across the warfighter's portfolios. These requirements were often outside the scope of the JUONS and the CPD. Without JROC-approved requirements, the PM could not support initiatives outside the scope of their authorized funding. The JPO MRAP could not restrict the CBTDEV from conducting their mission of delivering the warfighter's requirements to the program. However, the program office clearly conveyed to the CBTDEV that additional initiatives could not be executed without funding.

The JROC continued to follow through with the outlined process of the JCIDS for validation of new emerging requirements. Nonetheless, the JUONS that outlined the requirements for the M-ATV was excellent. The CBTDEV encompassed the warfighter's needs commensurate to the current technologies being used in OEF at the time it was authored.

(2) Improve Requirements Definition and Prevent Requirements Creep.

Rating: Poor

The M-ATV became a product of requirements creep as its relevancy in theater grew. The platform, much like HMMWV, became the vehicle of choice in OEF. The M-ATV was the 32nd variant of the MRAP (Kelley, 2012). Initially, JPO MRAP had the ability to control requirements of the M-ATV by meeting the needs of the CPD.

> They [CBTDEV] did do a better job there, but when we look at the vehicle JUONS' versus some of the other JUONS' that we received for widgets and things like that, some of the things that tied our hands and didn't allow us to do some of the things we wanted to do was they wrote in a specific type of [material specification] not a capability, but a specific [desired material]. (M. Minto, personal communication, February 13, 2013)

Specific material specifications constrained the program office to effectively analyze multiple materiel solutions. Exact specifications can lead to situations of requirements creep. For the M-ATV, this occurred by the MCD specifying the exact specification instead of performance requirements. Projection of capabilities allows for adequate planning to allow the materiel solution to be interoperable with other subsystems that may be added to the materiel solution (Figure 30). This maximizes the effectiveness of the MCD.

The CBTDEV and The JPO MRAP worked hard to ensure that the requirements were clearly stated in the CPD and that all key stakeholders concurred with the requirements, although new technologies had to be integrated on the M-ATV as the warfighter demanded more out of a platform. This caused further demands on the M-ATV platform to be the warfighters' tool to accomplish their missions. Only later was it revealed that the M-ATV also had its downside in requirements. This became a burden to the program office once the M-ATV entered Afghanistan. Requirements creep did occur as unanticipated initiatives needed to be integrated on the M-ATV.

The initial LRIP of the M-ATV met the requirements outlined by the CBTDEV's MCD and collaborated by the program office, as a standalone materiel solution. The M-ATV would later have additional LRIPs to build platforms for the warfighter and the Special Operations Command's needs. The JPO MRAP and the CBTDEV had projected additional power requirements for the M-ATV based upon

lessons learned from past MRAP vehicles and their SWAP analysis. Technology advancements had to be integrated. However, other C4ISR program offices also required that their technologies be integrated on the M-ATV. Modifications to the base M-ATV platform had to accommodate electromagnetic compatibility/electromagnetic interference (EMC/EMI) testing for eight separate C4ISR end items with multiple wiring harnesses, antennas, and other hardware while still maintaining the integrity of the hull of the vehicle. Figure 30 depicts the base M-ATV produced from the CPD to the C4ISR suite modification that support additional technology initiatives from other program offices.

Figure 30. M-ATV Characteristics (After A. H. Ha, personal communication, April 13, 2013)

Once fielded in Afghanistan, requirements creep became the bane of M-ATV and its CPD. Many unforeseen requirements arose as the M-ATV began to flood the Afghanistan battle space. An example of this is the B-Pillar Handle. The B-Pillar handle was made for military personnel to easily climb up into the vehicle while carrying the weight of battle equipment (Oshkosh Defense, 2010). Neither the PM M-ATV nor the CBTDEV could foresee that soldiers would use the horizontal handle as a step to reach the top of the truck in order to enter the turret or to clear the OGPK weapons system. Even after the PM M-ATV painted a template with the statement, "DO NOT STEP," underneath the handle, the warfighter continued to do so. Once the handle broke off, the soldiers used the frame of the vehicle to enter the M-ATV. A soldier who was unaware that another soldier's hand was on the frame would close the ballistic door on

the other's hand and break the hand (Oshkosh Defense, 2010). The PM M-ATV underwent a $3 million modification for a vertical handle that could not be used as a step, even though this issue could have been resolved by reinforced training.

Furthermore, combat commanders made changes in theater to meet their needs. At the initial inception of the M-ATV, the combat commanders in OEF required a mixture of OGPK turrets and remote weapons station (RWS) turrets. The initial capability request was for a 1:1 ratio of OGPK to RWS (D. Krawchuk, personal communication, April 13, 2013). The JPO MRAP built the OGPK M-ATVs to the established requirement and quickly deployed the vehicles to theater per the guidance of OEF-A (Operation Enduring Freedom – Afganistan). After M-ATVs with RWSs had already begun fielding, the new commander demanded a change in the requirement to a 3:1 ratio (D. Krawchuk, personal communication, April 13, 2013). The new ratio requirement was approved by the JROC, and the JPO MRAP had to comply.

Threat-based requirements evolved as RPGs were continually becoming an issue in OEF. The M-ATV armor provided the capability against the initial type of RPGs required. However, the enemy advanced the threat, and RPG nets had to be provided for the M-ATV. Bar-armor already existed on the Stryker vehicle but would increase the weight of the M-ATV if integrated on that vehicle. The M-ATV was outfitted with a lighter solution in order to stay within the weight KPP. The IED threat also increased as the more survivable M-ATVs were produced and deployed to OEF from an increase in production numbers approved by the JROC (Director, Operational Test and Evaluation, 2009). The M-ATV had met its threshold solution during blast testing (Director, Operational Test and Evaluation, 2012). Yet, the enemy countered that solution. The JPO MRAP had to integrate an Underbelly Improvement Kit (UIK) in order to provide a more survivable platform for the warfighter (Director, Operational Test and Evaluation, 2012).

The SPARKS II Mine Roller was another issue that evolved from the combat commanders' selection of the M-ATV as the vehicle of choice and from threat-based requirements. Originally, the mine roller was used on route clearance vehicles. The requirement changed so that all M-ATVs would have a SPARKS II Mine

Roller adapter bracket (Product Manager Close Combat Systems [PM CCS], n.d.). The SPARKS II began fielding after the M-ATV. The SPARKS II would kick up debris into the radiator, causing the M-ATV to overheat. It became a question of whether this was a PM IED Defeat issue or a PM M-ATV issue. More protection for the radiator required major changes to the vehicle, post-production. This issue was resolved by adding mud flaps on the SPARKS II; however, the PM M-ATV invested a great deal of engineering and testing to assist in resolving this issue.

These are just a couple of examples of the requirements creep that occurred on the M-ATV. Figure 31 captures several other examples of requirements creep.

Figure 31. M-ATV Retrofits (From A. Ha, personal communication, April 13, 2013)

There is a direct correlation between the necessities to align simultaneous materiel solution initiatives and clearly defined requirements in order to alleviate requirements creep from occurring. The requirements outlined in the capabilities documents must consider the overall ongoing programs' initiatives. The JUONS outlined requirements at that time, although new technologies had to be integrated on the M-ATV as the warfighter demanded more out of a platform. This

caused further demands on the M-ATV platform to be the warfighters' tool to accomplish their missions.

Furthermore, DOTMLPF must constantly considered by the CBTDEV when presented with new requirements. A great deal of cost could have been avoided if training had been implemented in safety of use versus creating the B-Pillar Handle materiel modification.

g. M-ATV Efficiency and Effectiveness Analysis

Figure 32 depicts our overall rating of the M-ATV's MCDs.

BBP 2.0 Principles and Initiatives – M-ATV

MCDs

Initiative \ Rating	Poor	Average	Excellent
Efficiency Initiatives			
(1) Build Stronger Partnerships With The Requirements Community To Control Costs		✓	
(2) Reduce Cycle Times While Ensuring Sound Investment Decisions		✓	
Effectiveness Initiatives			
(1) Eliminate Redundancy Within Warfighter Portfolios		✓	
(2) Improve Requirements Definition And Prevent Requirements Creep	✓		

Figure 32. M-ATV Overall Rating Scorecard

Overall Score

Efficiency: 2 × Average

Effectiveness: 1 × Poor, 1 × Average

Figure 33 depicts our overall rating of the M-ATV's MCDs

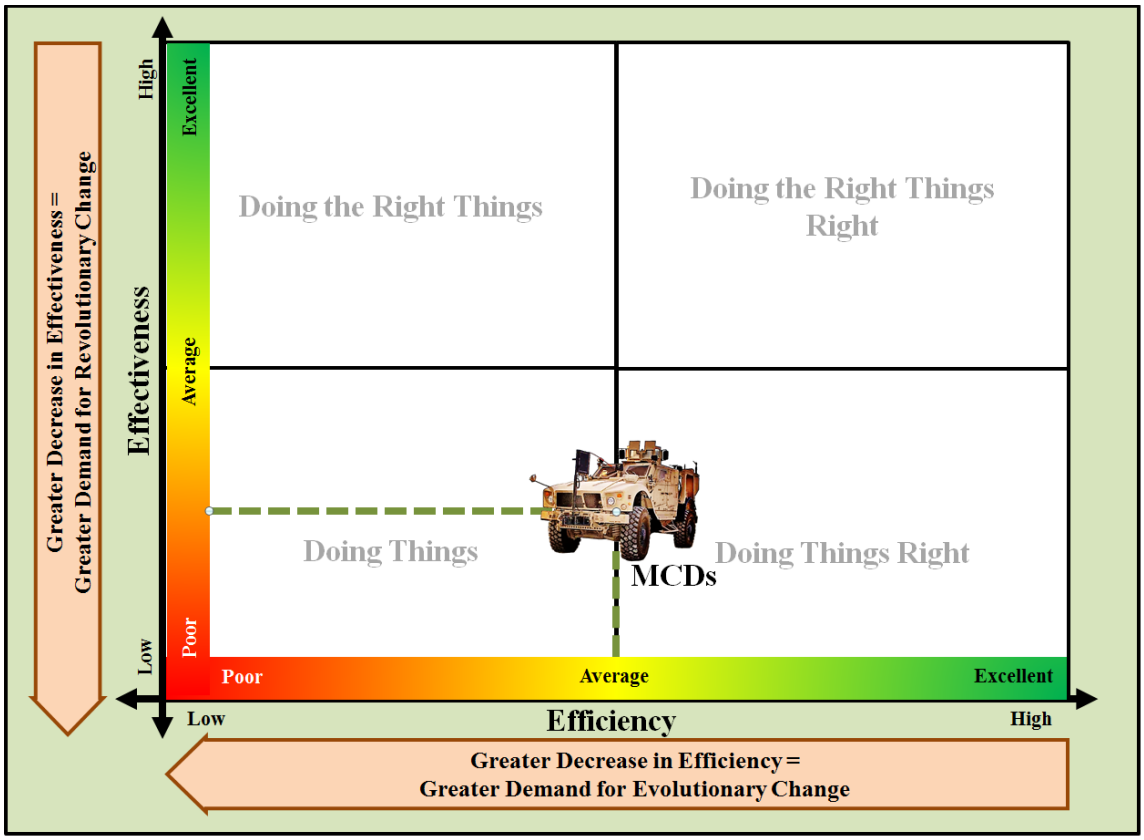


Figure 33. M-ATV Efficiency and Effectiveness Analysis (After Grüter & Boerendans, 2013)

Overall Rating (Results)

Efficiency: Average

Effectiveness: Poor – Average

The M-ATV receives an efficiency rating of average. The requirements outlined in CPD V2 fulfilled the needs of the warfighter to produce the M-ATV. CPD V2 by a contracted consultant was staffed due to the urgent and compelling need for the M-ATV in OED. However, the use of contracted consultant may have decreased the cycle-time; nonetheless, this method is outside the realm of regulations and cannot support a higher score.

Additionally, urgent needs and rapid acquisition pushed for the expedited production of the M-ATV. The M-ATV platform was extremely efficient in meeting the initial capability gaps for the warfighter. However, well defined requirements lost some efficiency as new JUONSs emerged and desired capabilities grew. Additionally, cycle times maximized efficiency due to the urgent and compelling needs for the M-ATV.

The M-ATV receives a rating of poor–average for effectiveness. The CPD V2 requirements were outlined for capabilities with existing technologies that had reached TRL nine. This ensured that the GFE added onto the vehicle was at the highest TRL level to prevent M-ATVs from having different versions or upgrades of GFE. The possession of different versions of GFE creates additional M-ATV variants and increases redundancy in the warfighter portfolio. Thus, MCDs increased effectiveness by minimalizing redundancy. However, requirements creep became an obstacle for the program as the M-ATV became the vehicle of choice in Afghanistan. Additionally, it became the common practice for new technologies to be integrated on the M-ATV. The M-ATV CPD became less relevant as every other program came to the realization that relevancy would be required for integration onto the M-ATV. Furthermore, the program was comprised of a workforce of several generations and varying levels of experience, which constrained the program's effectiveness.

3. Joint Light Tactical Vehicle (JLTV)

The below images, in Figure 34, are of the three competitive prototypes for the JLTV.

Figure 34. Potential JLTV Vehicles by AM General, Oshkosh Corp., and Lockheed Martin (From GAO, 2013, p. 85)

a. Mission

"The JLTV program creates a common family of vehicles consisting of the Combat Tactical Vehicle (CTV) and Combat Support Vehicle (CSV). The CTV has multiple combat mission role variants while the CSV has the ability to be employed as either a utility vehicle or shelter carrier" (PM JLTV, 2013).

b. Vision

"JLTV—Balancing the iron triangle (Protection, Performance & Payload) for the joint forces" (PM JLTV, 2013).

c. Focus

"The Joint Light Tactical Vehicle (JLTV) Family of Vehicles (FoV) is a Joint Army and Marine Corps program that provides vehicles, along with companion trailers, capable of performing multiple mission roles while providing protected, sustained, and networked mobility for personnel and payloads across the full spectrum of military operations" (PM JLTV, 2013).

d. JLTV Background

The JLTV is a major acquisition ACAT 1D program facilitated by the Army and Marine Corps. The JLTV is the best materiel solution to meet the prescribed capability gaps outlined primarily by the Army and Marine Corps' CBTDEV AoA report. The capability gap that is unfulfilled by the current system, the HMMWV, is explained below.

> Based upon the Technology Development phase results, the Analysis of Alternatives concluded that the JLTV program is the best option to fulfill the capability gaps. The Capabilities Development Document requires the JLTV program to develop two mission role variants (MRVs), a two seat MRV and a four seat MRV, to regain transportability and restore balance in the "Iron Triangle" of protection, payload and performance. (Hepner, 2011, p. 1)

Additionally, the identified capability gap requires the JLTV system to augment a family of systems to support ground tactical operations. Augmentation of existing systems led the Army to issue an EMD RFP for at least 20,000 JLTVs and 5,500 vehicles for the Marines (Feickert, 2013).

In 2006, the JPO JLTV was established. Approval of the program also identified the Army as the lead proponent of the program, which falls under the Army's PEO Combat Support and Combat Service Support (CS&CSS). The Marines have the JLTV program under the leadership of PEO Land Systems (LS). The Under Secretary of Defense John J. Young, Jr., approved the JLTV program to move into the technology development phase (JROC, 2007a). The current timeline for the program is shown in Figure 35.

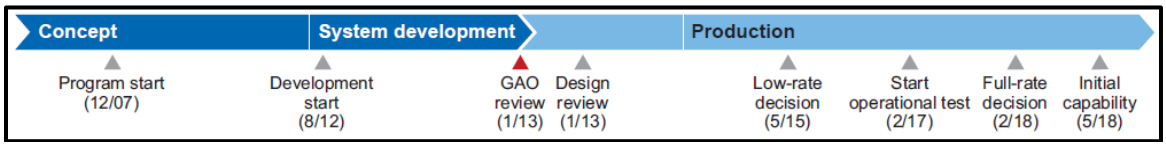


Figure 35. Current JLTV Timeline (From GAO, 2013, p. 85)

The support vehicle is the two-seat variant CSV. The combat vehicle is the four-seat variant CTV. The two-seat variant is a one base vehicle platform, also known as the Utility (UTL) platform. The two-seat variant has a payload capacity of 5,100 pounds (Feickert, 2013). The four-seat variant has a payload of 3,500 pounds (Feickert, 2013). The four-seat variant has two base vehicle platforms comprised of the Close Combat Weapons Carrier (CCWC) and the General Purpose (GP) platform. All platforms are configured through the installation of mission packages. Mission packages include the UTL, GP, Heavy Guns Carrier (HGC), and CCWC. Figure 36 shows the flowchart for the different JLTV variants, and Table 5 shows the relation of the anticipated mission roles and the variants to be used for that particular mission role.

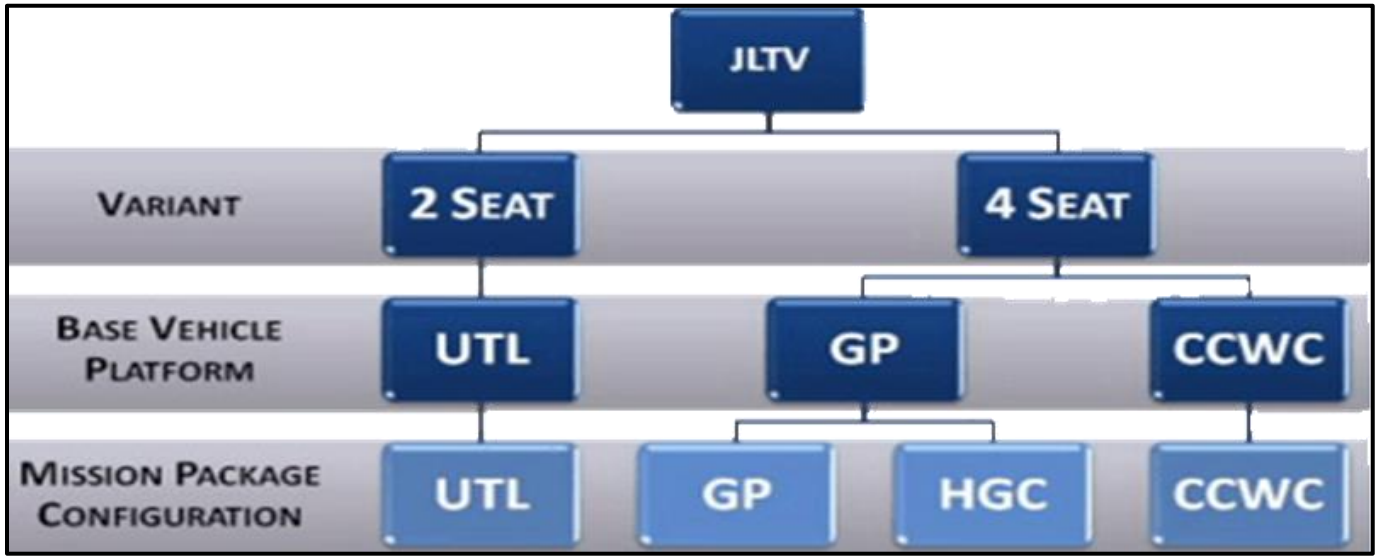


Figure 36. JLTV Variants (From PM JLTV, 2013)

Table 5. Joint Light Weight Tactical Vehicle Configurations
(From JROC, 2007b, Appendix: Configurations, p. 1)

Mission Role	Mission Role Variant (MRV) Configurations	Mission Packages
Move Small Units, Unit Leaders, and Staff	Combat Tactical Vehicle (CTV)	General Purpose (GP) (4 seats)
Move Infantry Weapons and Security Forces		Heavy Guns Carrier (HGC) (4 seats) (Wpns Co, MP, Mounted Patrol; Convoy Escort)
Move Anti-Armor Weapons		Close Combat Weapons Carrier (CCWC) TOW/Saber Carrier (4 seats)
Carry Light Cargo; Move Combat Support Elements; Carry Light and Standard Shelters	Combat Support Vehicle (CSV)	Utility/Prime Mover (2 Seats) (105-mm Howitzer, Q-36 Radar); Shelter Carrier (2 Seats) (Standard Shelters—Maintenance, Communications)

The JLTV program faced setbacks in May 2011. Discoveries made during the technology development phase showed some requirements to be unattainable. The JLTV was unable to achieve transportability and protection level requirements (GAO, 2013). These unachievable requirements led the program to the decision of canceling the special purpose and command and control variants from the FoV (GAO, 2013). The JLTV attempted to move into MS B but was denied until the program could effectively show a better technology development strategy. The JPO JLTV was forced to review the requirements and ensure that the technologies of the platform were mature enough to move into MS B.

Additionally, the program had to overcome the inevitable obstacles of future funding constraints and lack of technical maturity to support the capabilities of these platforms, and it had to better define the requirements and their associated metrics to validate the materiel solution during operational testing. Better definition of the requirements came through collaboration between the CBTDEV and the JPO JLTV to develop trade-offs within the threshold and objective values for the requirements. The JPO JLTV recognized that it would have to reform its acquisition strategy (see Figure 37) if it was to remain a DoD program of record. Additionally, the JPO JLTV and the CBTDEV came together to better understand whether the requirements written in the ICD and CDD were efficient if the JLTV was ever to reach production.

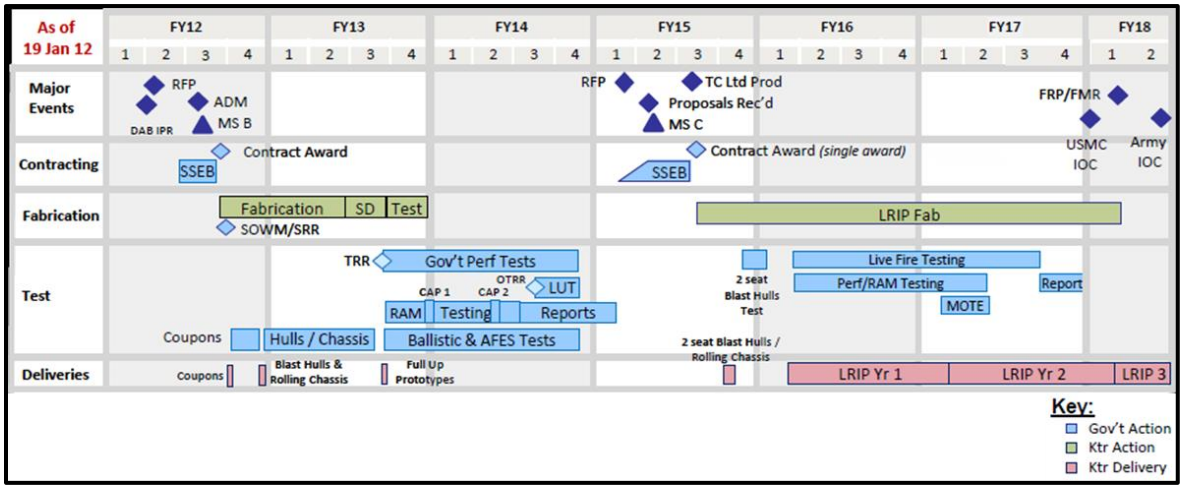


Figure 37. JLTV Program Structure and Schedule (From Bassett, 2012, p. 3)

The JLTV is a materiel solution that existed after the inception of the JCIDS and has followed the process outlined in JCIDS. The JLTV life cycle continues through the modifications in the JCIDS. The last RGP instruction for the JCIDS came into effect in June 2012. The JPO JLTV uses the JCIDS documents to guide their program. The ICD and CDD capabilities documents have been used in our analysis. The program has yet to reach the acquisition life cycle phase requiring the CPD.

Identified gaps associated with the CBTDEV's capability-based assessment, in addition to protection, payload and performance, are found in the ICD.

The JLTV family of vehicles (FoV) is intended to fill capability gaps identified by the combat developer's functional-needs analysis. These capability gaps are defined as:

> 1 - inability to move mounted infantry/combat arms forces via ground
>
> 2 - inability to move mounted combat support (CS) forces via ground
>
> 3 - inability to move mounted combat service support (CSS) forces via ground
>
> 4 - inability to move light infantry (airborne/air assault) via ground
>
> 5 - inability to move long-range reconnaissance (undetected) via ground. (Survivability/Lethality Analysis Directorate [SLAD], 2013)

The JLTV's ICD established the initial capability gap for the vehicle. These requirements for the capability gap differ from other vehicles in the Army's portfolio. JLTV's ICD requirements are call for a vehicle to transport troops, assist with CS and CSS forces, and provide a lightweight vehicle for the light infantry BCTs. This is different from the Bradley fighting vehicle with a sole use within the heavy BCTs and for tactical combat operations only. Bradley fighting vehicles are not used with any CS or CSS operations or personnel. Furthermore, the JLTV's identified capabilities gaps transitioned into requirements during the process of developing the CDD. Transition from a broad scope of an identified capability gap to the specific requirements was

accomplished through close coordination between stakeholders, specifically the product office and the CBTDEV.

Upon the JROC's validation and approval of the capabilities documents, the program was able to enter the first two phases of the acquisition life cycle. Additional resources were used to analyze the validity of the capability gaps and requirements. The RAND Corporation examined, compared, and analyzed the capability gaps and requirements between the ICD and CDD to ensure that overlap between new and existing systems would not occur (Kelly, Peters, Landree, Moore, Steeb, & Martin, 2011).

> RAND's National Defense Research Institute was asked to conduct the study and, specifically, to provide a detailed discussion of requirements and capability needs, identify capability gaps for vehicles, identify critical technology elements or integration risks associated with particular categories of vehicles and specific missions, and recommend actions to address the identified capability gaps.
>
> The researchers found no fundamental flaws in the requirements development processes for the vehicles considered. However, predicting future threats over the expected life spans of vehicles now in production is very difficult, and choices must be made and risk accepted due to the impossibility of designing vehicles that are optimal for all future threats. (Kelly et al., 2011, p. 1)

RAND was able to show the Army's identification of a capability gap and the Army's analysis was correct for determining the need of a materiel solution.

e. JLTV Better Buying Power 2.0 Efficiency Analysis

(1) Build Stronger Partnerships With the Requirements Community to Control Costs.

Rating: Excellent

The JLTV ICD outlines many different requirements that are expected from the materiel solution. Some of the requirements could not be met without neglecting other requirements. During the testing period, May 2010 to June 2011, the Army and Marine Corps determined that the vehicle's original transportability and survivability requirements could not be met (GAO, 2012). Efforts taken to meet the

requirements and reduce the weight of the vehicle would drastically take away from the survivability of the platform (GAO, 2012). Coordination and trade-offs had to be made.

> The [S]ervices have relaxed part of the requirement to transport the vehicle by helicopter at high altitude and at certain temperatures, which will permit a heavier vehicle to be transported. As a result of the requirements changes, the Army and Marine Corps will shift some missions intended for JLTV to the HMMWV. (GAO, 2012, p. 149)

JLTV is a program that has demonstrated how different stakeholders are able to work together to refine or even eliminate requirements that are determined to be unattainable or unfeasible. This is the essence of trade-off between the CBTDEV and the program office. A decrease in efficiency is the outcome of attempting to achieve unattainable or unfeasible requirements by requiring more time, money, and resources. The JPO JLTV identified a means to overcome the challenges of its requirements while minimizing the loss of the prescribed capabilities. The following quotes from COL Dave Bassett, serving as the JPM for JLTV, show how the program was able to closely coordinate between the acquisition and user communities.

> In this case, we had to collaborate together to make the final adjustments to the program so that the acquisition strategy, the budget, the requirements and technology were in alignment.
>
> So—and having the key leaders on both the requirements and the acquisition side and the resource side go down that path together and make those decisions understanding when a decision on the requirements side is going to have a direct impact—it is not even a second order effect, a direct impact on the acquisition strategy and path forward to actually produce that system. (personal communication, February 12, 2013)

The ability to work together between the program office and the CBTDEV was essential in establishing the program's acquisition baseline and maximizing efficiencies to continue to achieve the desired capabilities. The collaboration between the communities led to the ability to remove capabilities that may generate higher risk and cause timelines to extend longer than desired. Prevention of risk and reduction in time in capabilities trade-off afforded greater efficiency. "I was able to work with the user community to pull out [requirements] in a way that was mutually supportive" (D. Bassett, personal communication, February 12, 2013). A clear example

of the program officer for the JLTV working closely together with the requirements community is seen from the trade-off accepted for not being able to meet the weight requirement for the vehicle.

The program's involvement with the MCDs assisted in the ability to effectively complete the capabilities documents with the CBTDEV. This had to be done in order to ensure all stakeholders concurred in the final MCDs and maximize effectiveness.

> I think that in the development of that draft CDD it can't be TRADOC in isolation. It has to be a collaborative process. However, in that draft CDD and in any technology development phase, there may be some requirements that you deliberately stretch for. So you know maybe you want to use your technology development phase to really understand the left and right limits and cost of power generation. So it was okay that the TD vehicles on JLTV pursued a substantially higher power generation requirement than we ended up [with] in our CDD. (D. Bassett, personal communication, February 12, 2013)

This collaboration increased the efficiency of the workforce. By doing so, the workforce increased their experience not only with the RGP but also with the CBTDEV. While collaboration is essential in the development of MCDs, the CBTDEV must ensure they continue to develop those involved in RGP and not allow the acquisition workforce to surpass the CBTDEV's experience.

The JPO JLTV is able to progress towards the production and deployment phase of the acquisition life cycle from its MCDs. Personnel in the program office are able to build the program's RFP to clearly outline what is accepted of the potential contractors by building performance specifications from the requirements in the MCDs. An excerpt from the draft executive summary of the request for proposal shows the program's insight to prevent untested technologies and unproven designs.

> The JLTV acquisition strategy pre-supposes successful achievement of EMD testing and appropriate risk mitigation to achieve a Milestone C decision. Therefore, the Production Phase test profile is expected to be scaled to mitigate the remaining post Milestone C risks and complete mandated testing, and will not duplicate the extensive EMD testing. Accordingly, during the competition for the single award of the Production and Deployment Phase Contract, any offeror proposing JLTV

> vehicle solutions reflecting untested and/or un-validated designs, or only partially tested designs, will be evaluated with higher risk. (Hepner, 2011, p. 2)

The JPO JLTV's RFP for a production and deployment phase contract provides instructions to potential competitors that that a higher risk is automatically going to be assumed for untested and un-validated vehicle designs. This creates a measurement within the contract to provide higher scores to companies with a validated design. Movement in this direction creates greater efficiencies towards the materiel solution by reducing contractors that are not fully capable of delivering the desired system. Additionally, this serves as the program's means to keep the program and contractors on track for capabilities that have already been agreed upon with the user community and that are capable of being met with mature technologies.

The JLTV's MCDs has been able to clearly define the requirements for the defense industry to better understand what is needed for prototyping. The JPO JLTV continues to keep the defense industry abreast of the current status of the program. The program has conducted meetings and industry days to answer all questions that may not be fully understood in the MCDs and has created a website for industry exchange (Petermann & Garza, 2010). The JPO JLTV has embraced industry as a stakeholder and network partner in its endeavor to produce a materiel solution. The JPO JLTV understands the importance of the requirements provided by the CBTDEV and recognizes that the survivability of its program does not stop in the program office. The JPO JLTV brings industry into the loop in order to maximize the efficiency of the requirements.

(2) Reduce Cycle Times While Ensuring Sound Investment Decisions.

Rating: Average

The JLTV's MCDs attempt to efficiently reduce cycle times. These documents are one of many factors that drive the program's acquisition strategy. Industry has to consider not only what the materiel solution needs to be but also how to employ its best practices in production and sustainment to drive down costs. The JPO

JLTV has placed a great deal of reliance on the defense industry to meet the needs of many capability gaps. By doing so, the program attempted to minimize the technology development phase but went back to the TD phase upon receiving guidance for competitive prototyping.

The CDD was approved and facilitated an avenue for efficient competitive prototyping. Competitive prototyping is the ability to carry multiple vendors into the EMD phase for the purpose of having prototypes that have capabilities that may be compared against each other. This would reduce the costs associated with developing new or untested technology in the TD and EMD phases of the program. Going through this effort creates competition within the industries and potentially leads to a product that has greater capabilities and a lower price to the government.

Additionally, the focus has shifted towards utilizing mature technology and vehicle designs.

> In February 2011, the JLTV Program Office announced the award of the EMD contract would be delayed until January or February 2012 because the Army changed requirements for the JLTV to have the same level of under body protection as the Mine-Resistant, Ambush-Protected All-Terrain Vehicle (M-ATV). DOD had planned to award two contracts for the EMD phase, which was scheduled to last 24 months, but instead opted for a 48-month-long EMD phase before awarding Production and Deployment contracts in the second quarter of FY2016. In addition, the Category B variant was eliminated because it proved to be too heavy to meet the required weight of approximately 15,639 pounds to make it transportable by Army CH-47F and Marine Corps CH-53K helicopters. Now there will be two variants—a Combat Tactical Vehicle (CTV), which can transport four passengers and carry 3,500 pounds, and a Combat Support Vehicle (CSV), which can transport two passengers and carry 5,100 pounds. (Feickert, 2013, p. 3)

Although the program had to restart the second phase of the DAS, the JPO JLTV recognized that they must maximize efficiency in their timeline in order to complete the EMD phase. Some unrealistic requirements that the CBTDEV and the JPO JLTV concurred that some requirements were unrealistic and removed them from the CDD.. Removal of these requirements and expanding the EMD phase can produce cost savings. Cost savings would occur up front with removing requirements and later on in

the program by ensuring that a mature and validated design is ready before entering into production and deployment. However, the extended EMD phase creates a delay within the program and displays signs of inefficiency by requiring more time within the specific phase. Vehicle programs constantly struggle with trying to reach threshold values for weight. The removal of that requirement creates greater efficiency, saves the program money, and prevents delays that could be created when trying to reach weight thresholds established within the requirement.

The JLTV program also analyzed the designs of similar programs. Observations of these other programs provided the necessary insight to manage expectations in regards to timelines and respect to the development and production of a vehicle. In addition, risks that occurred within the other programs could be anticipated and mitigated on the JLTV. "We had seen those designs evolve over time largely because of the Army's investment in [MRAPs]" (D. Bassett, personal communication, February 12, 2013).

The JLTV program is able to take lessons learned from similar vehicle programs and apply the corrective actions before risks or issues arise. These identified preemptive actions could possibly save money and time because deficiencies would not have to be corrected. Moreover, new processes would not have to be developed because best practices have already been established and proven to work in other programs. The JPO JLTV's attempt to not repeat the mistakes of the past has allowed for greater efficiency in the program to meet the requirements and provide a materiel solution.

The JPO JLTV went a step further with multiple contractors and prototypes.

> "We have all the data we need to make the right decision," he [Kevin Fahey, PEO for CS & CSS Vehicles] said. "Based on that data we came up with a wonderful acquisition strategy for [moving through] EMD and into production." (Gourley, 2013, p. 40)

Fahey reinforced the process that is being used in the JLTV program office to develop a product with minimal cost and reduced cycle time. Yet, the opposite usually occurs when trying to reach capabilities in the MCDs that are unfeasible and unrealistic.

The JLTV program also has pursued mature designs and technology that would decrease production time and resources. Working to meet mature designs and technology and reducing cycle time yields a program to make better sound investments. The JLTV program learned from the shortfalls in their past. The program worked with the CBTDEV to refine the requirements in the MCD. The program implemented best practices like competitive prototyping to reduce cycle time and make sound investments. The JPO JLTV increased their efficiency by adjusting the acquisition strategy to fill the capability gaps in accordance with the ICD by ensuring that all stakeholders agreed on realistic requirements.

MCDs requirements must be managed to maximize efficiency. The JPO JLTV looked at the requirements management best practices from other programs. The program implements a Requirements Management and Analysis Plan (RMAP) for the technology development phase of the acquisition life cycle. The RMAP addresses

- The knowledge gaps, knowledge point timing, events, and execution;
- Roles, responsibilities, and decision authority;
- Change management of key documents, including classified annex;
- How analyses were initiated, tracked, and burned down and how results were integrated into the CDD/Specification; and
- Use of SE software. (Pflanz, Yunker, & Wehrli, 2012, p. 11)

Each of these topics, when addressed thoroughly, has provided a tool for better requirements management, as outlined in the JCIDS documents. The JPO JLTV learned from their first experience moving into MS B and wanted to ensure that they did not repeat the same mistake again. The JLTV program adopted the process of RMAP (Pflanz et al., 2012) to assist the program's efforts in meeting the competitive prototyping policy established by the USD(AT&L) in 2007 to ensure they were meeting their requirements efficiently (USD[AT&L], 2007). As stated in the USD(AT&L) memo:

> All acquisition strategies requiring USD(AT&L) approval must be formulated to include competitive, technically mature prototyping through MS B. The component Acquisition Executives will review all existing programs and all programs in the initial stages of development for the potential to adopt this acquisition strategy. (USD[AT&L], 2007, p. 2)

The JLTV went through the technology development phase for 30 months and is now in the EMD phase. The program carried three different companies on separate contracts to make competitive prototype vehicles and eventually will select a single company in the production and deployment phase (Pflanz et al., 2012).

f. JLTV Better Buying Power 2.0 Effectiveness Analysis

Eliminate Redundancy Within Warfighter Portfolios

Rating: Average

JLTV's MCDs outlined capabilities in areas within the Army's portfolio that did not currently exist.

> The objective of the JLTV program is to address the HMMWV fleet's protection, payload, and performance imbalance within a transportable vehicle. JLTV is expected to provide comparable protection to the MRAP vehicles in most cases—the major exception being underbody protection—but with better payload and performance. (GAO, 2010, p. 4)

As the new platform intended to replace the HMMWV, the JPO JLTV had to understand both the requirements in the HMMWV's portfolio but also the portfolios across the acquisition community. To further expound on this, the following excerpt demonstrates the uniqueness of the JLTV and that it is not a redundant system and vehicle to the HMMWV.

> The HMMWV's demonstrated vulnerability to IEDs and the difficulties and costs experienced in "up-armoring" HMMWVs already in the inventory have led to renewed emphasis on vehicle survivability. DOD officials have emphasized that JLTVs are not intended to replace HMMWVs "one for one." (Feickert, 2013, p. 1)

The described fielding plan shows that redundancy is going to exist within the Army's vehicle portfolio. The potential is created for some Army units to have both

HMMWVs and JLTVs. Units possessing both vehicle platforms would increase associated time and costs for training personnel on vehicle operation and maintenance.

There are capabilities that do cross over and match up with other existing vehicles. One such capability is survivability by providing a high level of protection to the vehicle. This is seen with the requirement for the "JLTV to have the same level of under body protection as the Mine-Resistant, Ambush-Protected All-Terrain Vehicle (M-ATV)" (Feickert, 2013, p. 3). The M-ATV was created as a platform that provided integration for present technology. The JLTV is focused more on the concepts of open-architecture for future advancements in technology and engineering. This requirement was outlined in the JLTV's MCDs to ensure that the JLTV would continue to effectively meet its mission throughout its life cycle.

Another similarity is found with the transportation of personnel. Currently, the HMMWV is capable of transporting two to five personnel, based on the variant. The JLTV is required to maintain the same capability as the HMMWV. Additionally, the M-ATV's capability is four personnel. Each of these three vehicles contains the same capability with no enhancement to carry additional personnel. This personnel requirement displays some redundancy within the Army's vehicle portfolio. However, this redundancy is minimal as the M-ATV is a product of the GWOT and a short-term fill during development of the vehicle that will eventually replace the majority of HMMWV variants.

The DoD has initiatives in place to prevent the duplication of acquisition efforts with programs that contain similar or almost exact capabilities that mirror each other. Thus, MCDs must also adhere to this consideration. One mechanism to control duplication is by phasing out older systems and slowly halting modernization and replacement programs. The JLTV is achieving this by analyzing the evolutionary changes to the HMMWV. "DoD intends to 'protect' the JLTV program and HMMWV modernization would be terminated so that resources could be focused on the JLTV" (Feickert, 2013, p. 7). Cancellation of the HMMWV modernization program ensures that only one vehicle program is moving forward. Efforts are not duplicated in creating and maintaining vehicles with similar capabilities, therefore reducing redundancy in the

Army's portfolio and maximizing effectiveness. Additionally, funds become available and may be reallocated from one program to another as efficient reduction in the portfolio occurs.

Another means to prevent the duplication of efforts is through external auditors. Consultants can analyze the new program's MCDs against other programs that are currently in existence. This is accomplished by not looking at just other platforms but all other capabilities that may be inserted on the JLTV. Audit findings from external organizations, such as RAND, allow the JPO JLTV to clearly identify the capability gaps and requirements and ensure that they are not duplicating efforts of other programs. RAND's analysis verified the accuracy of the identified capability gaps in the ICD and requirements in the CDD (Kelly et al., 2011).

The JLTV's MCDs create unique capabilities to meet the future force's needs through an array of fronts worldwide. Unlike PM M-ATV, the JPO JLTV also has the opportunity to ensure increased effectiveness in its MCDs, by developing the platform to project a future sustainment plan. The MCDs have served to effectively provide a means to prevent redundancy by duplicating existing systems. "A comparison of JLTV's capabilities with those of the M-ATV and HMMWV indicates the JLTV is expected to offer protection levels comparable to the M-ATV at a weight nearer to the HMMWV" (GAO, 2010, p. 11). This has allowed the program to not duplicate other capabilities across the portfolios and has potentially preserved present and future funds.

(1) Improve Requirements Definition and Prevent Requirements Creep.

Rating: Poor

JPO JLTV has faced issues due to requirements creep.

> In February 2011, it was announced the award of the EMD contract would be delayed until January or February 2012 because the Army changed requirements for the JLTV. DOD had planned to award two contracts for the EMD phase, which was scheduled to last 24 months, but instead proposed a 48-month-long EMD. (Feickert, 2013, p. 2)

Issues such as this decrease the effectiveness of a program. Delays resulting from increased and changing requirements have forced modifications to the CDD. The recently approved CDD contains changes to the design through the addition of new requirements. In addition, untested technologies are prevented from being added to a system or require extra efforts for interoperability with existing systems not required in the previous CDD. This decreases effectiveness in producing a system based on the original desired capabilities.

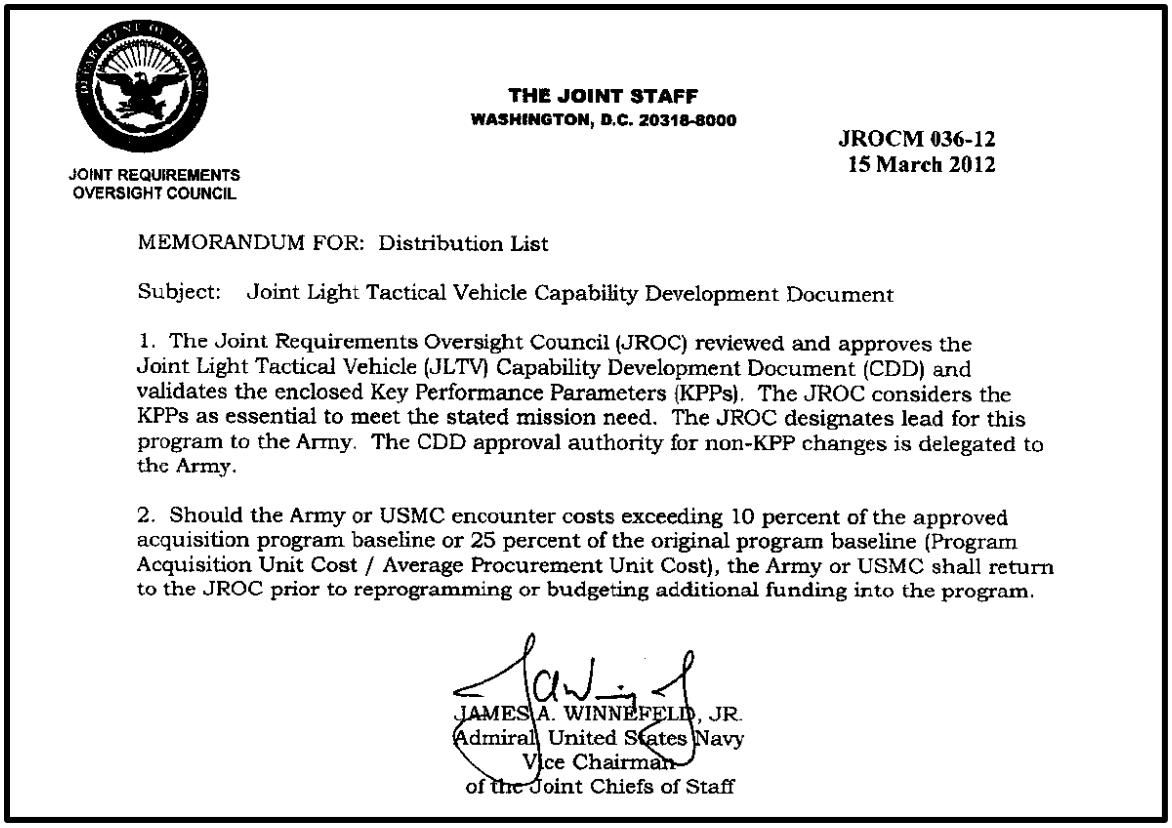
Another issue that has emerged is the capability to match the same level of survivability as the M-ATV. Requirements creep affected the initial MCDs. Repeating the technology development phase has increased the schedule and costs. However, the JPO JLTV has overcome this obstacle by tailoring their acquisition strategy to meet the needs of the new capabilities and the CBTDEV. The program implemented the initiative for competitive prototyping to identify the best capabilities, not just the platform, from multiple contractors. This creates the positive effect for ensuring that the prototype meets all the MCDs' requirements and mitigates requirements creep. Mitigation occurs from a contractor's having to demonstrate their design and by having all stakeholders agree on the preferred design. However, there also is an ineffectiveness in the original CDD. The program's second time through the TD phase shows that the MCDs' requirements were not effective in allowing the program to move into the next phase of the acquisition life cycle.

The JLTV program selected three contractors to produce three prototypes for a total of nine vehicles to use during the EMD phase. The positive effect from this course of action is the preservation of funds and reduction of schedule time (GAO, 2012). This increases effectiveness by having contractors demonstrate their vehicle designs. It also ensures that industry has mature technologies to bring to the table to meet the requirements. However, the downside to competitive prototypes is that the program may forgo activities that occur early on in the EMD phase to ensure the product's design is mature and meets the specified requirements (GAO, 2012). Forgoing early activities can create potential areas of risk for requirements creep. Potential risk emerges from vehicles that do not possess a mature design in the later phases of the program.

> what I want to do is pay for it [JLTV] one time after WIN-T [Warfighter Information Network-Tactical] has already demonstrated that integration on another platform. So it is one of those things where if you just looked at it [additional capabilities insertion] on the surface, you would say you have added risk to your program because now you run the risk, you may not be able to host WINT in a fielded JLTV. If you took no actions to prevent that, that would be the case but I don't have to demonstrate in EMD, in test, to be able to reduce that risk to an acceptable level. By not doing that, I was able to save enough money to add additional RAM [reliability, availability, maintainability] vehicles and to buy some additional assets that we needed to get our test plan approved. So it was a very hard, pragmatic trade that was made at the very, very last juncture. So to be able to get that pulled out of a document and approved by the JROC with the full support and approval of the user community was I think a key achievement. That required a lot of leaders all rolling in the same direction. (D. Bassett, personal communication, February 12, 2013)

The JPO JLTV was able to benefit from the competitive prototyping to enhance the requirements within the MCDs. Competitive prototyping provides the program office the ability to select the most effective design that adheres to the MCDs. Additionally, the program office was able to enhance other requirements after seeing the demonstration of the prototypes. By pursing these enhanced requirements, the program office is able to potentially decrease future requirements creep within the area of RAM and prevent modifications to the MCDs' requirements.

The JPO JLTV understood the importance of having full support and collaboration with the key stakeholders when going through the acquisition life cycle and having the revised CDD approved by the JROC. Requirements were refined through effective communication and collaboration between all parties involved. The requirements of the CDD had buy in from the CBTDEV and the program office to ensure that they were clearly defined. This collaboration assisted the JROC in its final approval on March 15, 2012, as shown in Figure 38.



THE JOINT STAFF
WASHINGTON, D.C. 20318-8000

JOINT REQUIREMENTS OVERSIGHT COUNCIL

JROCM 036-12
15 March 2012

MEMORANDUM FOR: Distribution List

Subject: Joint Light Tactical Vehicle Capability Development Document

1. The Joint Requirements Oversight Council (JROC) reviewed and approves the Joint Light Tactical Vehicle (JLTV) Capability Development Document (CDD) and validates the enclosed Key Performance Parameters (KPPs). The JROC considers the KPPs as essential to meet the stated mission need. The JROC designates lead for this program to the Army. The CDD approval authority for non-KPP changes is delegated to the Army.

2. Should the Army or USMC encounter costs exceeding 10 percent of the approved acquisition program baseline or 25 percent of the original program baseline (Program Acquisition Unit Cost / Average Procurement Unit Cost), the Army or USMC shall return to the JROC prior to reprogramming or budgeting additional funding into the program.

JAMES A. WINNEFELD, JR.
Admiral, United States Navy
Vice Chairman
of the Joint Chiefs of Staff

Figure 38. JLTV CDD Approval (From JROC, 2012b, p.1)

Additionally, the JPO JLTV outlined the CBTDEV's requirements and desired capabilities to the defense industry. This may prevent the government from incurring unnecessary costs for unneeded R&D initiatives. The end state is that the government can pick the best and most mature technologies that minimize future requirements creep.

g. JLTV Efficiency and Effectiveness Analysis

Figure 39 is the JLTV's MCDs scorecard.

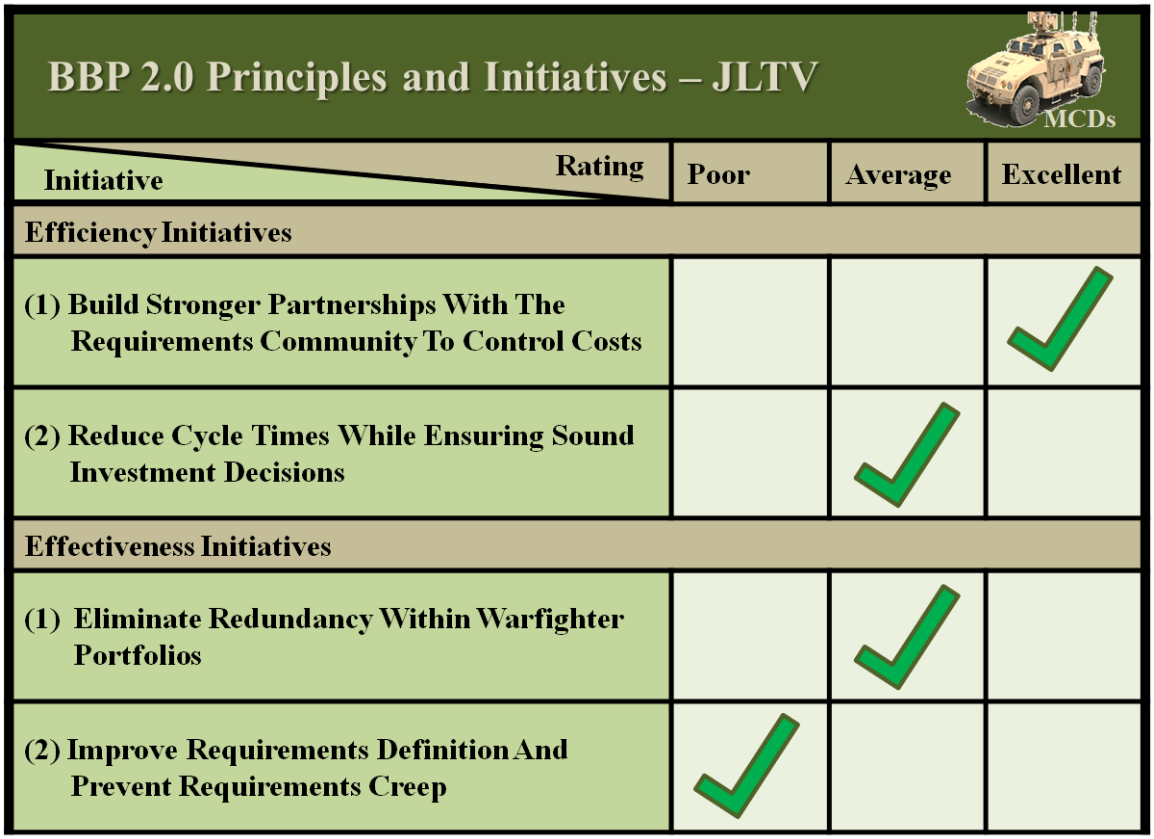


Figure 39. JLTV Overall Rating Scorecard

Overall Score

Efficiency: 1 × Average, 1 × Excellent

Effectiveness: 1 × Poor, 1 × Average

Figure 40 depicts our overall rating of the JLTV's MCDs.

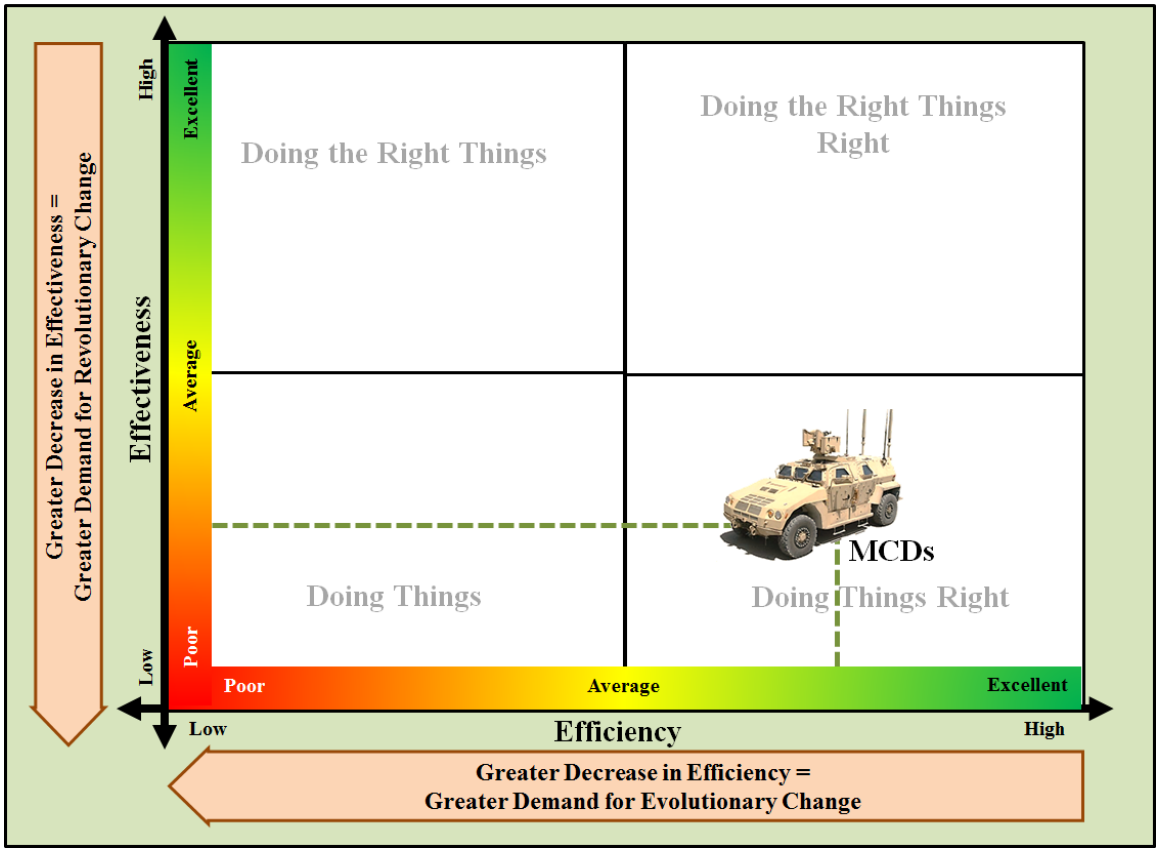


Figure 40. JLTV Efficiency and Effectiveness Analysis (After Grüter & Boerendans, 2013)

Overall Rating

Efficiency: Average–Excellent

Effectiveness: Poor–Average

The JLTV receives an efficiency rating of average–excellent. Efficiency of the MCDs results in using the minimum resources to provide the right materiel solution. Stakeholders must be synchronized with each other's missions. The JLTV MCDs were created through the efficiencies of two cultures and their ability to collaborate between multiple organizations to establish trade-offs. This allowed the program to get back on track. Collaboration and agreements improved the ability to conduct trade-offs on requirements. However, the program was unable to preserve the cycle time when trying to adjust requirements. This in return would preserve funds but increase time needed for the program. Policy changes, in conjunction with the MCDs,

yielded additional efficiencies. The new competitive prototyping and use of the draft RFP assist the MCDs in producing efficiencies in the program by reducing costs by enforcing validated designs prior to entering into the production and deployment phases.

The JLTV receives a rating of poor–average for effectiveness. Effective MCDs allow a materiel solution to traverse through the acquisition process with the feasibility of developing, writing, and understanding everything that is composed within the documents. The JLTV had clearly defined requirements outlined by the MCDs found in the second CDD. Effectiveness has yet to be achieved by reducing redundancies in the portfolios. Since JLTV has not entered production and deployment, a one for one swap for the HMMWV is currently not going to take place and M-ATV remains in the warfighting portfolio. Additionally, an effective document comes from the ability to address capabilities and the clarity of the written requirements. These attributes assist the program office in performing proper life-cycle management and managing cost, schedule, and performance. The JLTV program demonstrates how effective collaboration among the different stakeholders increases the experience of the workforce directly involved in the writing and execution of MCDs for greater effectiveness.

C. CHAPTER SUMMARY

Our research has revealed that through MRDs/MCDs, program offices are able to produce materiel solutions at an increased level of efficiency; however, the program may still experience a decreased level of effectiveness. Furthermore, the MRDs were less efficient and effective than the MCDs. Nonetheless, the MCDs so far have been equally effective, but there has been an increase in efficiency from M-ATV to JLTV.

Our research is focused on the MRDs/MCDs that produced materiel solutions for three wheeled platforms, and not the platform's efficiency and effectiveness on the battlefield. We combined our analysis by integrating the concepts of efficiency and effectiveness, together with the proper type of change and change management that has occurred throughout the history of the RGP, and four initiatives of BBP 2.0. We scored three program offices' MRDs/MCDs against these concepts. The overall scores for all three wheeled platforms are displayed in Figure 41.

BBP 2.0 Principles and Initiatives Consolidated Case Study Analysis			
Initiative \ Rating	 HMMWV MRDs	 M-ATV MCDs	 JLTV MCDs
Efficiency Initiatives			
(1) Build Stronger Partnerships With The Requirements Community To Control Costs	POOR	AVERAGE	EXCELLENT
(2) Reduce Cycle Times While Ensuring Sound Investment Decisions	AVERAGE	AVERAGE	AVERAGE
Effectiveness Initiatives			
(1) Eliminate Redundancy Within Warfighter Portfolios	POOR	AVERAGE	AVERAGE
(2) Improve Requirements Definition And Prevent Requirements Creep	POOR	POOR	POOR
Overall Score Efficiency	POOR – AVERAGE	AVERAGE	AVERAGE – EXCELLENT
Overall Score Effectiveness	POOR	POOR – AVERAGE	POOR – AVERAGE

Figure 41. BBP 2.0 Initiative Scorecard Roll-Up

We have assessed the MRDs/MCDs for these platforms and consolidated them onto one model to reveal our results. This links our scoring of efficiency and effectiveness scores, the BBP 2.0 initiatives, and evolutionary and revolutionary change appear in Figure 42.

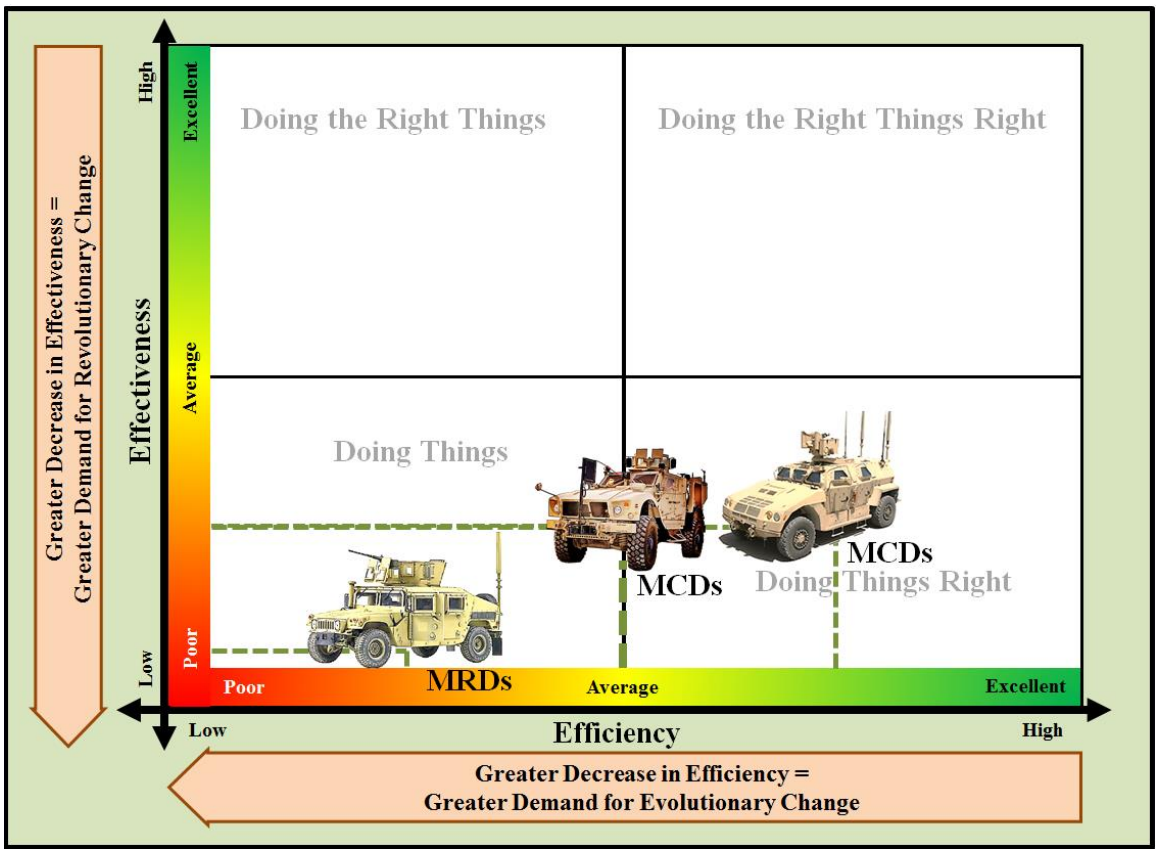


Figure 42. Platforms Efficiency and Effectiveness Analysis
(After Grüter & Boerendans, 2013)

"Efficiency" was measured on how well the MRDs/MCDs "Did Things Right" in regards to the BBP 2.0's two initiatives, (1) Build Stronger Partnerships With The Requirements Community to Control Costs and (2) Reduce Cycle Times While Ensuring Sound Investment Decisions. On the other hand, "Effectiveness" was measured on how well the MRDs/MCDs "Did the Right Things" in regards to BBP 2.0's two initiatives, (1) Eliminate Redundancy within Warfighter Portfolios and (2) Improve Requirements Definition; Prevent Requirements Creep.

Overall, the MRDs/MCDs should be "Doing the Right Things Right" if they are to maximize efficiency and maximize effectiveness. We have assessed HMMWV, M-ATV, and JLTV's requirements and capability documents to compare their scores against each other. Our comparative analysis is revealed in Figure 42.

First, the HMMWV MRDs efficiency and effectiveness overall rating is in the "Doing Things" quadrant. For HMMWV documents to increase in efficiency or effectiveness, the documents demand the need for evolutionary changes or perhaps a revolutionary change in order to increase their scores in regards to the BBP 2.0 initiatives. Data gathered showed that HMMWV program did not go through a revolutionary change of RGS to JCIDS and continued to use MRDs instead of MCDs. Ultimately, the JCIDS was implemented and MRDs ceased to evolve and were revolutionized by the MCDs.

Second, the M-ATV MCDs efficiency and effectiveness overall rating is on the cusp of "Doing Things" and "Doing Things Right." This reveals M-ATV MCDs have increased in efficiency and effectiveness. Evolutionary and revolutionary changes to the documents are not greatly demanded; however, there are still areas for refinement.

Finally, the JLTV MCDs' efficiency and effectiveness overall rating has placed the icon in "Doing Things Right" quadrant. The JLTV MCDs received the highest score on the efficiency axis and an equal rating with M-ATV on the effectiveness axes. This reveals that the JCIDS MCDs have increased in efficiency. Of note, JLTV has yet to enter the production and deployment phase of the life cycle. However, based on our BBP 2.0 measurements, the JLTV program's MCDs have scored higher than the other two platforms of HMMWV MRDs and M-ATV MCDs. Our qualitative information shows that increase in efficiency and effectiveness is strongly based on the key stakeholders' recognition of the mistakes of the past and implementation of best practices.

In closing, HMMWV's MRDs have undergone a revolutionary change due to the lack of efficiency and effectiveness. The JCIDS MCDs have made great strides in improving the efficiency and effectiveness (depicted by the M-ATV MCD icon) and are continually reaching greater effectiveness (depicted by the JLTV MCD icon). Therefore, the JCIDS MCDs are evolving in the right direction to support the programs executing the DAS.

Both efficiency and effectiveness begin with the manner in which requirements and capability gaps are created and defined. However, to truly be efficient and effective,

these requirements must not simply meet a current capability gap but also anticipate future capability gaps. There are many external factors outside the MRDs/MCDs that contribute to requirements creep, such as emerging threats and advancement in technology. That does not mean that key stakeholders should not anticipate possible foreseeable factors that change the requirements. All key stakeholders must have the ability to project uncertainty and the flexibility to quickly adapt. If all stakeholders work collaboratively, the current MCDs will be able to continuously provide the best materiel solution for the warfighter.

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

A. SUMMARY

At first, we believed that revolutionary change would be required in order for materiel MRDs/MCDs to be efficient and effective based on comparison of documents from two different RGPs (the RGS and JCIDS). In the end, we came to a very different realization as we conducted our research and analysis. The following summary recaps our previous chapters:

- In Chapter I, we introduced our paper by outlining our research questions and scope.
- In Chapter II, we provided the necessary background information upon which we based our research and analysis.
- In Chapter III, we presented the methodology for our project.
- In Chapter IV, we detailed our qualitative focus and presented our comparative analysis through the use of case studies.

Now, at the final portion of our project (Chapter V), we deliver our conclusion, recommendations, and areas for further research.

B. CONCLUSIONS

1. Research Findings

Our study examined the following questions:

- What makes requirement documents efficient and effective, or inefficient and ineffective for the stakeholders who facilitate the RGP?
- What key differences exist in the documents from the old RGS process compared to the new JCIDS process, and why were these changes made during this transition?
- Does future change need to be evolutionary or revolutionary?

a. What makes requirement documents efficient and effective, or inefficient and ineffective for the stakeholders who facilitate the RGP?

In our study, we concluded that efficiency for MRDs/MCDs is a laborious balancing act of many factors and considerations that involves the stakeholder and acquisition processes. Too much or too little consideration will unbalance the scale and shift the focus to specific stakeholders. This may cause a chain reaction that will ultimately hinder a materiel solution. For instance, if the CBTDEV is solely concerned with writing requirements for the warfighter without consideration of critical acquisition processes, the result may be a solution that does not really meet the identified capability gap. Remember, "if you want it bad, you'll usually get it bad" (P. Mann, personal communication, November 19, 2012).

An efficient materiel requirements document is one written to cater to the preponderance of stakeholders who must staff, approve, and execute the primary functions of that requirement document. MRDs/MCDs are not egocentric. The CBTDEV cannot write requirements without consideration of the acquisition process. The program offices should not demand requirements that identify an exact product but performance based. However, they must place full consideration into the missions of the CBTDEV and other key stakeholders' organizations. The JROC should not ask for MRDs/MCDs to be written just to ease staffing and processing. Requirements must promote efficiency for all stakeholders. The authors of the MRDs/MCDs must understand the constraints and limitations of the format. The CBTDEV, acquisition workforce, JROC, and other key stakeholders require alignment of tasks and processes to produce the right solution. This alignment comes from understanding of the processes, capabilities and constraints, and environment internal and external to the stakeholders' organizations.

Efficiency is purely creating a proficient, capable network. All stakeholders of the RGP achieve efficiency through alignment and understanding of their partners' cultures. This may occur through personnel exchange programs such as CBTDEV and program office personnel rotating through a Department of the Army

Systems Coordinator (DASC) developmental duty assignment. Service in this position allows key people to understand the inner workings of the Pentagon and the acquisition process. Furthermore, including the CBTDEV in the acquisition process, inviting them to program reviews, helps ensure a clear understanding of requirements by every stakeholder.

The intent for MRDs' format to transition into MCDs' format were to better streamline the process. However, while there is always room for improvement, if those who prescribe the format continually change the process, it forces all stakeholders to continually adapt. This constant adaptation will limit learning and make it difficult for any stakeholder to be a subject-matter expert in writing MRDs/MCDs. This detracts from efficiency.

The stakeholders must recognize where in the life-cycle system management process the requirements (capability) document fits and the gates that the documents must pass through to be approved prior to the next phase and milestone. Efficient requirement documents must be written well enough to enable a materiel solution to move along through the phases of the acquisition life cycle. Additionally, the documents must be effective in minimizing future changes to that materiel solution, which would require ECPs. This is how efficient MRDs/MCDs enable an effective materiel solution for the warfighters.

b. What key differences exist in the documents from the old RGS process compared to the new JCIDS process, and why were these changes made during this transition?

In response to Question 2, we identified key differences in the MRDs/MCDs that supported both the RGS and the JCIDS. The detailed formats for each document can be revisited in Chapter II.

Formats for the documents for the RGS and JCIDS were very different. The documents varied in required length and format. The MNS had a limitation of just five pages, while the ICD limitation doubled to 10 pages. The MNS contained six parts in its format, while the ICD contains three primary parts (Part 2 contained eight subparts

and Part 3 contained seven sections) and requires four appendices. The change in format structure allows information to be captured with greater fidelity. Beyond differences in the format structure, there are also differences concerning the purpose and intent of sections between the RGS and JCIDS documents. A major change from the MNS to ICD was that the ICD identifies a capability gap while the MNS outlined a requirement need. Another difference comes from the MNS using DTLOMS for analysis, but the ICD used DOTMLPF and now uses DOTmLPF-P for analysis. Changes in the analysis ideology provide a more expansive concept to a broader group of stakeholders.

The ORDs formats for both the initial and revised versions are the same. The only difference came with the capacity for revision for production modification in the RGS, if change was necessary. An ORD-Initial written to support production activity would remain the same, but could change as required after JROC approval.

The JCIDS separated the ORD into two distinct documents, the CDD and CPD. The main reason for the creation of two documents from one document came from the lack of restrictions for the ORD. The ORD does not have a page restriction and can go through multiple paths for approval, as long as approval occurs at the appropriate level. Additionally, the ORD's format had eight parts with Part 4 containing four subparts and Part 5 containing nine subparts. This structure caused the document to be very vague and allowed for a great deal of interpretation by the authors in identifying the requirements. This created discrepancies and ambiguities in the RGS's requirements documents (MNS and the two ORDs), which ultimately created difficulty for the stakeholders to execute various acquisition processes.

Unlike the RGS requirements documents, the JCIDS capabilities documents contained greater structure and restrictions to control the information that is placed in the document. The CDD has five parts with Part 3 containing 16 subsections and is specifically constrained to not exceed 45 pages. The body of a CPD consists of five primary parts, the 16 primary subsections, and Appendix A, all of which cannot exceed 40 pages. Additionally, the ICD, CDD, and CPD formats have clearly defined instructions for their completion. The majority of the parts and sections in the JCIDS documents clearly outline the expectations of how sentences begin and what is in every

part of the documents. The JCIDS documents provide better standardization for all stakeholders. If stakeholders need to reference only a part of the document, for example Spectrum Requirements, they know the exact section that is to contain all the details (Part.4.h). While portions of the RGS documents could accomplish the same level of detail, the JCIDS documents have clearly anticipated more technology considerations for integration.

Adjustment to the new way of thinking, in regards to a capability gap instead of a requirement need, has been beneficial to all stakeholders. Requirements often employ very technical information. An example of this is the following: the warfighter asks for an M4 rifle requirement, instead of asking for the capability of a weapon that does not weigh more than 12 lbs, has an effective range of 500 meters, and is integrated with optics. Proceeding based on the direction of the capability versus the need allows the executors of the MRDs/MCDs to seek out and provide the most effective capability.

Along with achieving a more effective solution, using capabilities provides horizontal networks to connect the different stakeholders' communities. Actions involved with each of the different capability documents (ICD, CDD, CPD) occur sequentially and are more streamlined (efficient) as all stakeholders are constantly working in a synchronized method. The CBTDEV can outline the capability, and the acquisition community is able to comment back to the CBTDEV on which capabilities are technically mature and cost effective.

c. Does future change need to be evolutionary or revolutionary?

Finally for Question 3, we have identified that evolutionary change may continue to develop the JCIDS capabilities documents to achieve higher levels of efficiency and effectiveness. Yet, a revolutionary change would be more detrimental than beneficial. Additionally, to implement change in large organizations, such as the defense industry that supports Army acquisitions, is slow and arduous.

History reveals that the DoD and the industrial base has been challenged to meet the requirements of the warfighter during the midst of the turmoil of war. For

instance, during World War II the U.S. military had to adapt to counter the threat of the German U-boats by developing new capabilities such as the B-24 Liberator bomber to assist in defeating the threat. Later during the Vietnam War the M-72, 66-mm Light Anti-Tank Weapons (LAWs) served as bunker busters to defeat the threat of hidden bunkers in the jungle. The LAW was an existing system. Finally, the MRAP FoV came about to counter IED threats during the GWOT. Each materiel solution came by means of its own respective RGPs and associated documents.

The JCIDS capabilities documents have undergone evolutionary changes during the last decade of war. The current capabilities documents of the ICD, CDD, and CPD must have an opportunity to prove their relevancy during more stable times. Furthermore, few large acquisition programs have yet to proceed through the entire JCIDS process. Revolutionary change would only create more havoc than order. Stakeholders are only now starting to understand the full JCIDS process and the associated documents. Creating a new process and or documents would serve to eliminate all of the knowledge and experience that recent generations of the defense workforce and defense industry have developed over the last 10 years with the JCIDS process.

2. Recommendations

a. Continue to refine the capabilities documents in support of modifications to the JCIDS process, as needed

Our first recommendation is to continue to refine the capabilities documents in support of modifications to the JCIDS process, as needed. In 2003, a revolutionary change was necessary to cease the RGS and developed the JCIDS in order to refine the requirements generation process and its supporting documents. The JCIDS and its supporting capabilities documents have served their purpose throughout the GWOT. However, the JCIDS and its capabilities documents have not had the opportunity to fully prove their effectiveness in defense acquisition during peace time. The requirements, acquisition, and defense industry workforce are still implementing best practices and changing each of their cultures to align with the JCIDS process.

Furthermore, the acquisition and DoD workforce has implemented and learned to utilize the JCIDS' capabilities documents for over a decade.

There are many benefits that may be gained by continuing to utilize the current JCIDS' capabilities documents. Revolutionary change tends to result in great disruptions in established cultures. The JCIDS and its supporting capabilities documents are still in their early stages of maturity. Continually evolving the JCIDS capabilities documents will minimize the learning curve for its SMEs.

b. Improve the quality of requirements writing

A second recommendation is to improve the quality of requirements writing. It is critical to continually improve the efficiency of JCIDS capabilities documents in order to better guide the process of creating a materiel solution. BBP 2.0 outlines the importance of clearly defined requirements for all stakeholders. The DoD must continue to impress the importance of requirements writing as a primary profession and not just simply an additional duty. Additionally, Congress has recognized the importance of writing quality requirements. Poorly written capabilities documents often lead to requirements creep. Better quality and more understandable capabilities documents can anticipate and prevent requirements creep. Anticipation may prevent future ECPs. This could result in cost avoidance. Also, no ECP means there is no need to change the system design or conduct re-engineering to achieve an added performance/capability. This helps preserve the acquisition schedule.

Employing best practices will shape better definition of requirements that are capability based and will meet the initiatives of BBP 2.0. The defense industry will continue to challenge itself with new and future technologies. The DoD can leverage this effort in cost savings in R&D while still obtaining the most cutting-edge technologies. However, the DoD must be at the forefront of requirements definition. Capability gaps drive the requirements that drive a materiel solution. That being said, using our previous example of efficiency and effectiveness with the mortar team, the DoD must seek out the capability to effectively destroy a bunker versus demanding a requirement of a 120-mm mortar shot from a tube that meets the expectations. If a bunker can be taken out with

another materiel solution that possesses greater effectiveness than a 120-mm mortar, and is more efficient and effective within the parameters of the acquisition process, then this is the right solution to fill the capability gap. The defense industry's capabilities and its technological advancements can meet capability gaps. However, the DoD cannot be overly confident in these technologies, which may result in a "conspiracy of hope." This conspiracy of hope leads to failed programs like the Army's Future Combat Systems (FCS) that was neither efficient nor effective.

The John Warner National Defense Authorization Act for Fiscal Year 2007, Section 801 (109 U.S.C., 2007, § 801[a-c]), introduced the initiative for a Requirements Management Certification Training (RMCT) Program. This policy mandates that those with authority within the DoD who generate requirements cannot participate in authoring requirements without receiving certification. The DAU has created courses and has outlined the curriculum for the certification. Currently, there are five required courses, based on duty position and grade. These courses are CLR 101: Introduction to JCIDS, RQM 110: Core Concepts for Requirements Management, RQM 310: Advanced Concepts and Skills for Requirements Managers, RQM 403: Requirements Executive Overview Workshop, and RQM 413: Senior Leader Requirements Course. The effectiveness of these prescribed courses has yet to be proven, but requiring them is a move in the right direction. These requirements courses and certification are not limited to individuals responsible for writing requirements. Anyone in the DoD workforce may attend the courses. Members of the DoD workforce that are stakeholders dealing with capabilities documents would benefit from taking these courses as well. Leadership must also reinforce this training in order to create an efficient requirements workforce within their organizations. The DoD community can only benefit by ascribing to better requirements definition through training and better understanding of the JCIDS process.

c. Requirements focus on a perceived capability and not the identification of a specific materiel solution

The third recommendation is to ensure requirements focus on a perceived capability and not the identification of a specific materiel solution. This may be more

challenging than it sounds. The defense industry continues to be at the forefront of technology and the DoD continues to stress the importance of purchasing commercial-off-the-shelf items. Furthermore, the defense budget continues to become more constrained. The defense industry struggles to survive during periods of constrained DoD budgets. In their struggle to survive, the defense industry attempts to showcase its new technologies to those stakeholders who develop requirements. Warfighter requirements may not identify a direct materiel solution, but the capability documents have the potential to be written in such a way that there is only one materiel solution. The DoD workforce must be vigilant in its efforts to ensure that this does not occur or become common practice. Capability gaps must be identified in a way that allows the acquisition workforce to work within identified constraints to fill these gaps. Capability-based principles can only benefit the DoD.

Embrace the best practice of "trade-offs" as a tool when refining the requirements of a material solution

Our fourth recommendation is to fully embrace the best practice of "trade-offs" as a tool when refining the requirements of a material solution. The capability gaps are identified in the ICD by the CBTDEV. After the MDA has identified that the materiel solution is needed, stakeholders must cooperatively work together to produce the best product for the warfighter. The CBTDEV's intent is to be a steward of the warfighters and provide them with everything that they require, but often providing everything is not realistic due to the many constraints in the defense acquisition process. There are many trade-offs that may be made in order to come to a desired end result. Trade-offs exist in multiple capabilities, between the adjustment of threshold and objective goals, the reclassification of a KPP to a regular requirement, and even within DOTmLPF-P analysis, to name a few.

The balance between survivability and maneuverability is an example of a requirements trade-off. Survivability usually requires additional weight and takes away from maneuverability. Thus neither threshold nor objective values would be met for either requirement. The CBTDEV's willingness to make trade-offs is the solution. The priority that identifies survivability over maneuverability is half the solution. The other

half comes into play with a trade-off between objective and threshold values. A trade-off can be established to decrease the expected threshold value of maneuverability in order to reach the threshold value of survivability for the solution. This collaboration on trade-offs between stakeholders is essential in defining requirements. Stakeholders must always remember that every organization has the best interests of the warfighter in mind. Working on realistic and reasonable trade-offs allows everyone to build stronger relationships and enhance the government requirement network.

d. RGP community does not repeat the mistakes of the past

Our fifth and final recommendation is that the RGP community does not repeat the mistakes of the past. We are at a volatile time in the DoD since we have been a nation at war for over a decade. The RGP community has done great things to support the warfighter. However, this same community must have the humility to identify the critical shortfalls and mistakes that have also been made. Many of these shortfall and mistakes have already been recognized in numerous reports and studies by organizations like the GAO, CRS, and Defense Business Board. Nevertheless, it is important that requirements stakeholders not stand by for these external think-tanks to identify solutions. Requirements stakeholders must develop and integrate their own after actions review and lessons learned to develop and implement best practices for the requirements generation workforce.

Furthermore, the solutions that come from self-analysis cannot fall on deaf ears or become a document that no one ever reads. The requirements community must take time as the wars wind down to pause and scrutinize how the capabilities documents have evolved during the JCIDS process. Then they must implement the best practices until they become standard practice, and create additional standards to ensure that the failures of the past are never repeated in their organizations. This will result in positive evolutionary change within the requirements generation workforce. AARs are only good if they are used.

C. AREAS FOR FURTHER RESEARCH

This section contains two subsections. The first subsection identifies ways to expand our study. The second subsection outlines four related projects that may be conducted as future research to further advance knowledge beyond the point of this project.

1. Expanded Study to Other Program Offices

We used a qualitative methodology when conducting our research. We conducted due diligence to eliminate personal bias when doing the study and ensured that we remained objective in our analysis. However, removing biases proved difficult since one of the researchers was formerly the assistant product manager of the M-ATV. Additionally, the platforms in the comparative analysis solely came from a single PEO of CS&CSS, which limited our sample size of acquisition programs that occurred in both the RGPs. Capabilities documents are used in every program of the DoD as outlined in the JCIDS. The data used for our research required personal interpretation and analysis as Army acquisition officers with limited experience and knowledge based on our current curriculums. Our interviews were structured to allow the SMEs to provide input based on the programs they had experience in and were subjective, which may have led to some biases in the results.

Similar research could be conducted by modifying our research methodology. Additional research could analyze the efficiency and effectiveness of other programs, whether they are across the Army's Acquisition Program Offices or across the programs of other Services in the DoD. Additionally, the inclusion of TRADOC would also expand the scope of a new project. This would provide a larger sample size that is more expansive and compares a multitude of varying programs from different perspectives. Additionally, a comparative analysis could also be done with non-like items or materiel solutions within different acquisition categories.

A second change to our research could be done by collecting more quantifiable data such as cost and timelines within the life cycle. The sample could be with similar

materiel solutions that have life cycles within the same calendar/fiscal years to reduce the variance of the cost analysis. This would provide another means for analyzing efficiency and effectiveness and for observing whether the results are similar or different.

2. Other Related Proposed Research Topics

We have conducted a great deal of research and analysis to come to our conclusions and recommendations. It has been truly a learning and professional development experience. It was often difficult to remain on one path since a great deal of the information provided us with more questions in regard to our subject. Consequently, here are some areas of interest for future research based on our study.

The first area for additional research is to look into other effects that occurred within the HMMWV program. There are two areas to look at within the HMMWV program as possible expanses that may or may not impact the efficiency and effectiveness of the program's requirements documents. The first area is the program's continued use of RGS requirements documents instead of transferring to JCIDS capabilities documents. Our research showed the program continued to follow RGS instead of changing to JCIDS. The question then becomes, why did the program not change to MCDs once JCIDS became enacted? The second area deals with the recapitalization program that occurred for HMMWVS. This provides the opportunity to look into the effects that any documents associated with the recapitalization program may or may not have had on the efficiency and effectiveness of the requirements documents.

A BBP 2.0 initiative that could be examined on the impact it places on the efficiency or effectiveness of the MRDs/MCDs is establish stronger professional qualification requirements for all acquisition specialties (Kendall, 2012). We originally planned on examined this initiative for effectiveness of MRDs/MCDs. However, after data collection and analysis we determined that the data we had collected to support this initiative was better suited towards the other BBP 2.0 initiatives. We recommend conducting an analysis of the level of certifications with CBTDEVs and PMs to examine the effects that may impact the MRDs/MCDs.

Analyze the average time it takes for each of the capabilities documents to go from initial draft to JROC approval in the JCIDS. As we learned from our research, there has been a great deal of variation in these times from the initial implementation of the JCIDS in 2003 to the present date. We questioned, What were the driving elements that affected the documents enroute to JROC approval? Was it urgency, priority, or staffing? Was it internal or external to individual stakeholders? Or was it the result it the result of streamlining changes as the JCIDS was more accepted and understood within the DoD community? We propose research to further investigate the processes of requirements document approval within the RGP.

Another research project we identified while examining our methodology was effective change management. In regards to evolutionary and revolutionary changes, we questioned if the change from the RGS to JCIDS was effectively implemented. What resistance was encountered when implementing the JCIDS and what were the effects of that resistance? Why were there so many versions of CJCSI 3170.01, and what were the factors that created a demand for so many evolutionary changes in the instruction? This research may potentially provide better methods to streamline change within the RGP and the DoD.

A fourth topic for consideration is how to better network our government and defense industry within the sphere of the RGP and how to manage this network. There are many constraints occurring, such as budget confidentiality, downsizing of our military, and our past reliance on contractor support. Many studies, reports, and investigations have been published in regards to realigning this network and managing the network to better meet the public interest. However, the question arises, How does the DoD and the acquisition community assist in this initiative without surrendering its sovereignty?

A final topic we recognize as an issue was the impact of the future state of the nation and the rapid growth of technology. The current National Security and Defense Strategy has identified that the great magnitude of involvement in the Central Command AOR is slowly decreasing and the priority shift is moving towards the Pacific Command AOR (Obama, 2012). A new capability document has been created known as a Joint

Emerging Operational Needs Statement (JEON) and is now in CJCSI 3170.01H (CJCS, 2012). What are the concerns and considerations that the RGP may face in this future challenge? How will technology be implemented as the nation and DoD shift their focus to a new threat? What can the DoD do to be at the forefront of this evolving NSS? This is an evolving issue for which the DoD must prepare. Answering these questions is one genuine way to truly serve our warfighters.

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APPENDIX

A. INTERVIEW QUESTIONS FOR PERSONNEL AT THE PENTAGON

Date: Interviewee:

Interviewer: Anh H. Ha & Nathaniel P. Costa

In your experience, what was right about the pre 2003 (pre JCIDS) "legacy" requirements systems process.

In your experience, what was wrong about the pre 2003 (pre JCIDS) "legacy" requirements systems process.

In your experience, why was the Joint Capabilities Integration Development System (JCIDS) Process created?\

In your experience, were their certain trends within the DOD / Army that drove the need for Joint Capabilities Integration Development System (JCIDS) Process?

In your experience, what is right with the Joint Capabilities Integration Development System (JCIDS) Process?

In your experience, what is wrong with the Joint Capabilities Integration Development System (JCIDS) Process?

In your experience, why was the Joint Urgent Operational Needs System (JUONS) / Urgent Operational Needs System (UONS) Process created?

In your experience, what is right with the Joint Urgent Operational Needs System (JUONS) / Urgent Operational Needs System (UONS) Process?

In your experience, what is wrong with the Joint Urgent Operational Needs System (JUONS) / Urgent Operational Needs System (UONS) Process?

In your experience, what do you feel are the bottlenecks in the Army Materiel Requirements Process? Of these bottlenecks, what are the steps that should be eliminated or what actions should be taken to begin correcting the issues to streamline the process?

What present actions are being identified to change / enhance the Army materiel requirements process?

How do you feel the Agile Process influence / effects / contributes to the current Army materiel requirements process?

How do you feel the Network Integration Evaluation influence / effects / contributes to the current Army materiel requirements process?

How do you feel the System of Systems Integration (SOSI) Directorate influence / effects / contributes to the current Army materiel requirements process?

How do you feel TRADOC influences / effects / contributes to the current Army materiel requirements process?

How do you feel TRADOC should influence / effect / contribute to the future Army materiel requirements process?

How do you feel your organization should influence / effect / contribute to the current Army materiel requirements process?

How has the current Army materiel requirements program influenced / effected / contributed to your program / initiative / mission?

How do you feel the current Army materiel requirements program has influenced / effected / contributed to your program / initiative / mission?

In your experience, do you feel the Army Materiel Requirements Process should undergo an evolutionary or revolutionary change? Why?

In your experience, what are the essential elements that need to be considered in the Army Materiel Requirements Process in order to maximize the overall efficiency and effectiveness?

B. U.S. ARMY TANK AND AUTOMATIVE COMMAND INTERVIEW QUESTIONS

Rank:_____ Name:_____ Title / Position:_____

In your _____ (duty position), what is the MOST important thing that must come from a MNS / ICD? Why?

In your _____ (duty position), what is the LEAST important thing that comes from a MNS / ICD? Why?

In your _____ (duty position), what is the MOST important thing that must come from a CDD / ORD – Initial? Why?

In your _____ (duty position), what is the LEAST important thing that comes from a CDD / ORD – Initial? Why?

In your _____ (duty position), what is the MOST important thing that must come from a CPD / ORD – Revised? Why?

In your _____ (duty position), what is the LEAST important thing that comes from a CPD / ORD – Revised? Why?

Requirements writers lack (Rank Order)

__ Acquisition Knowledge

__ Training

__ Experience

__ Other; Comment:

Do you feel that requirements should be defined by (Rank Order):

__ Capability

__ Threat

__ Identified system

__ Other; Comment:

How beneficial do you feel each document is for providing requirements? (0, being worst – 10, being best) __ MNS __ ORD __ ICD __ CDD __ CPD

- What causes the "worst" document to be the worst?
- What causes the "best" document to be the best?

How beneficial do you feel each document is for clarity (easily read and understood)? (0, being worst – 10, being best) __ MNS __ ORD __ ICD __ CDD __ CPD

- What causes the "worst" document to be the worst?
- What causes the "best" document to be the best?

How useful do you feel each document is within the RGP? (0, being worst – 10, being best) __ MNS __ ORD __ ICD __ CDD __ CPD

- What causes the "worst" document to be the worst?
- What causes the "best" document to be the best?

How beneficial do you feel each document is for providing needed information to execute the document for the appropriate phase of the acquisition lifecycle? (0, being worst – 10, being best) __ MNS __ ORD __ ICD __ CDD __ CPD

- What causes the "worst" document to be the worst?
- What causes the "best" document to be the best?

Rank order the documents from most useful to least useful? (1, being worst – 5, being best) __ MNS __ ORD __ ICD __ CDD __ CPD

- What causes the "worst" document to be the worst?
- What causes the "best" document to be the best?

How well do requirement documents allow the ability for you to perform your duties based on the four key functions outlined by the Army Acquisition Review Board in 2011:

- Realign, resource and focus its requirements and acquisition professionals on their raison d'être and associated core competencies, i.e., Training and Doctrine Command's timely delivery of requirements; PEO and Program Manager delivery of products meeting the requirement on cost and on schedule; and Army staffs that are accountable for enabling the requirement to be met

- Involve all stakeholders collaboratively in requirements development, development planning and acquisition solicitation, rather than just critiquing others
- Realistically assess and manage risk, and follow more tailored evolutionary acquisition strategies with associated reductions in steps, time and documentation to provide new systems
- Improve the number, quality and accountability of the people essential to the acquisition of equipment and systems needed for our servicemen and women to be equipped, trained and ready (Army Acquisition Review Board, 2011, p. iv).
- What could be changed to help meet these requirements?

What key differences exist in the documents from the old RGS process compared to the new JCIDS process, and what is your understanding for why these changes occurred during this transition?

- What requirement document(s) do you feel is most valuable? And why?
- When comparing RGS documents (MNS and ORD) to JCIDS documents (ICD, CDD, CPD), which documents do you prefer or mixture of documents do you prefer?
- What are your reasons for picking those particular documents?

Which document(s) are the most difficult to execute for JCIDS and RGS?

- What causes the difficulty? Organizations? Missing components within the documents? Unnecessary data?

What makes requirement documents efficient and effective for the stakeholders who facilitate the RGP? In regards to the program office, CMBTDEV and MATDEV.

Are CMBTDEV providing requirement documents with adequate detail and requirements that are clear, concise and easily understood?

- What is good?
- What is bad?
- Does TRADOC provide enough oversight to CMBTDEV?
- How effective and efficient is communication between program offices and CMBTDEV when working with ICDs, CDDs, and CPDs?

Is there adequate involvement and integration between CMBTDEV and MATDEV when requirements are cross-walked from the CPD to the RFP?

- Any thoughts on how the documents could be influenced to allow for a smoother process
- How effective is the process?

What makes requirement documents inefficient and ineffective for the stakeholders who facilitate the RGP?

- Do you feel any information to help the program perform its function is missing in the requirement documents? If so, what is missing?
- How difficult or easy is it to transpose the requirement documents to information used by industry?
- How much interaction and follow up do CMBTDEVs provide program offices once writing and submitting a requirement document?

Does future change need to be evolutionary or revolutionary change?

- How has the continued modification and incremental changes of the RGP (CJCSI3170.01A thru H) affected you or your program?
- What observations do you have of the continually changing document on the acquisition process?
- Do the continual changes impact the programs in a positive or negative way and what impacts have you seen or experienced?

Do you feel that JCIDS needs to undergo an evolutionary change or revolutionary change to support the Requirements Generation Process post GWOT?

- Evolutionary: Maintain JCIDS, but continue refinement.
- Revolutionary: Replace JCIDS with another Requirements Generation Process.

How may future change be successfully implemented into the U.S. Army?

- What changes would you recommend for requirement documents in general and or for a specific document?

What are the benefits of these proposed future changes to these capabilities documents?

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