

# Networking in the Twenty-First Century: The Acquisitions Process and Warfighter Information Network – Tactical (WIN-T)

A Monograph

by

MAJ Matthew A. Britnell  
US Army



School of Advanced Military Studies  
US Army Command and General Staff College  
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Name of Candidate: MAJ Matthew A. Britnell

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Approved by:

\_\_\_\_\_, Monograph Director  
Jacob A. Stoil, PhD

\_\_\_\_\_, Seminar Leader  
Richard A. Martin, COL

\_\_\_\_\_, Director, School of Advanced Military Studies  
James C. Markert, COL

Accepted this 24th day of May 2018 by:

\_\_\_\_\_, Director, Graduate Degree Programs  
Robert F. Baumann, PhD

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## Abstract

Networking in the Twenty-First Century: The Acquisitions Process and Warfighter Information Network – Tactical (WIN-T) by MAJ Matthew A. Britnell, US Army, 43 pages.

The Department of Defense's acquisitions process does not work for technology. It is too costly and time-consuming to provide the DOD with the weapons systems it needs when it needs them. A key example is the Warfighter Information Network – Tactical (WIN-T). WIN-T began in the late 1990s as an effort to provide tactical communications to the battalion level and below, using a combination of commercial and military technology. The inefficiency of the acquisitions process program caused the program to languish for nearly a decade. The DOD developed the Joint Network Node (JNN) for Iraq from an urgent need through an accelerated process, then incorporated it into WIN-T in 2007. After WIN-T incorporated JNN, subsequent increments struggled with issues of cost, schedule, and reliability through the usual acquisitions process before its cancellation in 2017. Without a significant acquisitions overhaul, future attempts to develop and maintain technological superiority will likely face the same challenges.

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## Acronyms

ACAT	Acquisitions Category
AoA	Analysis of Alternatives
APB	Acquisition Program Baseline
CAPE	Cost Assessment and Program Evaluation Office
CBA	Capabilities-Based Assessment
CCMD	Combatant Command
CDD	Capability Development Document
CDR	Critical Design Review
CJCS	Chairman of the Joint Chiefs of Staff
CPD	Capability Production Document
DAE	Defense Acquisition Executive
DAS	Defense Acquisition System
DCAPE	Director of Cost Assessment and Program Evaluation
DOD	Department of Defense
DOT&E	Director, Operational Test and Evaluation
DOTE	Developmental and Operational Test Event
DOTmLP-F	Doctrine, Organization, Training, materiel, Leadership Development, Personnel, and Facilities
DT&E	Developmental Test and Evaluation
EMD	Engineering, Manufacturing, and Development
FOUO	For Official Use Only
FYDP	Future Years Defense Program
GAO	Government Accountability Office
ICD	Initial Capabilities Document
IOC	Initial Operational Capabilities
IP	Internet Protocol

JCIDS	Joint Capabilities Integration and Development System
JNN	Joint Network Node
JROC	Joint Requirements Oversight Council
KPP	Key Performance Parameters
KSA	Key System Attributes
LRIP	Low Rate Initial Production
MDA	Milestone Decision Authority
MDAP	Major Defense Acquisition Program
MDD	Material Development Decision
MNS	Mission Needs Statement
MSA	Materiel Solution Analysis
NMS	National Military Strategy
NSS	National Security Strategy
O&S	Operations and Sustainment
OA	Operational Assessment
ONS	Operational Needs Statement
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense
OT&E	Operational Test and Evaluation
P&D	Production and Deployment
PPBE	Planning, Programming, Budgeting, and Execution
QDR	Quadrennial Defense Review
RFP	Request for Proposal
RGS	Requirements Generation System
TMRR	Technology Maturation and Risk Reduction
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics

WIN

Warfighter Information Network

WIN-T

Warfighter Information Network – Tactical

## Illustrations

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## Introduction

Success in the information age will go to those who have the courage to challenge themselves, who constantly innovate, and learn how to adapt as they go.

—Gordon R. Sullivan, 32<sup>nd</sup> Chief of Staff, US Army

The Warfighter Information Network – Tactical (WIN-T) is the US Army’s primary tactical communications system for units below the division level. It uses fiber optic cables, terrestrial radios, and satellite-based communications links to provide classified and unclassified connectivity to the communications networks of the Department of Defense (DOD). It links tactical units to each other and to the rest of the world. WIN-T began in the late 1990s as an effort to provide tactical communications to the battalion level and below, using a combination of commercial and military technology. However, after more than twenty years in development, the Army’s \$6 billion communication system faces significant challenges.

On September 17, 2017, Lieutenant General Bruce Crawford, the US Army Chief Information Officer/G-6, testified before Congress that the Army’s digital communications network did not meet the needs of the Army, and the Army did not foresee WIN-T doing so in the future.<sup>1</sup> He stated that the network is “too complex, fragile, not sufficiently mobile nor expeditionary, and one that will not survive against current and future peer threats, or in contested environments.”<sup>2</sup> The Army decided to cease future procurement of the WIN-T program at the end of Fiscal Year 2018, reallocate money to patch security vulnerabilities, and attempt to fix the program’s ability to operate with other joint network assets.<sup>3</sup> In effect, the Army halted any further investment beyond getting the current equipment working.

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<sup>1</sup> *Hearing before the Subcommittee on Tactical Air and Land Forces, Committee on the Armed Services, 115th Cong., 1st sess., (September 27, 2017) (statement of Lieutenant General Bruce T. Crawford, Army Chief Information Officer/G6): 2, accessed December 3, 2017, <http://docs.house.gov/meetings/AS/AS25/20170927/106451/HHRG-115-AS25-Wstate-CrawfordB-20170927.pdf>.*

<sup>2</sup> *Ibid.*, 3.

<sup>3</sup> *Ibid.*, 3.

In cancelling the WIN-T program, Army leadership cited the inability of the system to function in a contested electromagnetic spectrum. The WIN-T network evolved while the Army was fighting in Iraq and Afghanistan, where the specific adversaries the Army faced had limited ability to jam or hack military networks.<sup>4</sup> Thus the networks are vulnerable to a more sophisticated electronic warfare threat—threats that the Army could face in the future. The fact that the Army does not believe its primary tactical communications network can perform its basic functions against a peer or near-peer threat is a major problem.

A second and potential more significant reason for the WIN-T's ultimate failure was the process by which the military builds and acquires equipment. Part of the proposed solution for future networks is to bypass traditional acquisitions programs as much as possible for a more agile and flexible approach.<sup>5</sup> If the acquisitions process itself is the problem, then reforming the process, not bypassing it, will allow future systems to succeed. Congress has attempted to reform acquisitions almost constantly since modern acquisitions began following World War II.

This monograph begins by examining some of the historical attempts to reform the acquisitions process and the challenges to reform. It then examines two of the three major acquisitions processes and the specificities of the WIN-T process to identify issues that led to WIN-T's ultimate inability to satisfy requirements. This investigation of the inefficiencies in the military's acquisitions process demonstrates the effect that this process had on WIN-T. If the military is to design information systems and networks that meet requirements in the future, it must reform the process to enable systems to quickly meet requirements. An examination of the history of acquisitions reform and the WIN-T acquisitions process will yield a better understanding of the potential for future successes.

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<sup>4</sup> *Hearing before the Subcommittee on Tactical Air and Land Forces*, 3.

<sup>5</sup> *Ibid.*, 4.

This monograph is unclassified, so it does not include information from some of the documentation of the WIN-T, much of which carries a classification of For Official Use Only (FOUO). While it discusses some general technical characteristics identified by unclassified documents, it does not delve into the technical specifics available only at the FOUO classification.

## History of the Acquisitions Process

The history of acquisitions is a series of reforms in attempts to provide the optimal weapons system to the warfighter quickly and at a low cost. In the acquisitions process, the term “weapons system” refers to military equipment, whether a tank or a communications system. The three pillars of cost, schedule, and performance are a constant theme in acquisitions reform. The formal acquisitions process traces its roots to 1961, when then-Secretary of Defense Robert McNamara centralized the services’ budgets under the Office of the Secretary of Defense (OSD), and attempted to centralize weapons acquisitions.<sup>6</sup> Prior to this, each service had its own system for developing new technology. McNamara abandoned his early concept, Total Package Procurement because its programs—the Lockheed C-5A cargo plane, General Dynamics F-111 fighter aircraft, and Grumman F-14 Tomcat fighter aircraft—experienced huge cost overruns and delays.<sup>7</sup> From its very inception, DOD acquisitions struggled to achieve efficiency.

Between 1969 and 2017, nearly every presidential administration attempted to reform the acquisitions process, citing its inability to deliver working materiel solutions to the military on time and within budget. Secretary of Defense Donald Rumsfeld noted in 2003 that there had been over 120 studies on acquisition reform, but since 1975 the time to produce a new weapons system had doubled, and the time in which new technologies would become obsolete was rapidly

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<sup>6</sup> J. Ronald Fox, *Defense Acquisition Reform 1960-2009: An Elusive Goal* (Washington, DC: Center of Military History, 2011), 35-36.

<sup>7</sup> *Ibid.*, 37.

decreasing.<sup>8</sup> President Obama's 2009 reform attempted to ensure that senior leaders had the power to cancel programs that were over cost or underperforming to avoid going over budget, to deliver products on time, and to provide proper oversight.<sup>9</sup> Despite these attempts, in August 2017 the DOD again restructured acquisitions because the pace of weapons development could not keep pace with potential adversaries and increased costs.<sup>10</sup> Every time that the DOD has attempted to reduce inefficiency, it has created more bureaucracy, adding more undersecretaries or more oversight, all of which has continued to make the process less successful. If acquisitions reform is to be successful, the DOD must do more than minor corrections. The problem of acquisitions is clearly larger than just WIN-T and the changes to the process for acquiring communications equipment will not solve the larger problems of DOD acquisitions. WIN-T and its acquisition demonstrates the gravity of this issue.

### Acquisitions Process

The acquisitions process, sometimes called the DOD's decision support systems, consists of three subordinate processes which identify requirements, develop weapons systems to meet those requirements, and provide funding for these systems.<sup>11</sup> These processes work together to ensure that the military defines the correct requirement, develops the right equipment to satisfy the need, and can pay for it. These subsystems are the Joint Capabilities Integration and Development System (JCIDS), the Defense Acquisition System (DAS), and the Planning,

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<sup>8</sup> "Pentagon Town Hall Meeting with Secretary Rumsfeld," March 6, 2003, accessed December 3, 2017, <https://georgewbush-whitehouse.archives.gov/news/releases/2003/03/text/20030306-9.html>.

<sup>9</sup> Peter K Eide and Charles D. Allen, "The More Things Change, Acquisition Reform Remains the Same," *Defense Acquisition Research Journal* 19, no. 1 (January 2012): 105, accessed August 20, 2017, <http://dau.dodlive.mil/files/2012/01/Eide61.pdf>.

<sup>10</sup> Report to Congress Restructuring the Department of Defense Acquisition, Technology and Logistics Organization and Chief Management Officer Organization, (Washington, DC: Government Printing Office, 2017), 3, accessed November 30, 2017, <https://www.defense.gov/Portals/1/Documents/pubs/Section-901-FY-2017-NDAA-Report.pdf>.

<sup>11</sup> *Defense Acquisition Guidebook*, (Fort Belvoir, VA: Defense Acquisition University, 2017), 1-3.1, accessed October 12, 2017, <https://www.dau.mil/tools/dag>.

Programming, Budgeting, and Execution (PPBE).<sup>12</sup> These three processes work together to form the acquisitions system. The term *acquisitions* can refer generally to the three systems as a whole or to the DAS specifically. The policy documentation for these processes is thousands of pages long and includes many variations, so this summary simplifies the process as it pertains to WIN-T acquisitions, specifically for the JCIDS and the DAS. While the research for this monograph included PPBE, the details are less relevant to this study than the other two components of the acquisitions process, so the primary focus is JCIDS and DAS.

## Requirements Processes

### National-Level Guidance

The acquisitions process begins with guidance from the president. Since the Goldwater-Nichols Act in 1986, the president must submit to Congress an annual National Security Strategy (NSS), which outlines the strategic goals and foreign policy for the United States.<sup>13</sup> Presidential administrations rarely publish the NSS on time. When they do, the NSS guidance then makes its way into the National Military Strategy (NMS), which defines the national military objectives (ends), the strategy (ways), and the military capabilities necessary (means).<sup>14</sup> The NSS informs the Quadrennial Defense Review (QDR) and other documents which prioritize the resources of the Joint Forces to meet requirements.<sup>15</sup> These documents inform the Chairman of the Joint Chiefs of Staff (CJCS) regarding the military's missions and what equipment the DOD needs to

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<sup>12</sup> *Defense Acquisition Guidebook*, 1-3.1.

<sup>13</sup> "The National Security Strategy Report," National Security Strategy Archive, accessed October 30, 2017, <http://nssarchive.us>; Annual National Strategy Report, 50 US Code (2012) § 3043, accessed October 30, 2017, <https://www.gpo.gov/fdsys/pkg/USCODE-2015-title50/pdf/USCODE-2015-title50-chap44-subchapI-sec3043.pdf>.

<sup>14</sup> US Department of Defense, Joint Staff, Joint Publication (JP) 5-0, *Joint Planning* (Washington, DC: Department of Defense, 2017), xiii.

<sup>15</sup> US Department of Defense, Joint Staff, Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.011, *Joint Capabilities Integration and Development System (JCIDS)* (Washington, DC: Joint Chiefs of Staff, January 23, 2015), A-3, accessed October 11, 2017, [http://www.jcs.mil/Portals/36/Documents/Library/Instructions/3170\\_01a.pdf](http://www.jcs.mil/Portals/36/Documents/Library/Instructions/3170_01a.pdf).

accomplish them. The CJCS guidance enables the services to prioritize their weapons systems development to meet the national strategy.

For WIN-T, this guidance began in President George H.W. Bush's 1991 National Security Strategy, which focused on developing new technologies to offset quantitative disadvantages: "Our technological edge in key areas of warfare will be even more important at lower levels of forces and funding, and in the complex political and military environment in which our forces will operate."<sup>16</sup> President Bush planned to maintain the ability to deter aggressors largely through advanced technology. CJCS Colin Powell replicated the language in his National Military Strategy in January, 1992: "The United States must continue to rely heavily on technological superiority to offset quantitative advantages, to minimize risk to US forces, and to enhance the potential for swift, decisive termination of conflict."<sup>17</sup> This strategic Army document identified priorities for US capabilities that led to the development of the WIN-T program.

## Joint Capabilities Integration and Development System/Requirements Generation System

Once the DOD has the guidance from the president, it identifies where a capability gap exists—that is, a mission that the president requires the joint force to accomplish that it is currently unable to perform. Since 2001, the process for identifying gaps is the JCIDS. In JCIDS, the CJCS, with input from the services, identifies what capabilities gaps exist and recommends a materiel solution (based upon the generation and validation of a requirement). Prior to 2001, the process was the Requirements Generation System (RGS). Although the name changed, the goal of JCIDS remains the same as the RGS: identify the capabilities that the force requires in order to

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<sup>16</sup> George H.W. Bush, *National Security Strategy* (Washington, DC: White House, 1991), 30, accessed November 30, 2017, <http://nssarchive.us/NSSR/1991.pdf>.

<sup>17</sup> Colin L. Powell, *The National Military Strategy of the United States* (Washington, DC: Joint Chiefs of Staff, 1992), 10, accessed November 30, 2017, <http://history.defense.gov/Portals/70/Documents/nms/nms1992.pdf>.

accomplish its mission: *needs*. Then it identifies where the force does not yet have that capability: *gaps*. Finally, it recommends a possible *solution*, followed by a study to see if the solution is feasible.

In JCIDS, a service or Combatant Command (CCMD) identifies what capabilities the force requires to accomplish the national strategy through a Capabilities-Based Assessment (CBA).<sup>18</sup> A CBA looks at the tasks required for the force (usually a service or CCMD) to do its mission, known as a *need*. If it cannot and no program is under development to ensure that it can, a *gap* exists. The CBA can identify possible areas for change in the acronym DOTmLP-F, which is Doctrine, Organization, Training, materiel (captured as a lower-case m because in this case it refers to purchasing additional quantities of materiel, not acquiring new materiel), Leadership Development, Personnel, or Facilities.<sup>19</sup> If none of these areas provides a solution to the capability gap, then the CBA makes a recommendation to move forward in the process of acquiring new equipment.

For WIN-T, the guidance from the president to prioritize technological superiority, especially in communications, became the basis for two Army documents that led to the development of WIN-T. Although these documents were prior to the CBA, they provided the same function: the first identified gaps where a materiel solution would be necessary, and the second proposed a broad solution.

The first of these documents was 1993 *The Army Enterprise Strategy*, published by the 32<sup>nd</sup> Army Chief of Staff, Gordon Sullivan, a former battalion communications officer.<sup>20</sup> The strategy highlighted the need for more deployable communications systems that Soldiers could

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<sup>18</sup> US Joint Staff, CJCSI 3170.011, *JCIDS* 2015, A-3.

<sup>19</sup> *Ibid.*, C-2.

<sup>20</sup> Gordon R. Sullivan, *An Oral History of General Gordon R. Sullivan*, ed. John R. Dabrowski (Carlisle Barracks, PA: US Army Military History Institute, 2008), 308, accessed November 14, 2017, <http://cgsc.cdmhost.com/utills/getdownloaditem/collection/p4013coll11/id/1641/filename/1642.pdf/mapsto/pdf/type/singleitem>.

employ quickly.<sup>21</sup> The strategy emphasized deployability, reliability, and interoperability with the other services. Furthermore, the document prioritized leveraging commercial technologies, industry standards, and space-based technologies.

A critical component of the strategy was the priority to provide “assured access” to soldiers by protecting satellites and their signals from adversaries’ electronic warfare capabilities.<sup>22</sup> The *Army Enterprise Strategy* argued that in future battlefields, the electromagnetic spectrum would likely be contested, and the United States should develop technologies to both protect its use of the electromagnetic spectrum and deny that spectrum to adversaries.<sup>23</sup> These requirements are critical to an understanding of the failures of WIN-T because they reflect the same problems that Lieutenant General Crawford outlined nearly twenty-five years later when he canceled the program. These strategic documents correctly identified challenges for the next quarter century, yet the process of developing these technologies failed to achieve the means necessary to overcome those challenges.

A second important document was *The Army Digitization Master Plan*, which in 1995 outlined a four-phase plan to integrate tactical internet down to lower echelon forces. While the first phase focused on digital systems at the vehicle level, the second phase directly led to the development of the WIN-T program. The second phase was to integrate various existing communications systems on the battlefield using an Internet Protocol (IP)-based “Tactical Internet” (really a tactical *intranet*, but that term had not yet become popular).<sup>24</sup> After a third phase to standardize protocols across the network, the fourth phase would be a truly integrated

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<sup>21</sup> Gordon R. Sullivan, *Army Enterprise Strategy: The Vision* (Washington, DC, Office of the Secretary of the Army, 1993), 11, accessed November 14, 2017, [www.dtic.mil/dtic/tr/fulltext/u2/a273357.pdf](http://www.dtic.mil/dtic/tr/fulltext/u2/a273357.pdf).

<sup>22</sup> *Ibid.*, 15.

<sup>23</sup> *Ibid.*, 26-27.

<sup>24</sup> Gordon R. Sullivan and James M. Dubik, *Army Digitization Master Plan* (Washington, DC, Department of the Army, 1995) 3, accessed November 14, 2017, <http://www.dtic.mil/get-tr-doc/pdf?AD=ADA305855>.

tactical internet using commercial satellite and cellular technologies on the battlefield.<sup>25</sup> The *Enterprise Plan* laid out a broad vision of what the Army needed to do; the *Master Plan* laid out the details for how it would accomplish that vision: it proposed a solution. Together, these documents functioned as a CBA.

Once a service or combatant command has identified a gap through a CBA and recommended a potential materiel solution, it must then prepare a study, called the Initial Capabilities Document (ICD). In the ICD, the service justifies developing a new materiel solution by describing operational risk if the DOD does not develop a materiel solution to mitigate the capability gap.<sup>26</sup> The combatant commands look at operational risk in terms of their ability to accomplish a mission; the Army and other services look at operational risk in terms of their ability to man, train, and equip the force.<sup>27</sup> The ICD describes the operational context, the threat summary, and the capability requirements and gaps, before arguing why a non-materiel solution is insufficient to mitigate the gaps.<sup>28</sup> This ICD is critical because it is the document that drive the acquisitions process. It is the primary document that translates specific requirements into technological solutions.

Prior to 2001, when the RGS was the requirements process, the ICD was called a Mission Needs Statement (MNS). However, WIN-T did not create a new MNS because the DOD maintained that the 1995 MNS for “Horizontal Integration of Battle Command” supported the WIN-T project.<sup>29</sup> Despite the lack of the specific MNS, the requirements phase of the process had identified gaps in the joint force’s capabilities and posited some broad possibilities for solutions.

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<sup>25</sup> Sullivan and Dubik, 4.

<sup>26</sup> US Joint Staff, CJCSI 3170.011, *JCIDS* 2015, D-19.

<sup>27</sup> *Ibid.*, C-B-13.

<sup>28</sup> *Ibid.*, D-17.

<sup>29</sup> Operational Requirements Document (ORD) for Warfighter Information Network - Tactical (WIN-T), November 5, 1999, 3, accessed August 20, 2017, <https://fas.org/man/dod-101/sys/land/docs/WIN-T5NOV.htm>.

The failure to create a separate MNS caused a gap between the *Enterprise Strategy*'s emphasis on operating in a contested electromagnetic spectrum and the program's later lack of focus on this requirement. This gap caused significant issues as the program moved into the next step of the process because the requirements for operating in environments where the electromagnetic spectrum is contested did not enter the acquisitions process.

In the final step of the JCIDS process, the ICD or other capability requirement document goes to the Joint Requirements Oversight Council (JROC) for approval. The JROC began in 1984 as the Joint Requirements Management Board, and was renamed the JROC as a result of Goldwater-Nichols in 1986.<sup>30</sup> The JROC is chaired by the Vice Chairman of the Joint Chiefs of Staff and has four levels of review boards, with inputs from the Joint Staff (element J-1 through J-8), the OSD, each of the services, and the CCMDs.<sup>31</sup> It has responsibility to prioritize requirements across the Services and CCMDs, balancing cost, schedule, performance, and quantity, balancing cost with the level of priority, and recommending timelines for the delivery of initial operational capabilities (IOCs) to meet requirements.<sup>32</sup>

The JROC is the approving authority for an ICD, but the JROC ultimately does not have the authority to ensure that a materiel solution enters development. The JROC advises the CJCS, who advises the Secretary of Defense, who often delegates decision-making authority to the Defense Acquisition Executive (DAE).<sup>33</sup> The JROC can approve an ICD and recommend a non-

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<sup>30</sup> Gordon N. Lederman, *Reorganizing the Joint Chiefs of Staff: The Goldwater-Nichols Act of 1986* (Westport, CT: Greenwood Press, 1999), 93-94.

<sup>31</sup> US Department of Defense, Joint Staff, Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 5123.01G, *Charter of the Joint Requirements Oversight Board (JROC)* (Washington, DC: Joint Chiefs of Staff, February 12, 2015), B-1, accessed October 30, 2017, [http://www.jcs.mil/Portals/36/Documents/Library/Instructions/5123\\_01.pdf](http://www.jcs.mil/Portals/36/Documents/Library/Instructions/5123_01.pdf).

<sup>32</sup> *Ibid.*, 2.

<sup>33</sup> Moshe Schwartz, *Defense Acquisitions: How DOD Acquires Weapon Systems and Recent Efforts to Reform the Process*, CRS Report RL34026 (Washington, DC: Congressional Research Service, 2014), 5-7, accessed August 20, 2017, <https://fas.org/sgp/crs/natsec/RL34026.pdf>.

materiel solution, but if it concurs with the ICD recommendation for a materiel solution, the program moves forward.<sup>34</sup>

The largest change when the requirements process shifted from RGS to JCIDS was its focus. The 2001 QDR announced that the defense strategy would shift from a “threat-based” approach to a “capabilities-based” approach.<sup>35</sup> Published on September 30, 2001, and highly cognizant of the events of September 11th, the 2001 QDR consciously shifted the defense strategy from countering specific adversaries and their capabilities to focusing on developing “emerging opportunities.”<sup>36</sup>

JCIDS attempted to implement this strategic focus in the area of acquisitions: instead of acquiring weapons systems for each service based on specific perceived threats to the nation, the DOD, through the JCIDS process develops capabilities tailored for national strategy. However, adversaries continue to develop capabilities to counter US capabilities, while the United States lost its focus on likely near-peer adversaries. One of the primary reasons for the cancellation of the WIN-T program was that it focused on providing near-term capabilities while ignoring possible long-term threats. To be successful in the requirements process, the DOD must anticipate emerging threats and develop capabilities and strategies to counter them.

The current JCIDS process continues to stovepipe programs to specific services, rather than achieving necessary joint capabilities. In 2008, the Government Accountability Office found that nearly seventy percent of proposals came from the individual services themselves, and nearly all proposals were accepted.<sup>37</sup> If the JCIDS cannot prioritize effectively, then the requirements

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<sup>34</sup> Schwartz, 4.

<sup>35</sup> *Quadrennial Defense Review 2001* (Washington, DC: Department of Defense, 2001), 14, accessed October 31, 2017, [archive.defense.gov/pubs/qdr2001.pdf](http://archive.defense.gov/pubs/qdr2001.pdf).

<sup>36</sup> *Ibid.*

<sup>37</sup> Michael J. Sullivan, *DOD’s Requirements Determination Process Has Not Been Effective in Prioritizing Joint Capabilities*, GAO-08-1060 (Washington, DC: Government Accountability Office, 2008), 1, accessed November 1, 2017, <http://www.gao.gov/assets/290/281695.pdf>.

that it forwards to acquisitions likely require more than the available resources. One of the reasons for the cancellation of the WIN-T program was its inability to operate with other joint communications systems. If the DOD cannot fix the stove-piping of its requirements system, it will never be able to accomplish true joint interoperability.

The requirements process for WIN-T began well, but ultimately ignored a key aspect necessary for WIN-T’s future: the ability to operate in contested environments. Early documents correctly identified key requirements to meet the president’s strategic aims—specifically communications systems that were mobile and protected. Regardless, the JROC approved the MNS as defined, and the program transitioned from identifying requirements to developing solutions via acquisitions (see Figure 1). However, the lack of an ICD or MNS specifically for the Warfighter Information Network meant that the initial requirements became lost in translation. The program proceeded to development, but without the specific requirements to operate in a contested environment. This problem was never resolved, and once the Army’s focus shifted away from Iraq and Afghanistan to countering near-peer threats, this oversight became a primary cause for cancelling the program.

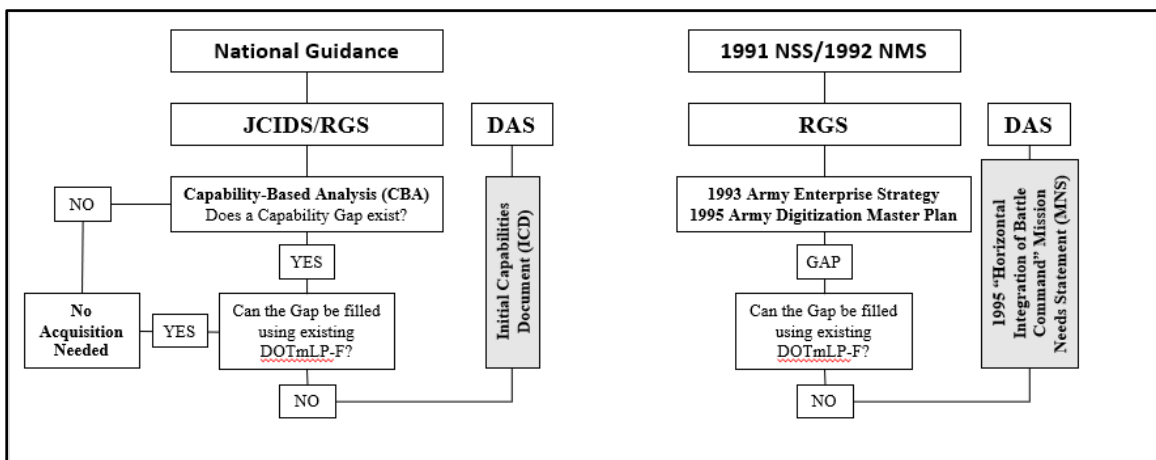


Figure 1. JCIDS/WIN-T Requirements Process. Created by author.

## Defense Acquisition System (DAS)

The DAS is a multi-year process by which the services, under the authority of the Secretary of Defense, develop materiel solutions to fill the capabilities gaps identified by the JCIDS. The DAS is the process by which the DOD develops and builds equipment and then sustains it over its life-cycle. While the CJCS has authority over the JCIDS process, the OSD is responsible for developing the capabilities necessary to accomplish the mission. The JROC, under the CJCS, retains responsibility for approving critical documents during the second and third phases of the process. OSD, through the DAS, provides solutions that fill the gaps in the needs of the DOD. The authority for the DAS is the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)).<sup>38</sup> The USD (AT&L) serves as the Defense Acquisition Executive (DAE), who is ultimately responsible for acquisitions; he or she also serves as the Milestone Decision Authority (MDA) for Major Defense Acquisition Programs (MDAPs). In 2017, MDAPs were those programs which the DAE estimated would cost over \$480 million for Research, Development, Test, and Evaluation or over \$2.79 billion for procurement.<sup>39</sup> These weapons systems are designated as Acquisitions Category (ACAT) I, the most important weapons systems for the DOD: weapons systems like the Air Force F-22, the Army's M1 Abrams, or the WIN-T communications system.

The DAS begins once the JROC approves the ICD or other capabilities document from the requirements process. The process moves from defining requirements to developing solutions. However, before a program can officially enter the DAS, it must pass a Material Development Decision (MDD), the OSD's decision to move the program into the DAS.<sup>40</sup> Essentially, the DOD

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<sup>38</sup> US Department of Defense, Joint Staff, Department of Defense Instruction (DODI) 5000.02, *Operation of the Defense Acquisition System* (Washington, DC: Department of Defense, January 7, 2015), 1, accessed October 3, 2017, [http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500002\\_dodi\\_2015.pdf](http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500002_dodi_2015.pdf).

<sup>39</sup> *Ibid.*, 44.

<sup>40</sup> *Ibid.*, 18.

does its own search to identify if there are any quicker or cheaper ways to close the gap. The Director of Cost Assessment and Program Evaluation (DCAPE) looks at any possible alternatives to satisfy the requirements in the ICD and completes an Analysis of Alternatives (AoA).<sup>41</sup> If a materiel solution is necessary, the MDA then makes the final decision to move forward with the program and designates a DOD component as the lead.<sup>42</sup> The program then finally officially enters into the DAS, which consists of five phases with three milestones, one after each of the first three phases of the process. Figure 2 depicts the typical acquisitions process. All DAS processes are slightly different, as they may be altered to fit the particular program, but unless they enter the process with existing technology, they all consist of five consecutive phases, with a milestone decision after each of the first three phases.

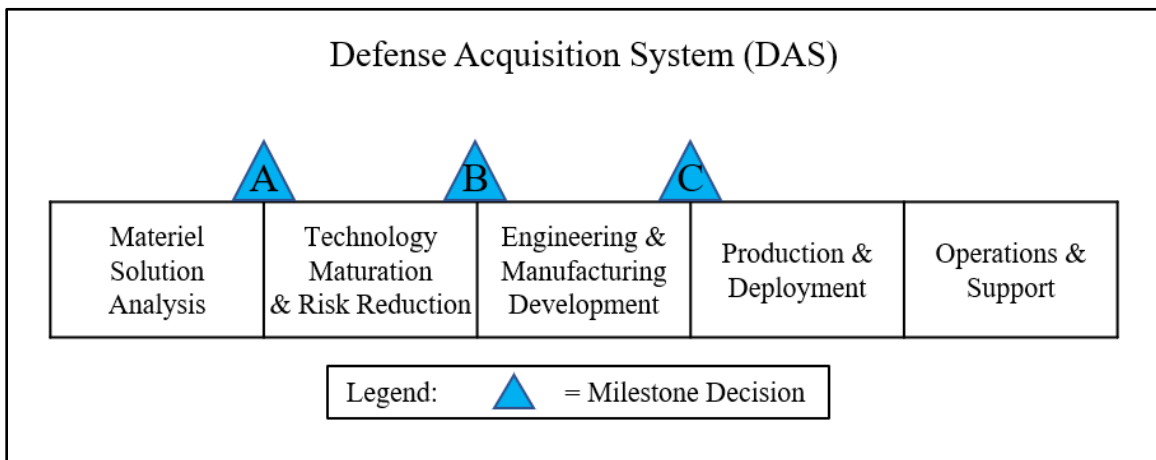


Figure 2. Defense Acquisition System (DAS). Created by author. Data from US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System 2015*, 9.

### Phase One: Materiel Solution Analysis

The first phase of the DAS is the Materiel Solution Analysis (MSA) Phase, where the goal is to determine what specific systems or equipment could mitigate the gaps identified in the JCIDS process.<sup>43</sup> The DOD component, as directed by the DCAPE, supervises this phase using

<sup>41</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System 2015*, 132.

<sup>42</sup> Schwartz, 8.

<sup>43</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System 2015*, 18.

the ICD and the AoA documents. The outputs from this phase are “system-specific requirements” known as Key Performance Parameters (KPPs) and Key System Attributes (KSAs), as well as a proposed summary of how the system will accomplish the specific tasks and within what operating environment.<sup>44</sup> The KPPs and KSAs are specific technical attributes that measure whether the program fills the capabilities gaps. They are laid out in the Capability Development Document (CDD), which is in draft form for the first key decision, Milestone A. Once a solution concept is satisfactory, the MDA approves the concept and moves forward to further develop the technology. This decision is Milestone A.

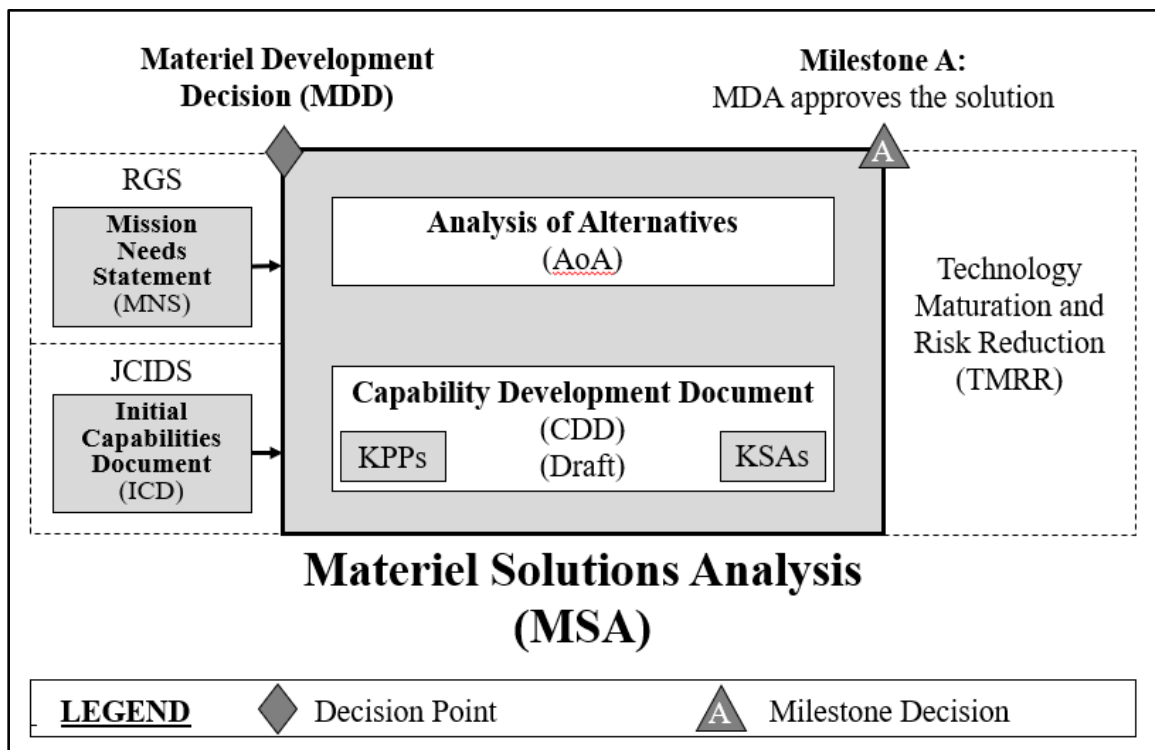


Figure 3. Materiel Solutions Analysis. Created by author. Data from US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 9.

### WIN-T MSA

WIN-T progressed rapidly through the MSA phase of the DAS. In 1996, the DOD approved the original Warfighter Information Network (WIN) architecture, effectively achieving

<sup>44</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 16.

Milestone A (WIN later became WIN-T). This document led to subsequent refinements of the WIN Master Plan in 1997 and 1998.<sup>45</sup> These were the foundational documents for the program, which outlined plans for integrating the WIN architecture into the Army's networks. As previously noted, the WIN-T program used an already approved MNS (the early version of the ICD), which may have allowed the program to rapidly move through these early stages. The WIN-T MSA phase was rapid, and it adequately identified what types of technology would be necessary to meet the requirements identified in the RGS. The challenges for WIN-T started in the next phase, when the Army attempted to find or develop technology that did not yet exist.

## Phase Two: Technology Maturation and Risk Reduction

Once a program achieves Milestone A with an approved solution, it enters the next phase: Technology Maturation and Risk Reduction (TMRR). The TMRR phase is crucial for the development of the program because this phase is where the DOD component (in the case of WIN-T, the Army) explores various options to attempt to reduce cost in four areas: technology, engineering, integration, and life-cycle, while developing the necessary technology for the weapons system to function.<sup>46</sup> The program manager takes responsibility for ensuring the program achieves its milestones and requirements in a timely manner. Generally, the program goes out for bidding during this phase, and companies submit prototypes to demonstrate either capabilities or risk reduction. Multiple prototypes or technology development demonstrations ensure that the preferred solution satisfies requirements and has a low enough level of technical risk. As the name implies, a key goal of this phase is to attempt to reduce risk and ensure that the program mitigates the capability gap that JCIDS identified.<sup>47</sup> Sources of risk include cost and

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<sup>45</sup> *Director, Operational Testing & Evaluation FY1999 Annual Report* (Washington, DC: Government Printing Office, 1999), III-196, accessed August 1, 2017, <http://www.dote.osd.mil/pub/reports/FY1999/pdf/FY1999AnnualReport.pdf>.

<sup>46</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 19.

<sup>47</sup> *Ibid.*, 22.

technology development, so a program manager would want to reduce the likelihood that a program would go over cost or would not meet the technical specifications necessary.<sup>48</sup>

The TMRR phase includes re-validating the requirements, agreeing on the solution to send out Requests for Proposal (RFPs), then deciding on a proposal. Each of these steps is a specific decision point (see Figure 4). The PM must submit the updated CDD, which the team developed prior to Milestone A, to the JROC or other designated requirements validation authority, who must validate the CDD before the contract can go out for proposals at the Development RFP Release Decision Point.<sup>49</sup> At the Development RFP Release Decision Point, the Program Manager and PEO make their best estimate of the materiel solution for the given need and ask competitors to provide their best solutions.<sup>50</sup> The goal is to ensure that the proposed program is technically sound, executable, and affordable.<sup>51</sup> Once the Project Manager has received all the proposals, the program proceeds to Milestone B: the decision on which proposal to accept.

Milestone B concludes the TMRR phase when the MDA awards the contract to begin development. The contract allows production to begin, committing the required funding to procuring the equipment. The MDA approves the Acquisition Program Baseline (APB), which includes production numbers and sustainment costs.<sup>52</sup> The APB is the contract between the MDA and the Program Manager for how the program proceeds once the MDA has awarded the contract. Prior to this step, companies seeking to gain the full-production contract have developed only prototypes, but Milestone B awards the contract and concludes the TMRR phase.

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<sup>48</sup> Schwartz, 11.

<sup>49</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 49.

<sup>50</sup> *Ibid.*, 130.

<sup>51</sup> *Ibid.*, 23.

<sup>52</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 24.

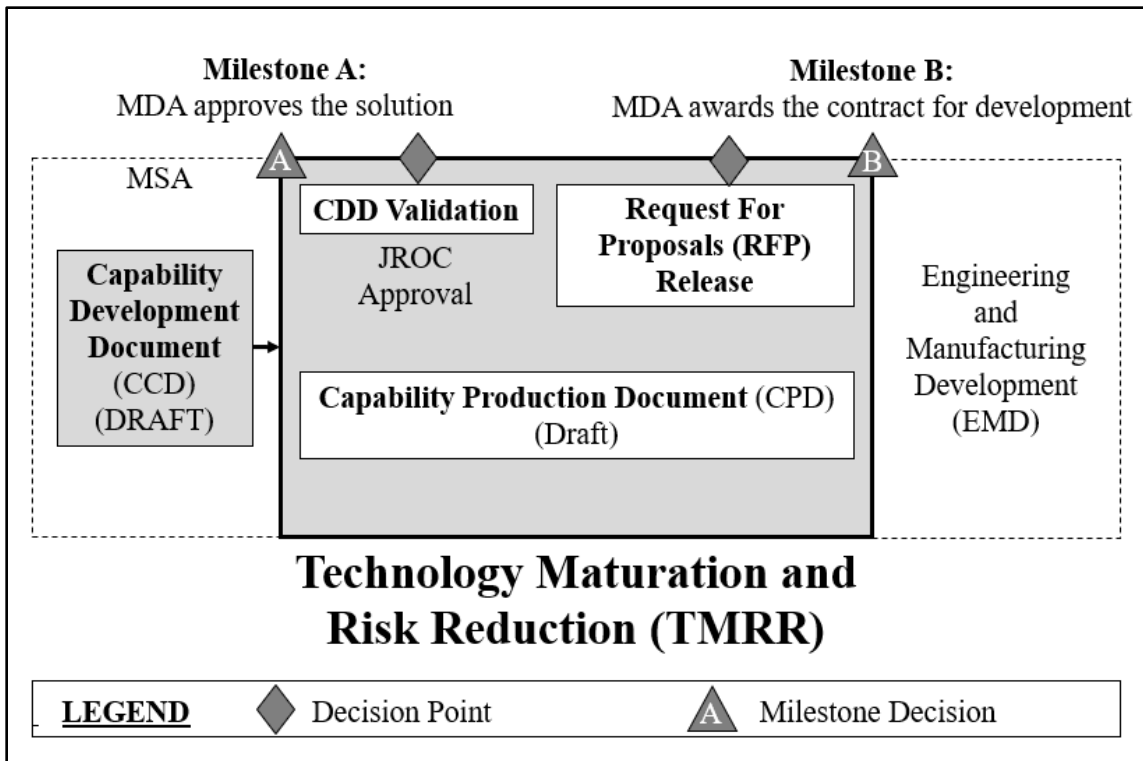


Figure 4. Technology Maturation and Risk Reduction. Created by author. Data from US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System 2015*, 9.

#### WIN-T TMRR

In 1996, the DOD decided that the WIN architecture would be the Army’s solution (Milestone A), and the program entered the TMRR phase. Planners began drafting the Operational Requirements Document (ORD). In current DAS terminology, the ORD is the CDD, proposing a solution for the gaps identified in the CBA, or in this case, the *Enterprise Strategy*. It is more specific than a MNS or ICD in outlining technologies that the DOD must develop to meet its mission requirements, but at this point, the solution is remains a proposal.<sup>53</sup> The WIN-T ORD notes that the system replaces legacy Tri-Services Tactical Communications, which OSD approved for development in 1979, and Mobile Subscriber Equipment (MSE), which OSD approved in 1984. By the time the Army submitted the ORD for WIN-T, those programs were fifteen- to twenty-year old legacy technology in need of a significant upgrade or replacement.

<sup>53</sup> US Joint Staff, CJCSI 3170.011, *JCIDS 2015*, B-24.

There was risk that any new technology would not meet the technical parameters outlined in the ORD, but the Army needed a solution to fill the potential gap.

The ORD, like the CDD that replaced it, outlined key technical parameters of the system that it must have to fill capabilities gaps. The document laid out nine specific overall characteristics, noting five of them as Key Performance Parameters (KPPs); three of these characteristics that remained an issue for WIN-T were interoperability, survivability, and security.<sup>54</sup> The ORD defined the KPP of interoperability as being able to operate other DOD information systems, as well as with joint, NATO, and commercial partners.<sup>55</sup> The KPP for survivability focused on ensuring that each node had multiple links; it focused on the failure of the network, which ignored the possibility of deliberate attack to the network.<sup>56</sup> The document noted that WIN-T would provide a reduced signal presence on the battlefield, but this statement referred to the amount of equipment necessary to provide the services, not an electromagnetic signature.<sup>57</sup> Finally, the security KPP provided few details beyond the ability to handle and separate information at different classification levels.

The parameters, from a document approved in 1999, became the basis for the technical specifications of the WIN-T program. These KPPs in the ORD as approved are critical because they are the specification for the equipment, but they do not reflect the needs outlined in the strategic documents. The *Army Enterprise Strategy* clearly highlighted the need to be able to operate in a contested electromagnetic spectrum, but the KPPs in the ORD did not reflect that need. Thus, when the need arose to operate in a contested environment, the equipment could not deliver. This foundational document for WIN-T's development contained the basis for its eventual failure to deliver.

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<sup>54</sup> Operational Requirements Document for WIN-T, 9.

<sup>55</sup> *Ibid.*, 10.

<sup>56</sup> *Ibid.*, 11.

<sup>57</sup> *Ibid.*, 4.

Another key difference in the 1998 ORD from the 1995 Army Digitization Master Plan was the shift from a phase-based approach to an attempt to build the entire system at once. The 1995 document viewed integrating various systems, standardizing protocols, then a true integrated network as three separate steps, each taking place over a number of years. However, the ORD ambitiously combined all three in its attempt to develop an integrated network. The document anticipated this possibility because it envisioned the system as a modular system, able to take advantage of new technologies as they became available.<sup>58</sup> This would prove to be problematic, as the technology did not advance as quickly as planners had intended, and the program would later be forced to revert to a phased approach.

While the WIN-T ORD predated the 2001 shift to a capabilities-based approach, it foreshadowed such an approach by emphasizing that it did not attempt to counter a specific threat, instead focusing on the capabilities that WIN-T could provide to the warfighter. The 1993 *Enterprise Strategy* noted that future battlefields would likely include a contested electromagnetic spectrum, but the WIN-T ORD didn't address how it intended to overcome that challenge. It noted a projected threat environment that could include electromagnetic jamming and hacking, but rather than including defensive capabilities in its KPPs, the ORD merely mentioned the threats and noted that the system could be vulnerable, especially in its dependence on commercial technologies and the Internet (which it described as the Public Switched Network).<sup>59</sup> The ORD reflected a different strategy from the *Army Enterprise Strategy*: once the DOD gained superiority in the electromagnetic spectrum, the network would provide services to the warfighters.

The Army's Signal Center approved the ORD in April 1998, along with the acquisition strategy.<sup>60</sup> The WIN-T Acquisition Strategy reflected the optimism common for acquisitions programs. According to the 1999 DOTE report, it anticipated a total program cost of \$3 billion,

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<sup>58</sup> Operational Requirements Document for WIN-T, 4.

<sup>59</sup> *Ibid.*, 8.

<sup>60</sup> *DOT&E FY1999 Annual Report*, III-196.

an average unit cost of \$50 million, selecting a prime contractor (Milestone B) by summer 2001, initial operational testing in Fall 2003, and moving into full-rate production (O&S phase) by 2004.<sup>61</sup> As full-rate production does not occur until the fourth phase of the DAS, this schedule clearly overestimated the ability to deliver the product. By early 2000, the program had already modified that ambitious 1999 estimate to a late 2001 contract award and initial fielding in 2004, a delay of one year.<sup>62</sup> While early delays are common, these slight delays merely foreshadowed significant future delays. The plan to use existing technology caused serious delays when the technology did not exist.

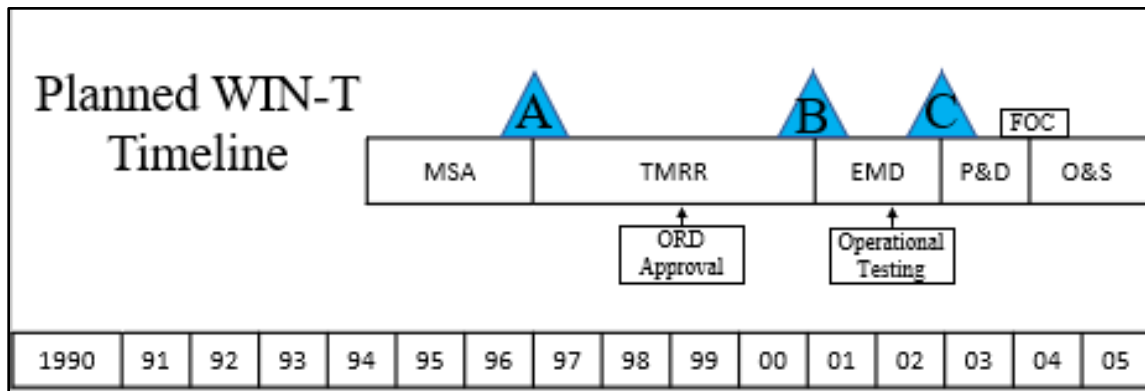


Figure 5. Planned WIN-T Timeline (1998). Created by author.

The JROC approved the WIN-T ORD in 1999, a critical step in the TMRR phase, which moved the program towards awarding a contract (Milestone B) and progression into the third phase of the process.<sup>63</sup> In 2002, WIN-T issued a Request for Proposal (RFP) to solicit bids from industry to build the weapons system. In late 2002, it awarded contracts to both Lockheed Martin and General Dynamics to begin development.<sup>64</sup> This “Pre-Milestone B” allowed both contractors

<sup>61</sup> *DOT&E FY1999 Annual Report*, III-196.

<sup>62</sup> “TSM-Warfighter Information Network-Tactical,” *Army Communicator* 25, no. 1 (Spring 2000): 31. *Military & Government Collection*, EBSCOhost, accessed November 13, 2017.

<sup>63</sup> *US Army Weapons Systems Handbook 2001* (Washington, DC: Government Printing Office, 2001), 175, accessed November 14, 2017, <http://usaascinfo.info/docs/wsh/2001-wsh.pdf>.

<sup>64</sup> *Defense Acquisitions: Assessments of Selected Weapons Programs*, GAO-04-248 (Washington, DC: Government Accountability Office, 2004), 114, accessed August 20, 2017, <http://www.gao.gov/assets/130/122422.pdf>; *Director, Operational Testing and Evaluation FY2003 Annual*

to enter into activities of the next phase while they continued to develop the necessary technology.<sup>65</sup> However, significant delays were already impacting the program's predictions for delivering weapons systems to the warfighter. By late 2003, the original estimate of full-rate production by 2004 had been pushed five years to 2009.<sup>66</sup> The final Milestone B, in late 2003, combined the two competing systems into a single team, with General Dynamics in the lead.<sup>67</sup> However, a 2004 GAO assessment noted that "WIN-T will include technologies...some of which are expected to undergo continuous maturation up until the design review"<sup>68</sup> Although the project was proceeding into the next phase, the necessary technology did not yet exist, so the program continued conducting TMRR activities.

A successful TMRR phase reduces the risk that a program will be late, over budget, or fail to meet technical specifications. TMRR does this by ensuring that the necessary technology is available prior to a program entering the next phase. WIN-T did not complete the TMRR phase because the technology was not mature, so even as Lockheed Martin and General Dynamics began to engineer the systems, the companies integrated new technologies as they became available. When technologies did not become available on time, the project experienced further delays and increased costs.

### Phase Three: Engineering and Manufacturing Development

Once a program has completed Milestone B by accepting a bid from a contractor to develop the weapons system per the specifications of the CDD (Milestone B), the program enters the third phase, Engineering and Manufacturing Development (EMD), and may at this point

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*Report* (Washington, DC: Government Printing Office, 2003), 117, accessed August 1, 2017, <http://www.dote.osd.mil/pub/reports/FY2003/DOTEfy03AnnualReport.pdf>.

<sup>65</sup> *US Army Weapons Systems Handbook 2004* (Washington, DC: Government Printing Office, 2004), 211, accessed November 14, 2017, <http://usaascinfo.info/docs/wsh/2004-wsh.pdf>.

<sup>66</sup> *DOT&E FY2003 Annual Report*, 117.

<sup>67</sup> *US Army Weapons Systems Handbook 2005* (Washington, DC: Government Printing Office, 2005), 253, accessed November 14, 2017, <http://usaascinfo.info/docs/wsh/2005-wsh.pdf>.

<sup>68</sup> *Defense Acquisitions: Assessments of Selected Weapons Programs*, GAO-04-248, 114.

become a program of record. A program of record is a major program that provides a needed capability over time; as a program of record it becomes a line item in the defense budget.<sup>69</sup> The primary goal of EMD is to develop the initial product, based on the validated requirements and baseline approved in Milestone B, then build the initial design into one that is ready for production.<sup>70</sup> Included in this phase is the process of integrating all the technologies and capabilities of the system (full system integration), as well as developing the manufacturing capabilities and processes and any redesigns necessary for mass production.<sup>71</sup>

The EMD phase begins with an iterative series of design reviews for both hardware and software. The purpose of the design step is to solidify a final design for production. To drive the design step, the Program Manager prepares a Systems Engineering Plan (SEP) and, for MDAPs, submits it to the Deputy Assistant Secretary of Defense (Systems Engineering) for approval.<sup>72</sup> Milestones A and B each require early versions of the SEP, but this updated SEP is the one that drives the design process. It details an overall technical approach with risks, describes required technical reviews, and outlines how the system integrates with existing capabilities.<sup>73</sup> The risks it describes are the risks that the program will not achieve its schedule, cost, and performance objectives.

Once the design is completed, the project continues through further reviews. The Critical Design Review (CDR) establishes a stable baseline product, confirms that the design meets the requirements of the CDD, and allows the production team to begin building the product.<sup>74</sup> Once the Project Manager identifies that the project is ready for initial testing or operational testing, he

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<sup>69</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 153.

<sup>70</sup> *Defense Acquisition Guidebook*, 3-2.4.

<sup>71</sup> Schwartz, 11-12.

<sup>72</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 81.

<sup>73</sup> *Ibid.*

<sup>74</sup> *Defense Acquisition Guidebook*, 3-3.5, 3-8.3.

orders Test Readiness Reviews or Operational Readiness Test Reviews to ensure that the program is ready for testing. Recommended best practices include a System Verification Review, which verifies that the system meets the requirements (short of functional testing) and a Functional Configuration Audit, which verifies the performance of the system prior to going into initial production. Finally, the Production Readiness Review for the system determines that the system and developer are ready for production.<sup>75</sup> The purpose of these reviews is to continue to reduce operational risk prior to the official operational test and evaluation (OT&E).<sup>76</sup> Like the TMRR phase, the EMD phase continues to assess the risk of the program's risk of failing to meet its objectives.

A critical component of the EMD phase is the Developmental Test and Evaluation (DT&E) and the initial Operational Testing and Evaluation (OT&E) events called Operational Assessments (OAs). The Program Manager designates a Chief Development Tester and lead DT&E organization to conduct the DT&E process, which is development focused, informing the Program Manager specifically on the design process, the ability of the system to meet its capability requirements, and initial system production and deployment plans.<sup>77</sup>

The DT&Es are internal, using the DOD ranges, labs, and other resources as much as possible. OT&E's are external, and the Director, Operational Test and Evaluation (DOT&E) is responsible for conducting them. The early Operational Assessments, conducted during the EMD phase, focus on independent evaluation of developmental test results or Limited User Tests.<sup>78</sup> Subsequent OT&Es, in the Production and Deployment phase, identify and test critical operational issues, critical technical parameters, KPPs, and KSAs to ensure the project is meeting

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<sup>75</sup> *Defense Acquisition Guidebook*, 3-3.7.

<sup>76</sup> *Ibid.*, 3-3.6.

<sup>77</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 97-98.

<sup>78</sup> *Ibid.*, 28.

the specifications of the ICD and CDD.<sup>79</sup> These initial assessments ensure that the project is capable of meeting its performance goals in a timely manner.

Finally, after the PM has established that the design and functionality of the system meets the requirements, the EMD phase begins preparations for phase four. The Project Manager must ensure that the plans for system production and sustainment during the life cycle of the system meet the requirements that Milestone B established.<sup>80</sup> During the final stages of the EMD phase, the PM confirms the following: the system meets validated capability requirements (demonstrated by the DT&E and OT&E), the developer has the proper manufacturing processes and production capabilities, and the system is ready to enter initial production.<sup>81</sup> Completion of this phase requires a completed Capability Production Document (CPD), the document that specifies the actual specifications for production. To this point in the DAS, the ICD and CDD have outlined desired parameters. However, the EMD process may identify necessary tradeoffs—and the risk associated with those tradeoffs—among cost, schedule, and performance.<sup>82</sup> Once all of these are confirmed, the PM submits the required documentation to the MDA for the Initial Production Decision, also known as Milestone C.

Milestone C, the decision to enter Low Rate Initial Production (LRIP), is both expensive and difficult to reverse, so the decision to do so occurs only after the significant testing and evaluation of the EMD phase. The decision to enter production for an MDAP commits a significant amount of resources to the program, so the stability of the product design and ability of the manufacturer to deliver on product and sustainment are critical. Milestone C may also serve as a Limited Deployment Decision, where the developers provide a limited number of systems to selected end users to conduct testing in addition to the Operational Testing and

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<sup>79</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 107-108.

<sup>80</sup> *Ibid.*, 28.

<sup>81</sup> *Ibid.*

<sup>82</sup> US Joint Staff, CJCSI 3170.011, *JCIDS* 2015, B-26.

Evaluations (OT&E).<sup>83</sup> Furthermore, Milestone C verifies that the project is interoperable with any relevant systems and commits the program to funding throughout the Future Years Defense Program (FYDP).<sup>84</sup> Ultimately, passing Milestone C says that the project meets the requirements and is ready for operational testing.

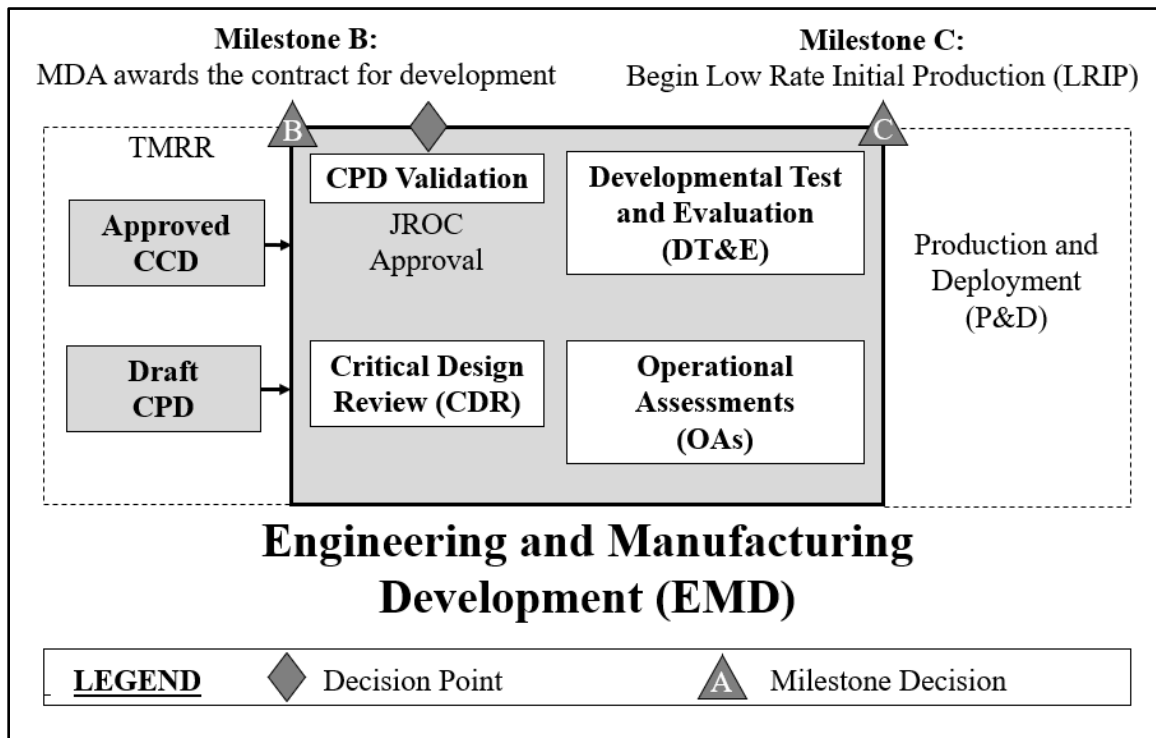


Figure 6: Engineering and Manufacturing Development. Created by author. Data from US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System 2015*, 9.

#### WIN-T EMD

The WIN-T program entered the EMD process long before the technology it depended upon was mature and ready for development, so meeting the necessary requirements proved to be a challenge. By 2005, the lack of mature technologies had significantly hindered the program's ability to meet initial schedule and cost estimates, and WIN-T still was not meeting performance objectives. A 2005 GAO assessment noted that none of the twelve critical technologies would be

<sup>83</sup> *Defense Acquisition Guidebook*, 3-3.1.

<sup>84</sup> Schwartz, 13.

mature when the program began production in March 2006.<sup>85</sup> The Director of Operational Testing and Evaluation noted the same issues in its 2005 report: “DOT&E is concerned that numerous Warfighter Information Network-Tactical (WIN-T) components lack the maturity normally demonstrated at Milestone C.”<sup>86</sup> Furthermore, estimates for total program cost had risen from the initial \$3 billion of the 1999 estimate to \$10.3 billion.<sup>87</sup> The GAO report noted that “WIN-T is not a manufacturing effort, but primarily a technology integration effort.”<sup>88</sup> However, if the necessary technologies do not exist, then the integration was infeasible. Furthermore, because the government deemed WIN-T not a manufacturing effort, it did not obtain the documents necessary to conduct the design reviews that normally occur at the beginning of the EMD phase, and thus could not assess the stability of the design.<sup>89</sup> The program was essentially a mess.

In November 2005, nearly ten years after the initial WIN architecture (later renamed WIN-T) had been approved and five years after entering the EMD phase, the program finally underwent a combined Developmental and Operational Test Event (DOTE). These usually occur early in the EMD phase to identify critical operational issues and verify that the program is meeting its KPPs, but in this case, the difficulties with the program had delayed this testing until right before Milestone C was scheduled to occur. Although the test event demonstrated that the program had the potential to meet its requirements, it still was not functional. Furthermore, the Army decided to reduce the required size and weight of the WIN-T equipment to support the

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<sup>85</sup> *Defense Acquisitions: Assessments of Selected Weapons Programs*, GAO-05-301 (Washington, DC: Government Accountability Office, 2005), 121, accessed August 20, 2017, <http://www.gao.gov/new.items/d05301.pdf>.

<sup>86</sup> *Director, Operational Testing & Evaluation FY2005 Annual Report* (Washington, DC: Government Printing Office, 2005), 93, accessed August 1, 2017, <http://www.dote.osd.mil/pub/reports/FY2005/pdf/other/2005DOTEAnnualReport.pdf>.

<sup>87</sup> *Defense Acquisitions: Assessments of Selected Weapons Programs*. GAO-05-301, 121.

<sup>88</sup> *Ibid.*

<sup>89</sup> *Defense Acquisitions: Assessments of Selected Weapons Programs*. GAO-05-301, 121.

Future Combat Systems, another part of the Army's modernization plan.<sup>90</sup> The Program Manager therefore converted the initial 1999 ORD to a CDD, which the JROC approved in November 2006.<sup>91</sup> Seven years after the JROC had approved the initial ORD, the program was late, costly, and nowhere near ready for Milestone C. The DAS process did not enable the Army to recognize when the proposed solution had become infeasible and needed to shift from the plan of integrating existing technology to developing technology.

## Joint Network Node

Meanwhile, as the Army waited on the WIN-T program to begin making some headway, the United States invaded Afghanistan in 2001, then Iraq in 2003. Army units immediately recognized the need for a working tactical communications network. The 3<sup>rd</sup> Infantry Division submitted an Operational Needs Statement (ONS), and General Dynamics provided the initial Joint Network Node (JNN) systems in 2005 as an interim solution to enhance the 3<sup>rd</sup> Infantry Division's communications capabilities in Iraq in 2005.<sup>92</sup> JNN provided limited network capabilities to units down to the battalion level. However, because of its initial success (at least compared to the legacy systems it replaced), the Army decided to provide JNN to all units possibly deploying in 2007-2009.<sup>93</sup> JNN was successful because the urgency of the need allowed

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<sup>90</sup> Government Accountability Office, *Defense Acquisitions: Assessments of Selected Weapons Programs*, GAO-07-406SP (Washington, DC: Government Accountability Office, 2007), 146, accessed August 20, 2017, <http://www.gao.gov/assets/260/258416.pdf>.

<sup>91</sup> *US Army Weapons Systems Handbook 2007-2008* (Washington, DC: Government Printing Office, 2007), 258, accessed November 14, 2017, <http://usaascinfo.info/docs/wsh/2007-wsh.pdf>; GAO-07-406SP, 146.

<sup>92</sup> William C. Hoppe, "PMO WIN-T: The Future Is Now!" *Army Communicator* 33, no 3 (Summer 2008): 12, accessed August 22, 2017, [www.dtic.mil/dtic/tr/fulltext/u2/a495156.pdf](http://www.dtic.mil/dtic/tr/fulltext/u2/a495156.pdf).

<sup>93</sup> Jen DiMascio, "Army Issues RFP For Joint Network Node" *C4INews*, March 29, 2007, ProQuest, accessed October 30, 2017, [http://search-proquest-com.lumen.cgsccarl.com/cv\\_746996/docview/232538961/6337807BE0AF4F9BPQ/57?accountid=28992](http://search-proquest-com.lumen.cgsccarl.com/cv_746996/docview/232538961/6337807BE0AF4F9BPQ/57?accountid=28992).

it to skirt many of the typical processes for a program of record, including providing the system under a sole-source contract.<sup>94</sup>

The quick development of JNN to meet a specific need for a specific theater—that is, to support the 3<sup>rd</sup> Infantry Division in Iraq—gave it some key advantages over the more cumbersome acquisitions process. First, because it was in response to an Operational Needs Statement (ONS) rather than a program of record, it did not require the traditional Operational Testing and Evaluation, nor did it require the traditional approval and oversight for funding.<sup>95</sup> Furthermore, because it was not a program of record, DOD officials argued that it did not have to comply with DOD 5000.02 processes, so it used sole-source contracts and quickly grew to the budget of an MDAP.<sup>96</sup> Rapidly fielded systems do not automatically include funding for sustainment, as an MDAP would, but the JNN program included limited sustainment through a multi-year contract.<sup>97</sup> From validated ONS to the 3<sup>rd</sup> Infantry Division fielding the equipment took less than one year.<sup>98</sup> Congress was uncomfortable with the amount of money spent on the program without usual testing and oversight, so it included a “JNN Law” in the 2007 NDAA to require the OT&E and Beyond LRIP reports in the future.<sup>99</sup> JNN was a victim of its own success, as Congress would not allow programs this large and costly to skirt the rules in a similar way in the future.

JNN demonstrated that it was possible for the Army to develop and provide working tactical communications systems to the force on a short notice. Most of the technology it used

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<sup>94</sup> Shara Williams et al. *Rapid Acquisition of Army Command and Control Systems* (Santa Monica, CA: RAND, 2014), 29, accessed October 30, 2017, [www.rand.org/content/dam/rand/pubs/research\\_reports/RR200/RR274/RAND\\_RR274.pdf](http://www.rand.org/content/dam/rand/pubs/research_reports/RR200/RR274/RAND_RR274.pdf).

<sup>95</sup> Ibid.

<sup>96</sup> Ibid., 30-31.

<sup>97</sup> Ibid., 32.

<sup>98</sup> Amanda Nappi, “Ground Truth,” *Army AL&T*, October-December 2016, 38, accessed November 14, 2017, <http://usaasc.armyalt.com/?iid=146335>

<sup>99</sup> Ibid., 39.

was commercial, but it quickly integrated that technology into a working system.<sup>100</sup> JNN was not a program of record, so it was not guaranteed funding as a part of the annual budget. The very status that allowed its quick development could have led to it being defunded. However, with WIN-T's ongoing struggles, incorporating JNN into WIN-T temporarily saved both programs.

## 2007 Nunn-McCurdy Breach and Restructure

JNN's overwhelming success, Congress's unwillingness to make JNN its own program of record, and WIN-T's difficulties, all ultimately proved beneficial for the WIN-T program because it gave the program a success upon which to build. In 2007, as a result of the WIN-T program's continued issues with meeting requirements, it breached the Nunn-McCurdy provision. The purpose of Nunn-McCurdy is to hold the DOD accountable for increases in costs for major programs, and it requires the DOD to inform Congress if costs exceed initial baseline estimates by 15 percent. Prior to 2006, the DOD was able to revise those baseline estimates to avoid a Nunn-McCurdy breach, but in the 2006 National Defense Authorization Act, Congress specified that the DOD must use the original baseline estimate when calculating Nunn-McCurdy breaches.<sup>101</sup> The WIN-T program breached that year because its initial estimate was based on the development of the necessary commercial technologies. The intent was to use commercial-off-the-shelf technology, but when those technologies did not exist when the Army needed them, the program's overall costs increased by at least \$1.3 billion.<sup>102</sup> Some estimates were as high as an additional increase by \$2.2 billion to \$16.4 billion.<sup>103</sup> The TMRR phase made some assumptions that technology maturation would happen quickly because the DOD would be able to integrate

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<sup>100</sup> Williams et al., 30-31.

<sup>101</sup> Michael J. Sullivan, *Trends in Nunn-McCurdy Breaches*, 3-4.

<sup>102</sup> *Ibid.*, 11.

<sup>103</sup> Josh Rogin, "DOD: Projected WIN-T cost soars by \$2.2B," *Federal Computer Week*, April 10, 2007, accessed November 14, 2017, <https://fcw.com/articles/2007/04/10/dod-projected-wint-cost-soars-by-22b.aspx>.

existing technologies. However, when the appropriate technologies did not exist, the DOD had to begin developing those technologies itself, which significantly increased the costs.

A Nunn-McCurdy breach requires a program to justify to Congress why program development should continue and alter its production plan. This report must convince Congress that the program is essential to national security, no alternatives exist, and that the program new estimated costs and management structure ultimately leads to a successful program.<sup>104</sup> Ultimately, the Nunn-McCurdy breach had a positive effect on WIN-T's ability to deliver its product because it provided necessary restructure, but it demonstrated that developing and integrating these technologies would take more time than planners originally anticipated.

An incremental system of development is common to major systems, where each increment provides a further development of the program's capability.<sup>105</sup> An incremental development is desirable when the requirement is urgent, but current technology may not allow for full development in a timely manner, or if the DOD expects technology improvements over the course of the life-cycle of the program.<sup>106</sup> An example is airframes, where subsequent models may receive avionics upgrades, but the DOD doesn't replace the entire aircraft, or communications systems, where the pace of technology far exceeds the ability of the DAS to develop a system from MSA to deployment. In these cases, the TMRR phase is ongoing, and the developer releases each increment in limited deployments for testing and evaluation.<sup>107</sup> For example, increment one may be in the O&S phase, while increment two is going through OT&E as a part of the P&D phase, while increment three is still in EMD. This structure is common for major programs, and it allows the DOD to provide working solutions to the force as they become available.

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<sup>104</sup> Hoppe, 12.

<sup>105</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 13.

<sup>106</sup> *Defense Acquisition Guidebook*, 3-3.4.

<sup>107</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 13.

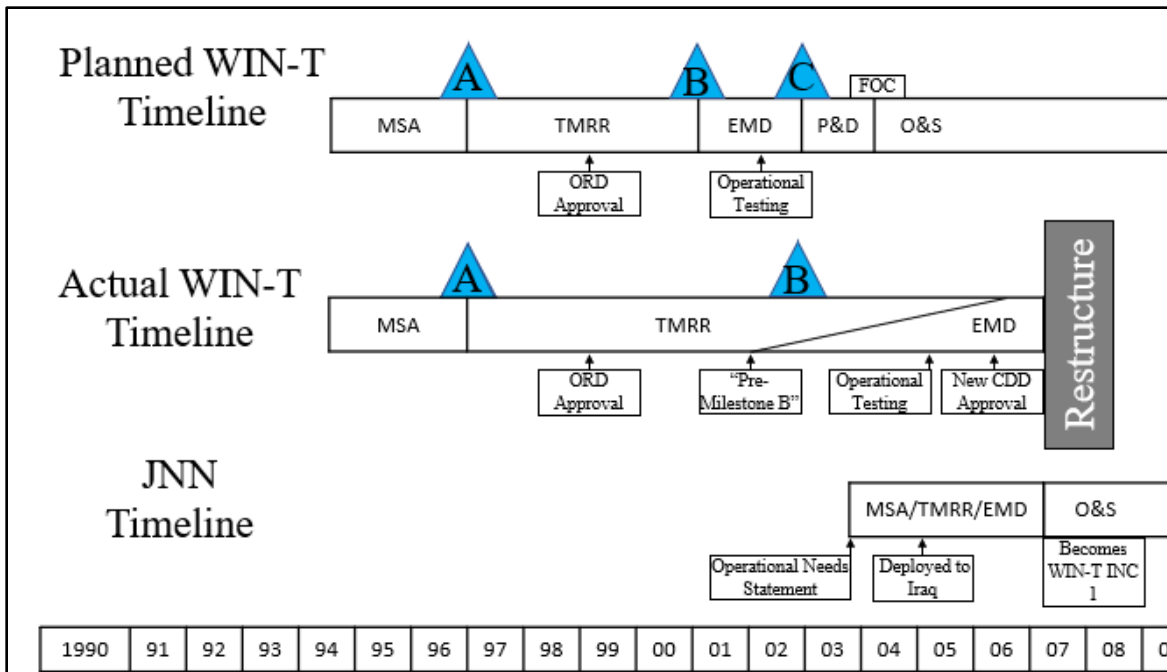


Figure 7. WIN-T/JNN Timeline. Created by author.

For WIN-T, the Nunn-McCurdy breach and subsequent reporting led to a significant restructure into an incremental system in 2007. This restructure allowed the program to integrate the JNN into the WIN-T program as the first in a four-part incremental development program, which would allow it to deliver capabilities to the warfighter as new technologies emerged.<sup>108</sup> Not only was this strategy more effective for the Army as its units continued to fight in Afghanistan and Iraq, but it was more in line with the initial strategy outlined in the Army Digitization Modernization Plan: incrementally integrating new technology as it became available. Making JNN part of the WIN-T program allowed WIN-T to finally get off the ground, using a program that had already moved past the EMD phase. Implementing this success into the WIN-T program gave it a head start in providing this technology to the rest of the force.<sup>109</sup> By 2009, five years after the initial ONS, most of the Army had JNN as a part of the restructured WIN-T program.<sup>110</sup>

<sup>108</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 13.

<sup>109</sup> Williams et al., 29.

<sup>110</sup> Nappi, 38.

WIN-T Increment 1 had managed to achieve success because of the urgent need filled by JNN and restructured into the program. However, WIN-T still needed to mature the technology and engineer the equipment for Increments 2 through 4.

### Post-2007 Restructure

Each increment had its own separate timeline and milestones. Once JNN became WIN-T Increment 1, the Program Manager for WIN-T began to sequentially develop the remaining three increments and their associated capabilities. Because Increment 1 had progressed rapidly and was already in the Operations and Support phase, the three remaining increments continued their TMRR and EMD activities. Increment 1 “Networking at the Halt” was the existing JNN system, which had no networking on the move capability, but required a unit to stop and set up its equipment to connect to the network.<sup>111</sup> Increments 2 and 3 provided increasing levels of “on the move” capabilities, where a unit could connect to the tactical network via satellite or terrestrial communications while moving in vehicles.<sup>112</sup> The planned Increment 4 would finally provide the protected satellite communications outlined in the initial *Army Enterprise Strategy* from 1995, but funding restraints caused its cancellation in 2014 while it was still in development.<sup>113</sup>

WIN-T Increment 2 faced similar issues to the original WIN-T program: it attempted to integrate technologies prior to those technologies reaching maturity. However, with the jump start it received from integrating the JNN program, INC 2 met some of its hurdles in a timely manner. While in the EMD phase, INC 2 completed its CDR in March 2008 and a DT&E in November 2008.<sup>114</sup> However, in a March 2009 limited user test, WIN-T Increment 2 failed to support on-

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<sup>111</sup> Hoppe, 12.

<sup>112</sup> Ibid., 13.

<sup>113</sup> *Director, Operational Test & Evaluation FY2009 Annual Report* (Washington, DC: Government Printing Office, 2009), 95, accessed August 1, 2017, <http://www.dote.osd.mil/pub/reports/FY2009/pdf/other/2009DOTEAnnualReport.pdf>.

<sup>114</sup> *Defense Acquisitions: Assessments of Selected Weapons Programs*, GAO-09-326SP (Washington, DC: Government Accountability Office, 2009), 148, accessed August 20, 2017, <http://www.gao.gov/assets/290/287947.pdf>.

the-move capability, especially in wooded terrain.<sup>115</sup> Assessments also noted that the system did not provide the necessary network speeds and that the complexity of the system made it difficult for Soldiers to operate.<sup>116</sup> Despite these issues, after a series of risk reduction activities, it reached Milestone C, the decision to enter into Low Rate Initial Production, in February 2010.<sup>117</sup>

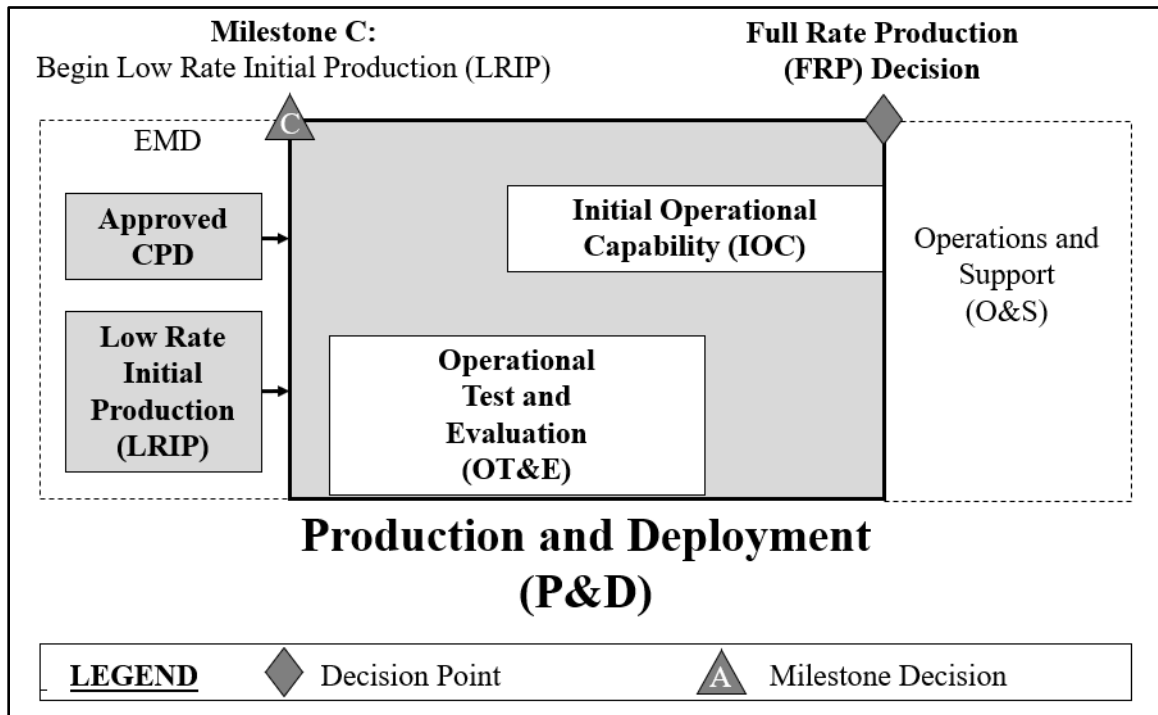


Figure 8. Production and Deployment. Created by author. Data from US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 9.

#### Phase Four: Production and Deployment

Once the EMD phase has fully developed the solution to the point of Low Rate Initial Production, the program goes to the fourth phase: Production and Deployment (P&D). The

115. *Defense Acquisitions: Assessments of Selected Weapons Programs*, GAO-11-233SP (Washington, DC: Government Accountability Office, 2011), 128, accessed August 20, 2017, [www.gao.gov/products/GAO-11-233SP](http://www.gao.gov/products/GAO-11-233SP).

116. *Ibid.*, 128.

117. US Army Project Manager Warfighter Information Network – Tactical (PM WIN-T), *December 2010 Selected Acquisition Report (SAR), Warfighter Information Network-Tactical Increment 2 (WIN-T INC 2)*, (Washington, DC: Executive Services Directorate, 2011), 5, accessed August 9, 2017, [http://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/Selected\\_Acquisition\\_Reports/WIN-T\\_INCREMENT\\_2-SAR-25\\_DEC\\_2010.pdf](http://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/Selected_Acquisition_Reports/WIN-T_INCREMENT_2-SAR-25_DEC_2010.pdf).

purpose of this phase is to produce the required amount of equipment, ensure that it meets requirements in a threat environment, and get it delivered to the force. The P&D phase begins with the producer at LRIP, and for major programs, the Director, Operational Test and Evaluation (DOT&E) conducts the Operational Testing and Evaluation (OT&E). This OT&E, unlike the OA in the EMD phase, tests the equipment in as realistic a threat environment as possible. The DOT&E evaluates the equipment in its ability to accomplish its mission in a realistic scenario, using criteria of operationally effective, suitable, and survivable. Then the MDA proceeds to a Full-Rate Production Decision or Full Deployment Decision. This decision scales up production from Initial Operational Capability (IOC) towards Full Operational Capability (FOC) and completes the fourth phase, P&D.<sup>118</sup>

#### WIN-T INC 2 P&D

WIN-T Increment 2 began Low Rate Initial Production in January 2011.<sup>119</sup> The program began testing the prototype in March 2011, but it had issues with both performance and reliability in its May 2012 Operational Test and Evaluation. Despite continued reliability issues, the Army continued to field Increment 2, pushing it out to end users, though it continued to delay the decision for Full-Rate Production until an operation test verified that the program had corrected all deficiencies.

The program continued to have reliability issues into 2013 with an updated Capabilities Production Document (CPD) that lowered expectations. The updated CPD, which the JROC approved in August 2013, reduced the KPPs from five to four, and in May of that same year, the Army reduced metrics on the KSAs for reliability and availability.<sup>120</sup> The reduced requirements,

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<sup>118</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 30.

<sup>119</sup> US Army PM WIN-T, *December 2010 SAR, WIN-T INC 2*, 5.

<sup>120</sup> *Department of Defense Systems Engineering FY 2013 Annual Report* (Washington, DC: Department of Defense, March 2014), 57, accessed November 1, 2017, <https://www.acq.osd.mil/se/docs/SE-FY13-AnnualReport-25March2014-Final.pdf>.

along with the cancellation of Increment 3, reflected more realistic goals for the program. Initially, the Army had planned for WIN-T Increment 3 to include a series of airborne communications relays, but in 2014, it restructured elements of Increment 3 into Increment 2, including only some of the network management and waveform technologies, opting to focus on getting Increment 2 off the ground.<sup>121</sup> After yet another Nunn-McCurdy breach in January 2015, the program entered Full Rate Production in June 2015, even though some of its technologies, specifically the advanced waveforms, remained deficient.<sup>122</sup>

The later phases of the WIN-T program are a continued struggle to integrate technologies in a way that provide a working solution to the warfighter. After the initial JNN success, the program struggled to provide technical solutions that worked. The program continued to attempt to fix the technical issues while lowering expectations for reliability, but in the end, military professionals expect their equipment to perform. A weapons system that cannot perform its primary function does not meet the requirements of the joint force.

## Phase Five: Operations and Support

The final phase of the DAS is Operations and Support, which consist of Life Cycle Sustainment and Disposal. The plan for life-cycle sustainment begins in the Materiel Solution Analysis (MSA) phase and continues through the other phases, documented in the Life-Cycle Sustainment Plan.<sup>123</sup> Once the MDA approves the plan, the program enters this final phase. The sustainment plan may include transitions from commercial to DOD support systems; for instance, scheduled maintenance may initially be provided by the developer, but transition to DOD

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<sup>121</sup> Amy Walker, "Army Restructures WIN-T Increment 3 Program to Focus on Network Operations," *PEO-C3T*, June 19, 2014, accessed August 24, 2017, [https://www.army.mil/article/128465/Army\\_restructures\\_WIN\\_T\\_Increment\\_3\\_program\\_to\\_focus\\_on\\_network\\_operations](https://www.army.mil/article/128465/Army_restructures_WIN_T_Increment_3_program_to_focus_on_network_operations).

<sup>122</sup> *Defense Acquisitions: Assessments of Selected Weapons Programs*, GAO-16-329SP (Washington, DC: Government Accountability Office, 2016), 80, accessed August 20, 2017, [www.gao.gov/assets/680/676281.pdf](http://www.gao.gov/assets/680/676281.pdf).

<sup>123</sup> *Defense Acquisition Guidebook*, 3-2.6.

personnel as those personnel receive the training and equipment to perform the maintenance. The PM also monitors the sustainment performance.<sup>124</sup> Finally, once the system has outlived its useful life, it ultimately enters disposal. For some systems, 70% of the total costs of a system are in the operations and support phase.<sup>125</sup>

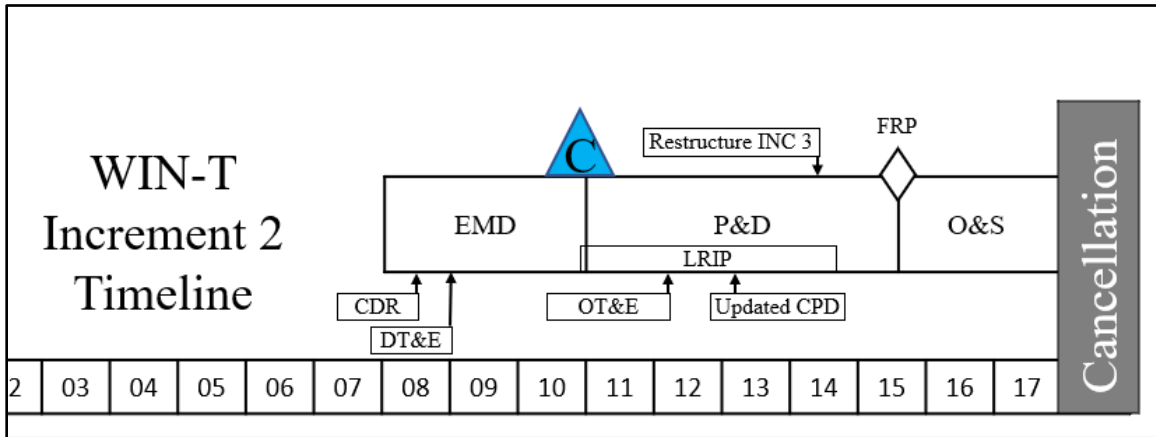


Figure 9. WIN-T Increment 2 Timeline. Created by author.

## WIN-T INC 2 O&S

Although the WIN-T program went to full-rate production in 2015, it never truly entered the O&S phase, for it continued to struggle to provide reliable on-the-move communications in the types of terrain that the Army would likely find itself. Through 2017, the program continued to make some progress in meeting reliability goals, although partially because of reducing reliability objectives from 90% to 80%.<sup>126</sup> However, ultimately, this limited progress was not enough to keep it from cancellation in late 2017.

## Conclusion

The performance issues that caused WIN-T's cancellation were threefold: it was not mobile enough, it was not reliable enough, and it was vulnerable to the electronic warfare or

<sup>124</sup> US Joint Staff, DODI 5000.02, *Operation of the Defense Acquisition System* 2015, 31.

<sup>125</sup> Schwartz, 13.

<sup>126</sup> *Defense Acquisitions: Assessments of Selected Weapons Programs*, GAO-17-333SP (Washington, DC: Government Accountability Office, 2017), 84, accessed August 20, 2017, <https://www.gao.gov/assets/690/683838.pdf>.

jamming it would likely face in a near-peer scenario. The acquisitions process was unable to deliver working technology in a timely manner: the program did not keep pace with civilian technology, or to integrate technology as it became available. The inability to persist through electronic warfare is a direct result of the fact that the guidance from the *Army Enterprise Strategy* did not filter its way into the documents which determined the actual production of the program. The DOD used a previous MNS for the Horizontal Integration of Battle Command, instead of developing an MNS specifically to meet the requirements of the *Enterprise Strategy*. When it did so, the priority of assured access was left on the cutting room floor. Furthermore, the 2001 change from threat-based requirements to capabilities-based may have narrowed the focus to current conflicts in Afghanistan and Iraq, while ignoring possible future threats, which include electronic warfare capabilities.

The issues of mobility and reliability are a simple inability to meet requirements in a timely manner. Civilian technology has far outpaced the DOD in terms of mobility and reliability, yet the DOD has been unable to effectively incorporate the improvements in civilian technology. It has been unable to match that pace in its own technology development because of the inefficiency of the system by which it does so. The most successful part of the program was Increment 1, which met the requirements for the urgent need in less than two years and reached FOC less than five years after the original ONS. By comparison, WIN-T Increment 2 struggled to reach an 80% reliability rate ten years later through the usual acquisitions process. The only truly successful WIN-T increment used an acquisitions process that did not require traditional oversight.

Acquisitions reform has been ongoing since Robert McNamara in the early 1960s. Both politicians and military professionals agree that the acquisitions system is not working. If the history of acquisitions were not six decades of attempting to reform a bloated, inefficient process, then one might believe that the 2017 reforms would solve these problems. But this reform has

resulted in programs like the WIN-T program, which is not alone in its inability to deliver its desired solutions in a timely manner at or under budget.

The United States maintains its military superiority not by having the largest number of personnel, but by continuing the strategy from George H.W. Bush's National Security Strategy: technological superiority. However, this technological edge is at risk because the ability to incorporate advances in technology is hindered by an outdated process. The WIN-T acquisitions demonstrates the effect of an inefficient process on weapons systems that depend heavily on the latest technology. Without significant acquisitions reform, any further attempts to develop and maintain technological superiority will likely face the same fate as the WIN-T program. If the United States is to maintain military superiority in the twenty-first century, it cannot do so while handicapped by an inefficient acquisitions process.

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