THE ROLE OF A DATA MANAGER IN THE SUCCESSFUL EMPLOYMENT OF THE DISTRIBUTED COMMON GROUND SYSTEM-ARMY (DCGS-A)

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This thesis examines the role of a data manager when employing the Distributed Common Ground System – Army (DCGS-A). The study examines if an effective data manager, when integrated into the intelligence activity's planning and execution cycle from the beginning, can improve the organization's ability to meet its intelligence requirements. The research methodology was qualitative and used case studies. The study analyzed three case studies in order to identify key opportunities and challenges organization's faced when attempting to employ DCGS-A. Further, the thesis examined the data manager's role in addressing those challenges or exploiting opportunities. The research finds that units who identify a data management function early and empower that position to make decisions or recommendations on not only the technical requirements associated with a digital intelligence system, but also the content of intelligence information or organizational processes are more efficient at effectively employing DCGS-A. The study concludes that in order to effectively employ DCGS-A, a unit must designate DCGS-A specific data management functions that reach beyond technical specifications and include an understanding of mission objectives and the associated intelligence requirements. The primary recommendations are that the data manager must be a permanent member of the organization, participate at every phase of the planning and execution process, and have a clear understanding of the technical capability of DCGS-A as well as the unit's intelligence requirements and how best to satisfy them.

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

THE ROLE OF A DATA MANAGER IN THE SUCCESSFUL EMPLOYMENT OF THE DISTRIBUTED COMMON GROUND SYSTEM-ARMY (DCGS-A)
by MAJ Brandon Van Orden, 69 pages.

This thesis examines the role of a data manager when employing the Distributed Common Ground System-Army (DCGS-A). The study examines if an effective data manager, when integrated into the intelligence activity's planning and execution cycle from the beginning, can improve the organization's ability to meet its intelligence requirements. The research methodology was qualitative and used as its sample set case studies. The study analyzed three case studies in order to identify key opportunities and challenges organization's faced when attempting to employ DCGS-A. Further, the thesis examined the data manager's role in addressing those challenges or exploiting opportunities. The research finds that units who identify a data management function early and empower that position to make decisions or recommendations on not only the technical requirements associated with a digital intelligence system, but also the content of intelligence information or organizational processes are more efficient at effectively employing DCGS-A. The study concludes that in order to effectively employ DCGS-A, a unit must designate DCGS-A specific data management functions that reach beyond technical specifications and include an understanding of mission objectives and the associated intelligence requirements. The primary recommendations are that the data manager must be a permanent member of the organization, participate at every phase of the planning and execution process, and have a clear understanding of the technical capability of DCGS-A as well as the unit's intelligence requirements and how best to satisfy them.

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ACRONYMS

DCGS-A	Distributed Common Ground System-Army
JOAX	Joint Operations Access Exercise

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CHAPTER 1

INTRODUCTION

The Distributed Common Ground System-Army (DCGS-A) enterprise is the Army Program of Record (POR) and first choice for intelligence data ingestion, correlation, processing, analysis and dissemination. DCGS-A capability supports three primary roles (1) information collection management for the Army including intelligence regarding all aspects of enemy, terrain, weather and civil considerations, (2) a "tool set" for intelligence analysts to collaborate and synchronize information, and (3) the control of select sensors with the ability to process and exploit collected data.[1] The DCGS-A enterprise is intended to act as an umbrella, ensuring multiple systems across several networks are integrated, effective and operational at every level of command from battalion through the Joint Task Force or theater command. Inherent in the successful accomplishment of roles listed above is the need to effectively identify, consolidate, manage and when necessary develop data feeds from tactical, theater and national Intelligence Surveillance and Reconnaissance assets. This need, or data management function, driven by the commander's intelligence requirements, is critical to intelligence support at any level. In the modern, complex operational environment the intelligence principles of synchronization and agility remain paramount when considering the construction of any digital intelligence architecture and supported systems. The architecture must be linked to higher, subordinate and adjacent organizations, the systems

[1]Department of the Army, *Distributed Common Ground System-Army (DCGS-A) Capability Production Document (CPD): Operational Mode Summary/Mission Profile (OMS/MP))* (Washington, DC: Government Printing Office. September 2013), 2.

must be interoperable, and the data must be assessable and consistent in structure to be successfully utilized.

As the Army moves forward with its Regionally Aligned Forces concept, coupled with an environment of increasingly constrained resources, the successful, efficient utilization of digital systems becomes even more important than in the past. As Army units begin conducting activities in their designated theaters, supported by theater intelligence brigades, and supporting geographic combatant commanders with their own unique requirements, a standard Army wide approach to architectural design may not be appropriate. The differences in how Army organizations support each theater may preclude standard force wide solutions on data, sensor and architecture types. In her August 2013 Army Green Book article, Lieutenant General Mary Legere, Department of the Army's senior intelligence officer, highlights DCGS-A's role in supporting RAF while acknowledging key tasks intelligence professionals will face when integrating support, "As these [DCGS-A] initiatives come on line, Regionally Aligned Forces, Army Special Operations Groups and Army Theater Intelligence units around the world will enjoy improved interoperability, simplifying their transition into unique regional architectures, and setting conditions for streamlined integration."[2] How will units accomplish improved interoperability and streamline integration? Who will identify the "unique regional architecture" issues? This research is intended determine if organizations with a dedicated data management function identified, staffed, and fully

[2]Mary Legere, "Army Intelligence in Support of a Regionally Aligned Army: No Cold Starts and No MI Soldier at Rest," *Army Green Book* (Washington, DC: Government Printing Office, August 2013), xx.

integrated with the intelligence staff are more successful in intelligence support activities than those without.

Statement of the Problem

The Army's continued commitment to DCGS-A and it's increased emphasis on using the system, particularly to support Regionally Aligned Forces, Army Theater intelligence activities and Special Operations Forces requires additional research in order to identify unique requirements that may require dedicated, specialized training or capabilities to address. The expansive nature of the DCGS-A enterprise and the complicated technical and organizational nuances of theater digital intelligence architecture, coupled with rapidly evolving technologies that can force dramatic changes to daily operations, make this study all the more relevant. The purpose of this research was to explore how the theater level digital intelligence architecture is critical to the successful implementation of DCGS-A, and that a dedicated data management function must exist in the supporting organization in order to effectively use the system.

Primary Research Question

Given the complexity of the data environment in operational intelligence support, must the supporting intelligence activity maintain a dedicated data management function in order to effectively employ DCGS-A? Secondary questions that, when collectively answered and considered will help answer the primary question are:

1. How does an intelligence organization determine the type and number of data sources to ingest into DCGS-A?

2. What is the US Army's doctrine on establishment of digital architecture when employing DCGS-A?

3. How does the process of selecting and managing data sources for ingestions into DCGS-A correspond to the Army's intelligence cycle?

4. How is a DCGS-A data and architecture manager different than a unit knowledge manager?

5. Are there unique requirements associated with constructing and ingesting data feeds into DCGS-A versus other intelligence systems?

Definitions

Data Management: Data Resource Management is the development and execution of architectures, policies, practices and procedures that properly manage the full data lifecycle needs of an enterprise.[3]

Information Management: is the science of using procedures and information systems to collect, process, store, display, disseminate, and protect data, information, and knowledge products.[4]

Joint Task Force (JTF): a joint force that is constituted and so designated by Secretary of Defense, a combatant commander, a subordinate unified commander, or an existing JTF commander. A JTF may be established on a geographical area or functional

[3]Data Management Association, *DAMA Dictionary of Data Management*, http://www.dama.org/i4a/pages/index.cfm?pageid=3711 (accessed 13 November 2013).

[4]Department of the Army, Army Doctrinal Publication (ADP) 6-0, *Mission Command* (Washington, DC: Government Printing Office, May 2012).

basis when the mission has a specific limited objective and does not require overall centralized control of logistics.[5]

Knowledge Management: Knowledge management (KM) is the process of enabling knowledge flow to enhance shared understanding, learning, and decision-making.[6]

Regionally Aligned Force (RAF): Army units; Brigades, Divisions, Corps, and support forces, which focus on a specific region within their normal training program.[7]

Scope and Limitations

This research focused its scope primarily on the general functions associated with the identification, development and sustainment of data sources used in the DCGS-A framework. The purpose of this research is not to prove or disprove *if* DCGS-A should be the Army's first choice for intelligence processing, but rather *how* to best support the successful employment of DCGS-A with regard to data management. Further, this research focused on the operational level of command through the review of joint task force case studies. While the results of this research can likely be applied to multiple echelons, the ability to review case studies or other evidence regarding DCGS-A

[5]Department of Defense, Joint Publication (JP) 1, *Doctrine for the Armed Forces of the United States* (Washington, DC: Government Printing Office, March 2013), xix.

[6]Department of the Army, Field Manual (FM) 6-01.1, *Knowledge Management Operations* (Washington, DC: Government Printing Office, July 2012), 1-1.

[7]Department of the Army, "Regionally Aligned Forces: A New Model for Building Partnerships," Army Live, http://armylive.dodlive.mil/index.php/2012/03/aligned-forces/ (accessed 13 November 2013).

employment beyond the JTF is impractical. Additionally, three primary limitations were identified when considering this research.

The first limitation was the inability to discuss classified information. Using classified information to answer the primary proposed research question may provide clarity to the answer, however, will not significantly impact the substance of the research or its ultimate findings. Additionally, the benefit of having unclassified research on the subject outweighs any loss to clarity.

Another limitation was the uncertainty associated with predicting a future adversary. As new threats are identified, commanders at every level will develop unique or as of yet unseen requirements to help address knowledge gaps. While this research will discuss several examples of developing requirements, it will not address every conceivable situation that may occur.

The final limitation, similar to the second, was the ever advancing technologies inherent in any data related subject. As this research is conducted, advances may change the functionality or individual aspects of digital intelligence architecture. These changes should not change the significance of the primary question, however, they may change individual parameters or sub functions discussed.

CHAPTER 2

LITERATURE REVIEW

Academic writing and research on DCGS-A specifically is limited. However, professional writing on the intelligence cycle, the development, validation and satisfying of intelligence requirements is broad and was used to draw conclusions in this research. The limited professional articles on DCGS-A typically focus on whether the intelligence community in general, and the Army specifically, should use DCGS-A as its first-choice for intelligence collection, correlating, analyzing and production. As discussed earlier in scope and limitations, this study did not address this issue. Primary source material formed the bulk of DCGS-A specific literature. When considering the problem of data management and the successful employment of DCGS-A, parallels can be drawn from three broad categories; intelligence principles, the military's doctrine on knowledge management operations, the concepts of mission command, and commercial sector data management policies and procedures.

In addition to DCGS-A and data management specific literature, the researcher also relied on Robert K. Yin's *Case Study Research, Design and Methods*, as a foundation to select and build the research methodology. Mr. Yin describes in detail when and how to use a case study methodology, as well as the importance of disclosing the strength and weaknesses associated with a particular case study. Mr. Yin's expertise in case study methodology was used throughout this research.[8]

[8]Robert Yin, *Case Study Research; Design and Methods*, 4th ed. (Thousand Oaks, CA: Sage Publications, 2009).

Intelligence Principles

First, to understand the challenges units face when employing DCGS-A and its associated data management function, this research must examine some of the basic principles of intelligence as defined by joint and Army doctrine. Joint Publication 2-01 *Joint and National Intelligence Support to Military Operations* and Army Doctrinal Publication (ADP) 2 *Intelligence* provides this foundation with their definitions of the intelligence enterprise and introduction to the concept of Processing Exploitation Dissemination (PED).[9] As directed by the lead for the national Intelligence Community (IC), the Director of National Security (DNI), one of the first steps to intelligence support is establishing intelligence architecture to, in part, leverage the intelligence enterprise.[10] In doing so, the concept of PED, and how the supported and supporting commands will use it, becomes increasingly important. Supporting this endeavor is inherent in the problem statement of this research. Specifically, as the DoD defines a critical aspect of PED support as the IC's "information networks and near-global computer access."[11] This reach has enabled supported component commands and subordinate organizations to access national and interagency databases through "reach back and distributed

[9]Department of Defense, Joint Publication (JP) 2-01, *Joint and National Intelligence Support to Military Operations* (Washington, DC: Government Printing Office, January 2012), III-10.

[10]Department of the Army, Army Doctrinal Publication (ADP) 2, *Intelligence* (Washington, DC: Government Printing Office, August 2012), 5.

[11]Department of Defense, JP 2-01, III-10.

architectures."[12] Both statements underscore the need to effectively manage the Army's digital intelligence architecture in general and DCGS-A framework specifically.

Recognizing this need, the Army's Intelligence Center of Excellence at Fort Huachuca, Arizona published Military Intelligence Publication (MI Pub 2-01.2) *Establishing the Intelligence Architecture* in February 2014. This publication had a tremendous impact on the research described here. MI Pub 2-01.2 is a simple, concise document describing the Army intelligence staff's role in establishing, maintaining, and leveraging the intelligence architecture at every level from corps to company. It proved invaluable to bind the case studies used in this research. MI Pub 2-01.2 is broken in to four major parts; plan the intelligence architecture, prepare the intelligence architecture, deploy the intelligence architecture, and redeploy the intelligence architecture. Generally, the document defines tasks that must happen when building an intelligence enterprise and what architecture considerations the senior intelligence officer and staff must take into account when preparing to deploy or deploying to an immature theater. Specifically, the publication describes the subordinate topic areas under the four major parts discussed earlier. When planning for the intelligence architecture, one must validate intelligence system interoperability. This critical factor must be considered and became a near constant consideration with all the organizations analyzed for this research. As introduced in chapter three and detailed in chapter four, this research examined an army brigade, division, and corps; all of which used DCGS-A in real world or simulated operations. All

[12]Ibid.

three organizations were continually faced with interoperability issues that had to be addressed before moving forward with their DCGS-A employment.[13]

Equally important is the need to establish relationships, coordination and liaison activities with both the supported and supporting intelligence organizations in a deployed theater. MI Pub 2-01.2 discusses in some detail this topic under the header "Prepare the Intelligence Architecture,"[14] and was helpful to this research as it, in part, validated the need for a function in the intelligence staff to be responsible for establishing these relationships. What it did not do, however, was provide refined guidance on who that person, or persons should be and what specific functions or responsibilities they would have beyond the general "the intelligence staff will."[15] This research used the ambiguity in MI Pub 2-01.2 as a starting point in its study. The "who" and "what" of DCGS-A data management became a central aim of the research.

Another topic discussed in MI Pub 2-01.2 were the critical need to establish access, meaning to connect a deployed intelligence activity's computers, servers and other systems into the larger theater and national intelligence databases. While the establish access considerations in MI Publ 2-01.2, chapter 2, were helpful, they again did not provide the "who" or "how," rather, they recommended just a general list of things that must happen in order to be successful. Some of the considerations included the need to identify relevant databases, who needs access (both individuals and computer

[13]Department of the Army, Military Intelligence Publication (MI Pub) 2-01.2, *Establishing the Intelligence Architecture* (Washington, DC: Government Printing Office, February 2014), 1-1 - 1-8.

[14]Ibid., 2-1.

[15]Ibid., 2-1 - 2-2.

systems), the need to include signal corps staff in planning in order to ensure network access beyond the MI specific domain, and the need to identify the "push-pull" requirements associated with the operation; in other words, who and how information was coming to, or going out of, an organization. The need to coordinate with the signal staff was particularly important to this research as it indicated the mission command communication systems implications with establishing an intelligence architecture and employing DCGS-A successfully. These implications are addressed further in the mission command section of this chapter.[16]

Knowledge Management

The next body of work that will support this study is the Joint military community and the Army's Knowledge Management (KM) doctrine and policy. The Army Field Manual (FM) 6-01.1 *Knowledge Management Operations* introduces and discusses the "nature and role of knowledge management," in military organizations in general.[17] In this publication, the Army identifies data management as a key part of a larger knowledge management plan. This direction gives focus to the research as it no longer begs the question as to whether an organization should conduct data management; rather, it discusses whether an organization should dedicate that function specifically to the employment of DCGS-A.

[16]Ibid., 2-5, 2-6.

[17]Department of the Army, Field Manual (FM) 6-01.1, *Knowledge Management Operations* (Washington, DC: Government Printing Office, February 2008), 1-1.

Mission Command

Linking the principles of mission command, knowledge management, information management and ultimately data management is key to answering this study's primary research question. Beyond FM 6-01.1, a review of Army Doctrine Publication 6-0 *Mission Command* offers some general overarching guidance on expectations and boundaries of how subordinates operate in a given environment. This study will touch ADP 6-0's guidance when considering what and how data is chosen, structured and management.

In addition to ADP 6-0, MI Pub 2-01.2 helped tie the successful employment of DCGS-A, and the associated need to establish an effective intelligence architecture to both the concept of mission command and, more practically, the need to integrate DCGS-A into other mission command communication systems. In his introduction to MI Pub 2-01.2, Major General Robert Ashley, the Commanding General of the Army's Intelligence Center of Excellence, discusses how, "units must continuously train and rehearse on establishing the intelligence architecture and integrating intelligence into the mission command network at all echelons."[18] Major General Ashley speaks to intelligence architecture in broad terms, but as previously discussed, a cornerstone to the Army's intelligence enterprise is DCGS-A.

Commercial Initiatives

The last and largest body of literature to inform this study is commercial initiatives in managing large amounts of complicated data. This body can be further

[18]Department of the Army, MI Pub, 2-01.2, foreword.

divided into two sub-categories, commercial data management, and organizational models tailored to address digital issues.

While dated, Joel Ross's Total Quality Management (TQM) Text, Cases, and Readings discussed the basic principles that help organizations lead and manage.[19] Additionally, he offers case studies that provide examples of how commercial organizations faced data challenges and transformed issues into success. Although the face of technology has changed dramatically, the difficulties encountered are not fundamentally different, and relevant lessons can be learned from these cases. The principles of TQM evolved into what is now known as "Lean Six Sigma," or a systems analysis driven concept aimed at streamlining organizational processes in order to gain efficiencies.[20] The Army's adaptation of many of Lean Six Sigma concepts, while not completely transferrable, offer insights on how an organization, again faced with large amounts of information, can organize, structure their individual duties, and develop systems to effectively manage data across an enterprise.

Of particular help is Peter Pande, Robert P. Neuman, and Roland R. Cavanagh's "The Six Sigma Way," *How GE Motorola, and Other Top Companies are Honing Their Performance* as it provides specific examples of technically-oriented companies and how they mastered technically dense subject matter. Additionally, the authors layout a clear framework, or "Roadmap" of how to identify core processes, define customer

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[19]Joel Ross, *Total Quality Management Text, Cases, and Readings* (Delray Beach, FL: St. Lucie Press, 1993), 65, 253.

[20] Peter S. Pande, Robert P. Neuman, and Roland R. Cavanagh, *"The Six Sigma Way," How GE, Motorola, and other Top Companies are Honing Their Performance* (New York, NY: McGraw-Hill, 2000), 19.

requirements, measure performance, improvements and redesigns, and how to expand and integrate systems approaches.[21] Similarities can be drawn between this roadmap and the Army's intelligence cycle, as well as key lessons on how the Army can apply commercial success to military problems.

Another publication used to lay the foundation of this study was Keith Gordon's "Principles of Data Management" *Facilitating Information Sharing*." In it Mr. Gordon truly lays out the basic principles of what he sees as effective data management, provides a clear and concise definition to traditionally complicated terms or ideas, and offers concepts that will be key to the successful completion of this research.[22] Mr. Gordon also identifies a point that will be carried further in this research, that "data and the enterprise," or data management, are not technical problems, but business issues.[23] Further, Mr. Gordon contends, basically, that the data allows information to be shared, and synthesized; information is thus data that is understood and knowledge is information that is judged.[24] This is not a new concept; rather, it is the essential element of the cognitive hierarchy theory,[25] when as he applies it to data management specifically, it now offers an additional frame by which to identify roles and responsibilities in a DCGS-A employment strategy.

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[21]Ibid., 155.

[22]Keith Gordon, *Principles of Data Management: Facilitating Information Sharing* (Swindon, UK: The British Computer Society Publishing, 2007), xix, 1-10.

[23]Ibid., 2.

[24]Ibid., 7.

[25]Department of the Army, ADRP 6-0, *Mission Command* (Washington, DC: Government Printing Office, May 2012), 2-7.

Lastly, a review of the International Data Management Association (DAMA) Functional Framework literature by Mark Mosely provides reinforcing information to Mr. Gordon's work cited earlier. DAMA, through Mr. Mosely, attempts to "build consensus for a generally applicable view of data management functions."[26] To accomplish this, DAMA works to standardized terms, definitions, functions, processes, roles and responsibilities, and deliverables or metrics. Using this professional association's functional framework as a guide for standards and principles will add clarity to the study.

[26]Mark Mosely. Data Management Association (DAMA), DMBOOK Functional Framework. DAMA, http://dama.org/i4a/pages/index.cfm?pageid=3733 (accessed 20 October 2013).

CHAPTER 3

RESEARCH METHODOLOGY

This chapter discusses the methodology used to research, analyze and discuss the primary and secondary questions listed previously. The goal of the research was to determine the need and extent of responsibilities of a data management function inside organizations using DCGS-A as part of their intelligence support activity. This research explored the challenges and opportunities different organizations faced as they attempted to establish the DCGS-A enterprise and associated data requirements.

Using Robert Yin's seminal work *Case Study Research; Design and Methods*, the researcher used a mixed-method retrospective multiple case study analysis. As Mr. Yin discussed in his book, using the case study method offered, "a logical plan from getting from here to there."[27] The researcher attempted to lay out a series of case studies associated with the employment of DCGS-A, and illustrate the merits or costs of maintaining a data management function.

The research methodology was a mixed method as it used both qualitative and quantitative analysis to identify strengths, weaknesses, vulnerabilities, and opportunities with unit's using DCGS-A. Quantitative data such as number and type of data sources used, rate of enterprise establishment and relevant data usage were used to offer an empirical foundation to assess the unit's DCGS-A performance. Understanding the limits of such data, the researched used qualitative factors to compliment the study, including factors such as the comfort commanders had with the information received from their

[27]Yin, 25.

intelligence staffs and the assessment of the senior intelligence officer on how his staff performed or handled the intelligence information coming into the organization.

The study was both retrospective and broad as it reviewed three organizations' past experiences in both real world and simulated operational environments. The researched focused on an Army brigade, division and corps. The brigade was examined through its experience at the National Training Center at Fort Irwin, California as it prepared to deploy to support of military stability operations abroad. The division was studied during its final staff training validation exercise prior to deployment through the first 90 days of serving as a Combined Joint Task Force. Finally, the Army Corps was examined during a major training event as it practiced its ability to perform as a Joint Task Force performing a global response role to address an as of yet unforeseen overseas contingency. The intent of studying the three organizations was to identify and characterize patterns or trends across multiple elements using DCGS-A, regardless of echelon or type of mission support provided.

The examination of these case studies were bounded by a system, or set of parameters, derived from MI Pub 2-01.2, *Establishing the Intelligence Architecture*. Again using Robert Yin's model for designing a case study methodology and the Army's Intelligence Center of Excellence's major components for establishing the intelligence architecture as described in MI Pub 2-01.2, this research built a model to examine each case study consistently and with the intent to draw out DCGS-A specific challenges and opportunities. The researched focused along three lines of effort similar to the major sections of MI Pub 2-01.2: planning, preparing, and deploying the intelligence

architecture.[28] Redeploying the intelligence architecture, while likely an important part of a successful DCGS-A employment and utilization plan, was not examined as the primary effort of a DCGS-A data manager as defined by this research and took place in the other areas. Data was collected through the review of After Action Reports, Standard Operating Procedures, DCGS-A technical and instruction manuals, and interviews with unit data managers and Senior Intelligence Officers.

To support the determination of the primary research question, this study attempted to answer the secondary questions with the intent of identifying, characterizing and prioritizing data management requirements essential to the success of an organization. Beginning with how the process of selecting and managing data sources for ingestions in to DCGS-A match the Army's intelligence cycle helped to determine the required associated architecture. This was deduced through the examination of Army intelligence doctrine, unit AARs, and interviews with organizational data mangers.

Further examination of how organizations identified data sources and subsequent associated management requirements was conducted through the review of case studies involving organizations employing DCGS-A in real world and exercise environments. Who on the intelligence staff identified, managed or exploited the data feeds coming into or out of the DCGS-A enterprise helped draw conclusions on how successful an organization may be in employing the system. The function of data management specific to DCGS-A was also examined at each echelon, through the case studies, in order to help identify consistent challenges or opportunities each organization faced. As those consistencies were identified, synthesized, and understood, they were used by the

[28]Department of the Army, MI Pub 2-01.2, 1-7.

researcher to help draw conclusions on who and how an organization may successfully employ DCGS-A.

Additionally, the review of the case studies helped develop a sample of the most common types of data units chose to ingest into their respective DCGS-A framework in order to support their operations as well as any unique requirements associated with constructing and ingesting data feeds in to DCGS-A versus other intelligence systems. These samples allowed the research to extrapolate some potential friction points when establishing a functioning DCGS-A support plan. As discussed in the previous chapter, ensuring interoperability between not only tactical, operational and strategic intelligence systems and databases, but also with other mission command and joint communications systems was critical to successful employment of DCGS-A.

Lastly, this study reviewed established organizational models and how they utilize knowledge management concepts successfully. This portion of the study placed special emphasis on the organization's data management functions in relation to knowledge and information management duties. By looking at how knowledge, information, and data management form around an organization's needs, regardless of the type or size, allowed the researcher to further analyze how an Army activity can best establish a DCGS-A data manager.

CHAPTER 4

ANALYSIS

Chapters 1 and 2 provided the introduction to DCGS-A, data management, and the potential challenges and opportunities an intelligence organization may face when employing a digital system in such a complex environment dominated by large amounts of data from so many different sources. Chapter 3 discussed the qualitative and quantitative methodology that the researcher used through the study and how it was designed. This chapter focuses on the analysis of the three case studies introduced earlier and the DCGS-A specific data management implications identified in each.

The analysis is presented in two main sections:

Section 1 presents how an Army corps' intelligence activity trained to assume a global response force role and examine it based on how it planned, prepared, and deployed the intelligence architecture specific to DCGS-A.

Section 2 presents how an Army division and an Army brigade intelligence activity trained and assumed an integrated combined joint task force mission in a stability and support environment and examine it based on how it planned, prepared, and deployed the intelligence architecture specific to DCGS-A.

In order to answer the primary research question that, given the complexity of the data environment in operational intelligence support, must the supporting intelligence activity maintain a dedicated data management function in order to effectively employ DCGS-A, the research first focused on several secondary, supporting questions. Following the methodology described in Chapter 3, the researcher examined how the intelligence organizations studied and determined the type and number of data sources to

ingest into DCGS-A as well as how this process corresponded with the US Army's doctrine on establishing a digital intelligence architecture. The researcher then attempted to answer the third and fourth supporting research questions; How does the process of selecting and managing data sources for ingestions into DCGS-A correspond to the Army's intelligence cycle, and how is a DCGS-A data and architecture manager different than a unit knowledge manager. Lastly, the study worked to identify any unique requirements associated with constructing and ingesting data feeds into DCGS-A versus other intelligence systems.

Case Study I: The Army Corps

Introduction

In June 2013, the XVIII Airborne Corps at Fort Bragg, North Carolina, conducted a Joint Operations Access Exercise (JOAX) with elements of the 82^{d} Airborne Division and the 66th Military Intelligence Brigade. The exercise took place in a simulated and constructed Decisive Action Training Environment and focused on intelligence support to joint forcible entry operations, airfield seizures, Noncombatant Evacuation Operations, and the defense of biological, nuclear, chemical or radiological sites.[29]

The XVIII Airborne Corps senior intelligence officer used the 66th Military Intelligence Brigade as an "anchor point" for intelligence support to host data structured and delivered appropriately to be available to DCGS-A systems forward. In support the of the XVIII Airborne Corps Commanding General's larger training objectives, the corps

[29]Gary Johnston, *XVII Airborne Corps Joint Operations Access Exercise 13-03 After Action Report* (Washington DC: Government Printing Office, September 2013), 1-2.

senior intelligence officer intended to test the Intelligence and Security Command's, "ability to provide geographically separated, real time intelligence support that was relevant, timely, and actionable."[30] A major part of accomplishing this test was through the use of DCGS-A. By the end of the JOAX, the XVIII Airborne Corps and 66th Intelligence Brigade had validated that a theater intelligence brigade, located outside of the continental United States and geographically separate from the supported military operations, could provide support that, "ensured DCGS-A drove intelligence operations, and enabled the 82[d] [Airborne Division] to meet intelligence demands of an immature / austere environment."[31]

Background

As early as March 2013, members of the XVIII Airborne Corps were working with the Intelligence and Security Command and its subordinate brigade, the 66th Military Intelligence Brigade, to identify requirements associated with meeting the unit's training objectives. They determined that in order to achieve the appropriate level of training desired, an exercise environment had to be established that had data (intelligence information), that was available over, "low-bandwidth, accessible anywhere in the world, easy to update, easier to use, and would work with very little 'care and feeding."[32] This determination, made by the XVIII Airborne Corps' senior intelligence officer, helped shape the training environment moving forward. It helped focus the number and type of

[30]Johnston, *XVII Airborne Corps Joint Operations Access Exercise 13-03 After Action Report*, 2.

[31]Ibid.

[32]Ibid., 3.

data requirements the unit would need to construct and maintain throughout the event. Further, the direction provided by the senior intelligence officer directly impacted this research's attempts to answer how an intelligence organization begins to select the number and types of data sources for ingestion into DCGS-A. The limiting factors of "low-bandwidth," "accessible anywhere in the world," "easy to update," and "easier to use," effectively eliminated some types of data sources and drove the supporting staff towards others that may meet the requirements.

In addition to the high demand data requirements, they determined the level of intelligence services that needed to be available throughout the exercise. In this case, the intelligence services included a training version of the Modernized Integrated Database (MIDB) for Ground Order of Battle analysis through the Tactical Entity Database. For ease of understanding, the Modernized Intelligence Database was a system that housed what the intelligence community knew of the adversary's military capability; units, leaders, facilities, equipment, and training levels were a few attributed tables included in the database.[33] Ground Order of Battle is simply where and how many of the enemy systems are located. The Tactical Entity Database is a customized, changeable version of the MIDB native to the DCGS-A system which a tactical intelligence analyst uses. Other services included geospatial data tools, search engines, and the ability to send intelligence data to other military communication systems.

In order to establish these services, the 66th Military Intelligence Brigade was integrated early into the XVIII Airborne Corps' planning meetings. To design such a

[33]Department of Defense, "Modernized Integrated Database (MIDB) Joint Interoperability Certificate Status," http://jitc.fhu.disa.mil/index.html (accessed 30 April 2014).

training environment, the 66th designated the intelligence systems integration officer inside the 24th Military Intelligence Battalion (Operations) as the JOAX planner. From this point, the intelligence systems integration officer became the de facto JOAX DCGS-A data manager.

Planning the Intelligence Architecture

Develop the Initial Intelligence Architecture Plan

Using the guidance provided by the XVIII Airborne Corps senior Intelligence Officer, the JOAX DCGS-A data manager, with a clear understanding of the environment, began planning the DCGS-A intelligence architecture.[34] It is here the research is able to ascertain, at least in part, answers to several other supporting research questions: how does the process of selecting and managing data sources for ingestions into DCGS-A correspond to the Army's intelligence cycle and; how is a DCGS-A data and architecture manager different than a unit knowledge manager?

First, another supporting research question had to be answered; what was the US Army's doctrine on establishment of digital architecture when employing DCGS-A? At the time of the XVIII Airborne Corps JOAX, MI Publication 2-01.2), *Establishing the Intelligence Architecture* had not been published. The JOAX occurred in the summer of 2013 and MI Pub 2-01.2 wasn't officially released until February 2014.[35] This research found no other useful supporting doctrine on the planning, establishment, or deployment of digital intelligence architecture. That said, given the JOAX DCGS-A data manager's

[34]Robert Coon, electronic correspondence with author, 25 January 2014.

[35]Department of the Army. MI Pub 2-01.2, i.

access to intelligence community members in related fields, he was aware of the draft MI Pub 2-01.1 and was asked for, and provided input to, the document. The DCGS-A data manager largely followed the principles described in the four chapters of the final approved document.[36]

The initial DCGS-A architecture plan was based largely on the ideal world not constrained by resources or system interoperability issues. To effectively plan the appropriate level of DCGS-A specific intelligence architecture, the JOAX DCGS-A data manager first had to determine how the brigade would provide the core services required by the XVIII Airborne Corps. The JOAX DCGS-A data manager started with basic information flow, systems involved, and tools or analysis provided. The JOAX DCGS-A data manager's process helped the research answer the several supporting questions. The data manager, in part, determined the upper limits of number and type of data sources available to the exercise by analyzing what services his organizations had available to it, and what it was capable of doing for themselves. By examining how the 66th Military Intelligence Brigade could support the XVIII Airborne Corps, the data manager was able to focus, from a resource perspective, the amount of time and organizational energy spent on data source or service identification.[37]

[36]Robert Coon, electronic correspondence with author, 25 January 2014.

[37]Intelligence and Security Command, "24th Military Intelligence Battalion Core Services, 66th Military Intelligence Brigade" (PowerPoint Presentation, Wiesbaden Army Airfield, Wiesbaden Germany June 2013).

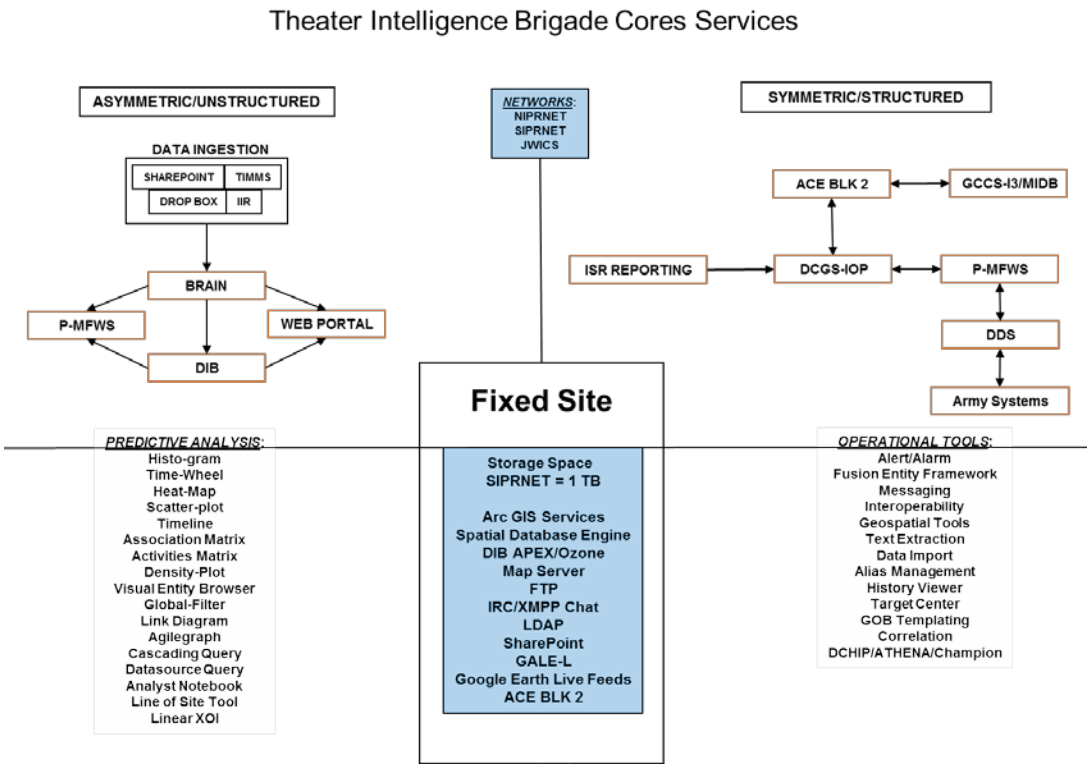

Figure 1. Theater Intelligence Brigade Core Services

Source: Robert Coon, "Theater Intelligence Brigade Core Services," 24th Military Intelligence Battalion, dated June 2013.

As the JOAX DCGS-A data manager described what the theater intelligence brigade was capable of providing that was relevant to support the XVIII Airborne Corps training event, he was able to better understand how to develop the initial plan. Figure 1 provides the initial lay down of core services the JOAX DCGS-A data manager devised. He divided services into two parts, structured and unstructured data.[38] Structured data is intelligence information in defense message format system, meaning it comes off a

[38]Coon, electronic correspondence.

technical sensor such as a satellite, radar, or unmanned aerial vehicle.[39] Structured data often looks at conventional, organized military forces, units, and equipment. Unstructured data is intelligence information most often associated with those military operations not necessarily focused on conventional forces. These operations include counter insurgency, stability, and support operations. Examples of unstructured data would be a military advisor's notes regarding a meeting with his host nation counterpart, a civil affairs report on the condition of essential services in an area, or an atmospheric report or survey of a population demographics' perspective on a particular issue.

By looking at the right side of figure 1, the JOAX DCGS-A data manager could clearly see what type of systems and tools he would need to incorporate into his architecture plan to satisfy the structured data requirements. By linking the systems the theater intelligence brigade had put together, he could easily understand what was needed to collect specific types of intelligence such as signals or imagery. As he listed out his associated operational tools, the JOAX DCGS-A data manager was able to identify technical tasks associated with his architecture.[40] For example, by seeing "alias management" as an operational tool needed for the exercise, he knew he had to establish and maintain alias table. The alias table would be transparent to the XVIII Airborne Corps or 82^{d} Airborne Division intelligence analyst, but was critical to the successful implementation of the digital architecture. Alias management is how to control multiple spellings or references to like entities. For example, in the exercise, the 82^{d} Airborne

[39]North Atlantic Treaty Organization (NATO), AAP-06(2013), *NATO Standardization Agency (NSA) Glossary of Terms and References* (NATO: Brussels, Belgium, 2013), 2-S-13.

[40]Coon, electronic correspondence.

Division might face the First Reconnaissance Brigade of Third Operational Security Corps. Depending on what type of sensor collects information on the brigade, the name may display several different ways, 1/3 OSC, 1st RECON, 3rd OSC, or 1RECON/3OSC to name a few. In addition, the brigade may have an honorific name, something tying the unit to a past leader or victory, such as "the third of July brigade," or the "honorable martyrs brigade." The alias table ensures all of the name variations are accepted and then converted to one, preapproved term for clarity. Figure 3 illustrates a simple notional alias table:

Table 1. Notional Alias Table

If	Then
1st Reconnaissance Brigade Third Operational Security Corps	1RECON / 3OSC
1st RECON 3rd OSC	
Honorable Martyrs Brigade	
1RECON / 3OSC	

Source: Created by author.

Alias tables are resource intensive and must be set up prior to DCGS-A employment. In order to effectively manage all the possible aliases, the data manager had to understand what type of enemy the friendly force would face as well as the types of collection sensors were available and their unique characteristics.

By looking at the left side of the figure 2, the JOAX DCGS-A data manager was able to visualize where and how the XVII Airborne Corps would receive its unstructured data requirements. In this case, it was largely from commercial off the shelf (COTS) systems like a web page, a commercial database or a simple networked shared drive. From this, the data manager was able to determine what the access issues may be and how of if the systems would communicate between each other. As unstructured data sources were identified as relevant, the data manger had to continually refine his plan, restructure or build new data feeds and ensure all were available through the DCGS-A framework to the end user intelligence analyst.

By examining how the JOAX DCGS-A data manager developed the initial support plan and associated architecture, then refined and ultimately executed the training event, the researcher was able to answer the supporting research question of how the process of selecting and managing data sources for ingestions into DCGS-A corresponds to the Army's intelligence cycle. The data manager's analysis of core services provided by the intelligence brigade most closely corresponds to intelligence process step one, "plan and direct."[41] Whether intentional or not, the JOAX DCGS-A data manager's support process linked to the XVII Airborne corps generally mirrored the intelligence process as described in Army Doctrine Reference Publication (ADRP) 2-0 *Intelligence*, chapter 3.[42] The data manager's inherent understanding of the intelligence process, his familiarity with the associated intelligence requirements, and his understanding of the

[41]Department of the Army. ADRP 2-0, *Intelligence* (Washington DC: Government Printing Office, August 2012), 3-3.

[42]Ibid.

capabilities of the theater intelligence brigade, caused him to behave in a manner familiar to other intelligence professionals.

Having the JOAX DCGS-A data management capability also allowed other supported intelligence leaders to discuss objectives, largely in the terms of plain language deliverables. One of the major sustaining events for the JOAX, in the eyes of the DCGS-A data manger, was the consensus on developing a requirements based architecture, versus having architecture limitations drive what requirements could be met. Specifically, he noted:

> There are no cookie-cutter approaches for intelligence architectures; each and every event, exercise, operation, etcetera will look different and require a creative approach. When [Intelligence and Security Command] offered to assist with the [theater intelligence brigade] Anchor Point concept . . . the 82^{d} Airborne Division [Analytical Control Element] Chief was very pointed with what he needed to accomplish the mission–we did not talk systems, we spoke end-states and deliverables. This allowed… the organization to accommodate pointed requirements, while mandating [army service component command] specific standards. This was accomplished by building on existing [theater intelligence brigade] Core Services while enhancing the data flows, tool sets and accesses for specific analytical goals.[43]

Evaluate Intelligence System Interoperability

Throughout this process, the DCGS-A data manager had to evaluate interoperability between systems and networks. Much of the intelligence information originated somewhere other than DCGS-A, but ensuring the information reached the DCGS-A framework in the correct format and in a timely manner was critical. The JOAX DCGS-A data manger inside the 66th Military Intelligence Brigade become a critical member of the overall JOAX planning team. Considerations had to be made when determining who and what would participate in the exercise. Any addition of an

[43]Coon, electronic correspondence.

organization who brought with it a digital system could have ramifications throughout the exercise design and compromise both the effectiveness of intelligence support generally, and DCGS-A employment and utilization specifically.[44]

Again, with respect to the supporting research question, the data manger's involvement in events not directly related to the employment of DCGS-A specifically, but were rather to the intelligence process generally, demonstrated the integrated and critical nature of his role in the successful execution of the training event. During the evaluate intelligence system interoperability phase, the JOAX DCGS-A data manager was still in the planning phase of both this research methodology and the intelligence process. His ability to plan for the integration of compatible systems, or generate alternatives to incompatible ones, further allowed the entire intelligence enterprise planning team, from the XVII Airborne corps, division, intelligence brigade and other supporting agencies, to focus limited time and resources on relevant solutions.

Complete the Intelligence Architecture

After his initial requirements assessment, the DCGS-A data manger completed the intelligence architecture plan for the XVIII Airborne Corps JOAX. This plan became the launching point for future discussion for the duration of the exercise planning and execution. It quickly became apparent that planning the intelligence architecture and prepare the intelligence architecture were not progressive steps, but were rather, much more iterative.[45] The DCGS-A data manager had to establish relationships, coordination

[44]Ibid.

[45]Ibid.

and liaison (steps described in prepare the intelligence architecture), prior to the completion of the plan the intelligence architecture phase.

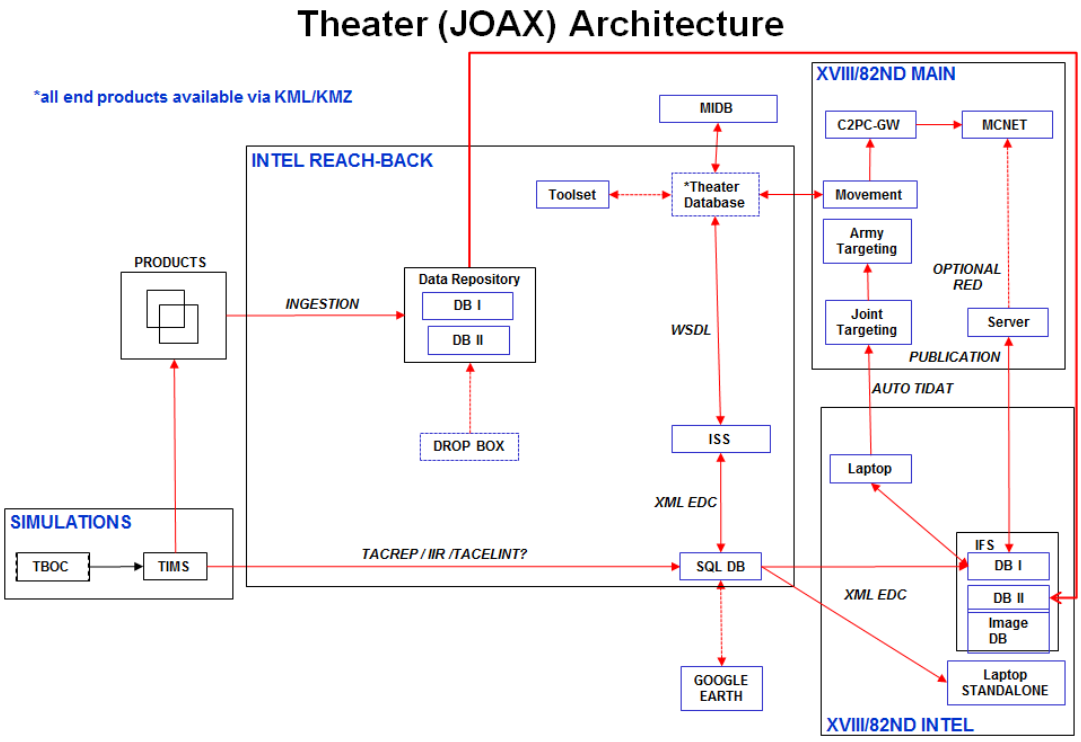

Figure 2. JOAX Intelligence Architecture

Source: Robert Coon, XVIII Airborne Corps, JOAX DCGS-A Data Manager, 24th Military Intelligence Battalion, June 2013.

The iterative nature of the process manifested in the final intelligence architecture plan. While DCGS-A remained the nexus of digital intelligence support to the JOAX that ultimately, "drove the intelligence mission and assisted in driving tactical operations,"[46] it also wasn't the platform on which most intelligence, and non-intelligence personnel

[46] Johnston, *XVII Airborne Corps Joint Operations Access Exercise 13-03 After Action Report*, 4-6.

viewed the intelligence picture.[47] Following the XVIII Airborne Corps senior intelligence officer's requirements of making the intelligence data "easy to update," and "easier to use," the DCGS-A data manger ensured all end products were available via a Google Earth live layer.[48] This allowed anyone involved with the exercise who had access to a government computer, to view near real time opposing force, "unit and equipment locations while also displaying relevant / current non-traditional reporting."[49] As illustrated in Figure 2, the data viewed in Google Earth was updated from the Tactical Entity Database every three minutes through an automated process. This meant that as analysts completed their assessments, or technical sensors picked up additional information from the environment, it was readily available for viewing in a medium many were already comfortable and familiar with. The data manager used his initial analysis of structure data (opposing force unit and equipment locations) and unstructured data (relevant and current non-traditional reporting) to anticipate the need for a commonly understood visualization platform (Google Earth).

Thus far, the study of the Army Corps has aided the researcher in answering three supporting questions: how does an intelligence organization determine the type and number of data sources to ingest into DCGS-A; what is the US Army's doctrine on establishment of digital architecture when employing DCGS-A and; how does the process of selecting and managing data sources for ingestions into DCGS-A correspond to the Army's intelligence cycle? At this point the researcher is also able to partially

[47]Ibid.

[48]Ibid., 3.

[49]Ibid., 4.

answer a fourth supporting question; namely, how is a DCGS-A data and architecture manager different than a unit knowledge manager? As discussed in chapter 2, the Army Field Manual 6-01.1 *Knowledge Management Operations* defines knowledge management as, "the process of enabling knowledge flow to enhance shared understanding, learning, and decision-making."[50] The document expands on that definition throughout the text, ultimately communicating that the most effect means by which to transfer knowledge is through face to face interaction to facilitate shared understanding.

When examining the role of the data manager in this particular case study, it becomes apparent many of the JOAX DCGS-A data manager responsibilities are very similar to that of a knowledge manager as described in Field Manual 6-01.1.[51] The DCGS-A data manager, in fact, may be a suitable choice for a unit knowledge manager, but as the research question focused on determining if and what the differences between the two roles were, that conclusion was determined to be irrelevant. Based on the review of both Field Manual 6-01.1 and the Army Corps' After Action Report and interviews with the JOAX DCGS-A data manager, several key distinctions were drawn between the two roles:

1. A unit knowledge manager develops processes to share information across an organization regardless of subject or content. A DCGS-A data manager not only focuses on intelligence information specifically, he also is empowered to make decisions on the relevancy of information.

[50]Department of the Army, FM 6-01.1, *Knowledge Management Operations*, 1-1.

[51]Ibid., 1-1 - 1-3.

2. A DCGS-A data manager will interact with the unit knowledge manager routinely, but his role is different in that a unit knowledge manager makes information available, or facilitates, while the orientation of a DCGS-A data manager is aimed at pushing mandatory information to a consumer (analyst).

These two key distinctions are important as they help directly answer the primary research question. Does a unit using DCGS-A require a DCGS-A specific data manager? Up to this point, the DCGS-A data manger supporting the XVII Airborne Corps JOAX was directly involved in not only answering the data specific questions related to the exercise, but in making more broad organizational decisions as well. All of these decisions were based on the expressed desire to create a relevant, realistic training environment. This training environment was anchored in digital intelligence architecture comprised in large part of DCGS-A associated components. The DCGS-A data manager's involvement became critical to mission success.

Prepare the Intelligence Architecture

Establish Relationships, Coordination, Liaison

In order to make decisions such as making all end products available in Google Earth, the DCGS-A data manager had to integrate early with the XVIII Airborne Corps intelligence staff and senior leadership. Through the establishment of relationships between the data manager and XVIII Airborne Corps staff, recommendations on improvements to the architecture plan could be made continually and without fear of creating unnecessary friction. Prior the start of the JOAX, the data manger identified several potential problems with both the type of data planned for use and the subsequent content issues the analysts may have when attempting analysis. Basically, the data

proposed for use couldn't be parsed, or copied, into the DCGS-A framework in a way that would stimulate the system, thereby making almost 80% of the tools available to analysts irrelevant. If the data format and content remained unchanged, the DCGS-A data manager felt the XVIII Airborne Corps training objectives would not be met.[52]

The DCGS-A data manager was able to articulate the overall XVIII Airborne Corps' training objectives to a third party data provider. When or if issues were not addressed, the data manager was able to leverage the relationships established with the XVIII Airborne Corps' senior intelligence officer to make direct recommendations. At one point, two weeks prior to the June 2013 exercise, the data manager provided direct, relevant recommendations to the senior intelligence officer who took the comments and was able to implement change immediately. The data manager, using DCGS-A as the platform, but also exploiting an in depth understanding of the overall intelligence requirements needed to effectively execute the mission, was able to make adjustments to the overall JOAX support plan.

Direct Recommendations Made by the DCGS-A Data Manager were:

1. Well developed and understood intelligence training objectives based on operational realities.
2. A clearly defined end-state: make sure everyone understands what right looks like.
3. Requirements drive systems, not the other way around.

[52]Coon, electronic correspondence.

4. Expectation management: more is not always better. If Google Earth and a Radio meet the Commanders decision making cycle requirements – use Google Earth and a Radio.
5. Emphasis and focus on utilizing reach back: leverage the enterprise.[53]

Evaluate and Ensure Training and Certification

Surveys conducted by the US Army senior intelligence staff have indicated many analysts and intelligence leaders believe Intelligence architecture in general and DCGS-A specifically to be complicated and at times cumbersome to use.[54] In light of these findings and the direction provided by the XVIII Airborne Corps Senior Intelligence Officer, the JOAX DCGS-A data manger understood he had a role from the beginning in setting up a trimmed down, easy to use, but effective supporting intelligence architecture.

At times during the planning portion of the exercise, the DCGS-A data manager performed duties that an outside observer may have considered outside the scope of his responsibilities. According to the data manager and XVII Airborne Corps senior intelligence officer, however, this was exactly the reason the unit needed a DCGS-A specific data manager capability.[55] In determining the type of supporting architecture, associated data requirements, and DCGS-A specific tools and data bases, the DCGS-A data manager was unavoidably shaping the XVIII Airborne Corps' training and

[53]Ibid.

[54]Department of the Army, The Army G2 Staff Visit, "DCGS-A" (PowerPoint Presentation, 5 February, 4ID Headquarters, Fort Carson CO), Slide 10-13.

[55]Johnston, *XVII Airborne Corps Joint Operations Access Exercise 13-03 After Action Report*, 7.

preparation plan. This phenomena directly helps answer two of the supporting research questions that will ultimately answer the primary research question: how is a DCGS-A data manager different than a unit knowledge manager, and; are there unique requirements associated with constructing and ingesting data feeds into DCGS-A versus other intelligence systems? By answering these two questions the researcher can better determine what, if any, benefit organizations employing DCGS-A have when maintaining a DCGS-A specific data management capability.

The JOAX data manager quickly determined the training requirements needed to prepare the intelligence analysts to use the DCGS-A associated tool suite. In close collaboration with the senior intelligence officer, the data manager determined:

1. Analysts would need to be trained and certified on the latest software version of DCGS-A (3.1.7.3)
2. Analysts would need to be trained and familiar with the Tactical Entity Database (TED) to include how to build, modify, and associated entities.
3. Analysts would need to be trained and familiar with the XOI tool set (named area of interest tool).
4. Analysts and leaders would need to be proficient with Google Earth
5. Analysts and leaders would need to be proficient in the use of TerraExplorer visualization software
6. Analysts and leaders would need to be trained and proficient on the DCGS-A Integrated Backbone (DIB)

7. Analysts and leaders would need to be trained and proficient on Jabber (instant message) Chat software to include chat room creation and maintenance.
8. Analysts would need to be trained and certified on ArcGIS geospatial software use.
9. Analysts and leaders would need to be familiar with the Global Command and Communications System (GCCS)
10. Analysts and leaders would need to be trained and proficient on the Command Post of the Future (CPOF); now referred to as Mission Command Network (MCNET) system
11. Analyst and leaders would need to be familiar with Blue Force Tracker (BFT)[56]

The implications of selecting the system type and architecture design were immediate and far reaching. The unique characteristics of DCGS-A associated tools, to include setup, training, and employment, made the need for a technical and organizational bridge capability that much more pronounced. Without the integration between the digital support managers at the theater intelligence brigade, namely the JOAX DCGS-A data manager, and the training and exercise planners inside the XVIII Airborne Corps, it would have been exceedingly difficult to prepare the analysts and leaders for the JOAX execution.

[56]Robert Coon, "Joint Operations Access Exercise Update 2," (66th Military Intelligence Brigade, Wiesbaden Army Airfield, Wiesbaden Germany, March 2013).

Develop, Evaluate, or Refine SOPs

As the exercise planners and JOAX DCGS-A data managers were developing training requirements and schedules, operational sections were developing the processes and procedures needed to institutionalize the training throughout the organization.[57] The JOAX DCGS-A data manager participated in these efforts as well. His nuanced advice and technical support to validate processes the organization would use to identify, collect, process, analyze, and disseminate information became critical. Some of the unique characteristics of the DCGS-A enterprise, such as the required format or sequence in which data must be ingested, or inputted, required oversight by someone who possessed the training and proficiency to ensure accuracy.[58] [59]This oversight capacity did not translate into approval authority; rather, the advice and guidance the data manger was able to provide ensured the XVIII Airborne Corps leadership developed effective strategies to most effectively leverage the DCGS-A enterprise.

Case Study II: The Army Division and Brigade

Introduction

In March 2013, the Fourth Infantry Division executed its headquarters validation exercise, code named UNIFIED ENDEAVOR 13-02, in preparation for an upcoming deployment in support of OPERATION ENDURING FREEDOM in the southern portion

[57]Coon, electronic correspondence.

[58]Steven Parker to All Personnel G2 Training and Readiness Cell, 23 November 2013, G2, XVIII Airborne Corps, JOAX Standard Operating Procedures (SOP).

[59]Johnston, *XVII Airborne Corps Joint Operations Access Exercise 13-03 After Action Report*, 2.

of Afghanistan. Following the exercise, the division intelligence staff made further adjustments to their training and deployment plan based on lessons learned from the exercise and developing requirements from the deployed theater. At the same time, a subordinate brigade, the Fourth Infantry Brigade Combat Team, was officially re-missioned from a planned deployment to the eastern portion of Afghanistan to the south; the same area of operation as the Fourth Infantry Division. Fourth Brigade would be subordinate to the Fourth Infantry Division while deployed. This case study examines how the two organizations prepared for their upcoming deployment and ultimate integration while deployed, specifically focusing on the planning and preparing of intelligence architecture as it relates to DCGS-A.

Background

As early as the summer of 2012 Fourth Infantry Division Intelligence personnel, to include the senior intelligence officer, began to prepare for a deployment to Regional Command – South (RC-South), based out of Kandahar, Afghanistan. When examining their future area of responsibility, they quickly identified a need to gain some type of efficiency with regard to the type, number and consistency of intelligence data and intelligence systems insider RC-South.[60]

Neither the Fourth Infantry Division nor the Fourth Brigade immediately named a DCGS-A specific data manger, rather the senior intelligence officers for both

[60]Matthew Rutter, electronic correspondence with author, 19 March 2014.

organizations placed senior analysts in charge of team who would in turn focus on intelligence architecture and DCGS-A related issues.[61]

The division was scheduled to deploy approximately nine month before the brigade, but both organizations quickly came to the conclusion they should integrate as early as possible to fully maximize efforts. As this was done, the division could set policy and develop associated requirements the brigade could then review, train, and be prepared for prior to deployment. Both acting DCGS-A data managers got together in in the summer of 2013 to develop the initial intelligence architecture plan. The Fourth Infantry Division was scheduled to take over RC-South later that summer. US forces had been in RC-South for over ten years; systems and architecture, while not interoperable at times, where in place and generally well established. Multiple units that would be subordinate to the Fourth Infantry Division were already in theater and using the established architecture and system. The teams determined any changes to architecture and intelligence systems, would have to be made with careful consideration to daily operational requirements and potential resistance from other brigades.[62]

Plan the Intelligence Architecture

Develop the Initial Intelligence Architecture Plan

Using initial guidance provided by the Fourth Infantry Division senior intelligence officer and understanding the unique dynamics that existed in RC-South, the division and brigade teams began to develop the initial intelligence architecture plan.

[61]Kelly Gorton, electronic correspondence with author, 5 February 2014.

[62]Ibid.

Similar to the experience of the Army Corps, MI Pub 2-01.1, *Establish the Intelligence Architecture*, was not yet published at the time of this case study. The division and brigade teams, however, through lack of experience, lack of training, and duty position, had far less access to the military community at large.[63] This lack of experience with digital intelligence architecture and DCGS-A directly impacted how and what data sources the teams determined they would need to satisfy their intelligence requirements. This dynamic helps further answer a supporting research question, how does an intelligence organization determine the type and number of data sources to ingest into DCGS-A?

The division and brigade teams' lack of experience in intelligence architecture and DCGS-A employment forced them to rely heavily on external organizations for support, to include contracted DCGS-A support personnel already deployed to RC-South. This, coupled with the fact that the architecture, whether effective or not, was already established and in use in Afghanistan, made it difficult for the division to most effectively link requirements to architecture.

While constrained by existing dynamics, the teams did determine a number of requirements they used to either validate existing architecture components or propose new modifications. The brigade and division had two primary missions in Afghanistan: to advise and assist the Afghan security forces and to plan and execute initial retrograde operations. Based on these two areas of focus, the organizations developed the following requirements in the form of a memorandum signed by commander and directing certain intelligence activities:

[63]Ibid.

1. Intelligence Support to Force Protection
2. Intelligence Support to Afghan Security Forces Advise and Assist Teams (SFAAT)
3. Intelligence Synchronization (Collection Management/Knowledge Management)
4. Military and Security Forces Analysis[64]

[64]In June 2013 the Fourth Brigade drafted four directed areas of intelligence emphasis. Published in a memorandum from the brigade commander, the areas of emphasis detailed the intelligence activities the brigade's Intelligence Warfighting Function (IWfF) personnel would need to conduct to be successful. Among the requirements were 1) Intelligence Support to Force Protection that required the development of a an Indication and Warning system and would measure indicators associated with desire and intend, training required, resources required, timing and target; additionally, the warning system should focus on threats to retrograde, threats to the Afghan national elections, insider attack planning or execution and threats to Afghan security forces or government capacity expansion or realignment. 2) Intelligence Support to Afghan Security Forces Advise and Assist Teams (SFAAT) would focus collection and analytical effort on protecting the force and enabling Afghan mission success. The brigade DCGS-A data management team felt, to do this, they needed to establish a series of distributed teams that would directly support the advisor teams while reporting back to the brigade intelligence activity. 3) Intelligence Synchronization (Collection Management/Knowledge Management) The team also determined that to best manage the complex nature of the intelligence architecture in RC-South, the intelligence activity would direct all aspects of intelligence collection, processing and dissemination. They also recognized the need to integrate nontraditional collection platforms like human terrain teams and Afghan atmospheric teams. 4) Military and Security Forces Analysis. Finally, the team determined the need to conduct basic Ground Order of Battle (GoB) analysis for the Afghan security forces to include Composition, Disposition, Strength, Tactics, Training, Logistics, Combat effectiveness, Personalities). This memorandum served as the foundational requirements document for the rest of the planning cycle. The teams used it to build or modify architecture and DCGS-A components and systems (Memorandum dated May 2013 from Colonel Brian Pearl to the intelligence soldiers of the Fourth Infantry Brigade Combat Team).

Evaluate Intelligence System Interoperability

Using the above four directed requirements listed above, the DCGS-A data management teams set about determining what data sources already existed in RC-South, what data sources would need to be modified, and what data sources would need to be created that could satisfy the requirements.[65]

Again, given the lack of formal training or experience with digital intelligence architecture and DCGS-A systems components, the teams relied heavily on outside agency assistance. With the help of the Fourth Infantry Division senior intelligence officer, the team made contact with the organization already deployed to RC-South, and coopted a contracted DCGS-A data manager for use in managing their data sources.[66] Much like the case with the Army Corps, the steps laid out in MI Pub 2-01.1 *Establish the Intelligence Architecture*, proved much more iterative in nature than progressive, especially given the Fourth Infantry Division's data management teams capabilities. The teams developed initial requirements early, then appeared to move directly from *plan the intelligence architecture* step to *prepare the intelligence architecture – establish relationships, coordination, and liaison* [author's emphasis]. The teams were often unable to move forward in developing their plan until they reached out to supporting organizations; once the immediate problem or shortcoming was identified and solved or mitigated, the teams went back to planning. As they developed their understanding of and proficiency with the architecture and DCGS-A enterprise, their relationship with supporting agencies became more collaborative; they were able to engage in direct

[65]Gorton, electronic correspondence.

[66]Rutter, electronic correspondence.

discussions and problem solve together.[67] These relationships will be discussed further in the following sections, but understanding them now aided the researcher in determining both how and intelligence organization goes about selecting data sources for ingestion into DCGS-A as well as some of the unique characteristics of DCGS-A associated architecture over other intelligence systems. As the teams developed, so did their ability to create options through collaborative problem solving.

Complete the Intelligence Architecture

Once the existing architecture was mapped, and the Fourth Infantry Division's requirements set, the two DCGS-A data management teams met and agreed on a planned final architecture.

[67]Ibid.

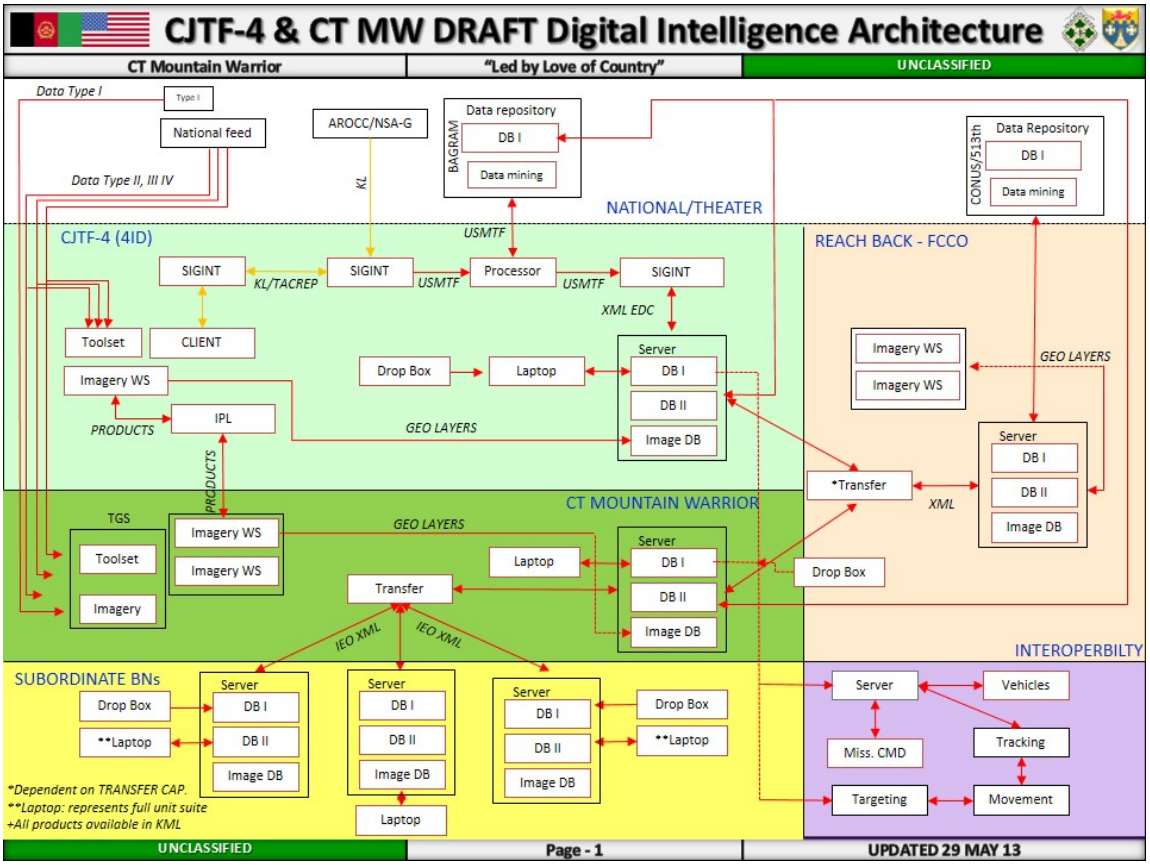

Figure 3. Army Division and Brigade Intelligence Architecture

Source: Kelly Gorton, Fourth Infantry Brigade Combat Team, Fourth Infantry Division May 2013.

The final architecture plan used DCGS-A as the nexus of digital intelligence related information processing. The teams, with external support, were able to develop a plan that allowed the passage of data between multiple sources to and from analyst and the relevant associational data base. It also allowed analysts to publish finished intelligence products to non-DCGS-A systems on the mission command network. These other systems would allow non-intelligence personnel to see the current community's

assessment of where threats were located, as well their associated strength and compositions.

As the teams described in Figure 3, the intelligence architecture affecting operations in RC-South was divided into essentially four layers. Of those four, the Fourth Infantry Division could only influence three, CJTF-4, the Fourth Infantry Combat Brigade (CT Mountain Warrior), and subordinate battalions. The fourth layer, national/theater intelligence, was pushed to the division and constrained both how and what data the organization could access.

Prepare the Intelligence Architecture

Establish Relationships, Coordination, Liaison

As discussed earlier, the teams began building relationships with outside supporting organizations early. Beyond the building of the architecture and employment of the DCGS-A system, leaders from the teams were concerned about risk associated with lack of analysts experience, not only with DCGS-A specifically, but with managing the overall architecture required to support the system.[68] These concerns point directly to the supporting research question, are there unique requirements associated with constructing and ingesting data feeds into DCGS-A versus other intelligence systems? The data management team felt there were enough unique requirements associated with establishing and operating the enterprise, they requested the DCGS-A program management office provide, "DCGS-A mentors and database managers to fill [advanced operations and architecture] positions to mitigate lack of soldier experience during the

[68]Rutter, electronic correspondence.

deployment."[69] The relationships the teams developed with the contracted or outside support agencies became critical to implementing their intelligence architecture plans.

Evaluate and Ensure Training and Certification

A disadvantage to both teams with regard to training and certification was the uncertain initial requirements based on the enduring nature of the mission and existing architecture infrastructure, as well a software baseline upgrade that required a complete analyst recertification. Both these events delayed a comprehensive training plan with both organizations integrated prior to the division deployment.[70] These factors again highlighted the importance of the relationships established with outside support agencies. This insight helps answer the primary research question; if the organization had the dedicated DCGS-A data management capability established and trained in their organizations, while not definite, they may have been able to more effectively anticipate challenges with the existing architecture or how to mitigate the software upgrade delays on the training plan.

That said, the units did perform basic certification on the baseline software and plan opportunity training events prior to the division's deployment. Additionally, troop limits in Afghanistan forced leaders to innovate unique support solutions, some of which ultimately benefited the training and certification of the analysts in both organizations. The division was forced to leave a number of analysts behind, but kept them engaged in supporting the forward deployed elements by setting up an analytical support cell in

[69]Ibid.

[70]Gorton, electronic correspondence.

garrison. Those analysts that stayed behind gained a number of weeks to complete short DCGS-A suspense training and certification, as they no longer required deployment related training or travel. The brigade analysts, not set to deploy for an additional nine months, integrated into the analytical support cell as soon as it was established, allowing them to gain proficiency and develop an understanding with the architecture and DCGS-A system early.[71]

The establishment of the garrison support cell was not without its own challenges, however. Its creation generated a whole new set of architecture issues the DCGS-A data management teams did not anticipate or were not prepared to address. This forced the teams to reengineer components of the architecture, develop ways to pass data across multiple domains, each with their own set of standards and approvals, and collaborate with additional organizations through whose networks the DCGS-A data would pass. The examination of these set of unique challenges, directly helped the researcher answer a number of supporting questions. Each time a challenge was presented to the DCGS-A team, members felt ill prepared to develop solutions. Each time they prevailed, but often by engaging those external support teams who possessed the institutional and individual training and experience to handle the changes. [72]

Develop, Evaluate, or Refine SOPs

The Fourth Infantry Division's DCGS-A or architecture Standard Operating Procedures (SOP) were limited. Many of the SOPs focused on analytical approaches to

[71]Ibid.

[72]Ibid.

problem framing and solving. The main exception was the Multi-Function Work Station (MFWS) SOP and the Tactical Entity Database (TED) data entry SOP.[73] The development of these two documents provided the analysts and operators a basis for consistency and expectation. It gained compliance, which in time the teams hoped would transition to commitment to the systems as gains became visible, the associational data bases became populated with enough entities to become useful, and the analysts became proficient with the tool suite provided.[74]

[73]Richard Appelhans to All G2 Personnel, "Multi-Function Work Station (MFWS) Standard Operating Procedure (SOP)," May 2013, Fourth Infantry Division, Fort Carson Colorado; Richard Appelhans to all G2 Personnel, "Distributed Common Ground System-Army (DCGS-A) Data Entry Standard Operating Procedures (SOP)," May 2013, Fourth Infantry Division, Fort Carson Colorado.

[74]Rutter, electronic correspondence.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

Conclusion

The concept of a data manager is not new, nor is the general need for trained, competent professionals proficient at their assigned capability. The question of having someone who is in charge of DCGS-A specific systems and associated architecture employment being trained, certified, and dedicated to that task is not something one may initially consider worth the time and resources needed for research. The answer seems obvious; to effectively employ a capability the organization employing it needs to know how to use the system in question. Experience, however, has proven otherwise. The examination of the second case study, for example, shows a team, while dedicated, intelligence and proficient in their own right, who was not prepared to fully appreciate the complexity that comes with employing a 21st Century digital intelligence system that is federated (spread across many organizations), associational (only as good as the data put into it), and massive in scale (recent reporting estimates the DCGS-A enterprise has cost the US Government nearly 12 billion dollars).[75]

The team struggle, at first, to address the challenges. As they gain experience, streamlined their processes, and named a dedicated DCGS-A specific data manager, they began to more efficiently anticipate problems and address them. They were also able to

[75]Kevin McCaney, "Army units give thumbs-down to battlefield intelligence system," 7 February 2014, http://defensesystems.com/articles/2014/02/07/army-dcgs-afghanistan-criticism.aspx (accessed 2 May 2014).

better communicate with the outside support agencies who were critical to the success of DCGS-A employment.

In contrast, the XVIII Airborne Corps team, while not without their own unique set of challenges, was able to anticipate what architecture, systems, and tools were needed in order to meet their clearly defined requirements. They were able to do this, in part, because of their use of a trained, experienced and empowered, DCGS-A data manger.

This study's findings, however, are not authoritative. The examination of three Army units in two case studies may provide anecdotal information when considering the depth and breadth DCGS-A utilization across not only the Army, but the other sister services and joint military organizations. This shortcoming in this research may be a point for future study and will be discussed further in following sections.

The researcher does assert, however, that many of the issues faced by the XVIII Airborne Corps, Fourth Infantry Division, and Fourth Infantry Brigade Combat Team are, in all likelihood, issues that not only Army units using DCGS-A may face, but any organization, regardless of affiliation, may encounter. The data format, networks, and technology doesn't change dramatically between units, services or organizations. All the systems and architecture discussed in this study must pass a joint interoperability standards certification test administered by the Joint Interoperability Test Command and, therefore, issues encountered in one service are very likely to affect another, particularly the higher one travels up the chain of command.[76]

[76]Department of Defense, Joint Interoperability Standards, http://jitc.fhu.disa.mil/, (accessed 5 February 2014).

These issues of complexity with regard to digital intelligence architecture and DCGS-A system components and enterprise capability are not likely to be resolved without dedicated, long term, comprehensive technical and organizational commitment, either. The US military's reliance on technology in the modern era has always been high, and is increasing even now. The joint nature in which the services have operated over the last thirteen plus years is likely indicative of how they will operate in the future. The reliance on inter and national agency level support to deployed military forces is also increasing. These variables point to the ever expanding need to maintain a federated, interoperable, digital infrastructure on which all concerned organizations can operate. For the military, and the Army in particular, this system is DCGS-A. Given this dynamic the need for a trained, dedicated, empowered data manager is all that more pronounced.

Recommendations

The case studies suggest that, organizations that employ DCGS-A must have a dedicated, empowered data management capability established. This capability must be defined in so far as the leadership of the organization knows the key players with whom to interact when planning, preparing, establishing, or deploying any aspect of digital intelligence architecture, particularly an DCGS-A systems or tool.

The DCGS-A data management should be a capability, manifest in a section or individual activity that has a leader who is primarily responsible for all aspects of the organizations intelligence architecture establishment and maintenance, including DCGS-A. The section must be integrated with the organization's operational activities and understand not only the technical nature of digital intelligence, but also the analytical, problem solving tradecraft important to satisfying intelligence requirements.

The data management capability does not necessarily mean the expansion of the intelligence organization or activity; there may be no need to add personnel or equipment, but only training and delineation of responsibilities. It is quite possible the DCGS-A data management capability should reside in an already established section, possibly the all source fusion section, intelligence, electronic warfare maintenance section, or a shared responsibility between both. The division of labor and required additional training or certification may require additional research and will be discussed further in the following section.

Some potential responsibilities of the data manager already exist in a variety of duty descriptions required of intelligence activities, and may need only minor modifications to address the needs outlined in this study. Some may include:

1. Current and expert knowledge of Army Intelligence, Surveillance, Reconnaissance systems, tactics, joint military doctrine and concepts.
2. Demonstrated comprehensive working knowledge and familiarity with Army intelligence systems and requirements, to include strategic, operational, and tactical employment concepts and the operations characteristics and challenges for commanders and soldiers using the systems.
3. Demonstrated comprehensive knowledge of Joint and Army ISR requirements and technical performance and interoperability needs. Technical proficiency with agency and multi-service ISR collection and processing platform capabilities and their interfaces required to successfully integrate national and joint theater and tactical tasking, collection, processing, exploitation, dissemination and display system functions.

4. Demonstrated ability to communicate effectively orally and in writing to address highly technical subject areas to audiences ranging from totally non-technical to acknowledged subject matter experts.
5. Principally responsible for US Army ISR and Distributed Common Ground Sensor –Army (DCGS-A) systems; analyzing, planning, documenting, and executing war fighting concepts, future operational capabilities, organizational requirements and by determining solutions for future operational capabilities.
6. Develops information technology solutions to enable Relevant ISR to the Edge and manages circuit extensions for classified networks as it pertains to Intelligence operational and exercise support. Serves as chief advisor to the brigade for digital intelligence systems, primarily as they pertain to strategic and tactical intelligence support specifically coordinating and designing network reach and IT solutions.[77]

Recommended Future Research

As discussed not only in the above conclusion and recommendations, but throughout the entire research study, training is paramount to success. Assuming the intelligence organization establishing the DCGS-A specific data management capability, how does the organization train or integrate the activity? This study focused on whether organizations attempting to use DCGS-A to satisfy intelligence requirements were more

[77]Taken from the 24th Military Intelligence Battalion, 66th Military Intelligence Brigade, Plans, Exercises, intelligence systems integration and operations specialist duty description. The 24th MI BN supported the XVIII Airborne Corps JOAX and the individual responsible for the activities listed also acted as the DCGS-A data manager. While existent in the 24th MI BN, this duty position is not universal and does not appear in many, if any MI activities elsewhere.

successful when they had an established DCGS-A data management capability. It did not discuss or investigate how to train capability. Ever changing requirements, rapidly evolving technologies, and current military transformation initiatives make it that much more important for further research to be undertaken on this subject. The implementation of the DCGS-A data management function to an organization may also be another topic for future study. Using the Department of the Defense's doctrine, organization, training, materiel, leadership and education, personnel and facilities framework (DOTMLPF), one could study, now that a DCGS-A data management capability is identified as required, how they are employed and what they do (doctrine), where they come from in an organization (organization), how they're trained/what training they require, either institutionally, organizationally, or from civilian education (training), or what equipment or systems they require (material), to name just a few.

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