

TACTICAL AIRLIFT SUPPORT TO THE LAND COMPONENT IN
LARGE SCALE COMBAT OPERATIONS

A thesis presented to the Faculty of the U.S. Army
Command and General Staff College in partial
fulfillment of the requirements for the
degree

MASTER OF MILITARY ART AND SCIENCE
General Studies

by

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2019

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REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE (DD-MM-YYYY) 14-06-2019		2. REPORT TYPE Master's Thesis		3. DATES COVERED (From - To) AUG 2018 – JUN 2019	
4. TITLE AND SUBTITLE Tactical Airlift Support to the Land Component in Large Scale Combat Operations				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Jonathan P. Dixon, Major, U.S. Air Force				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Command and General Staff College ATTN: ATZL-SWD-GD Fort Leavenworth, KS 66027-2301				8. PERFORMING ORG REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution is Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Tactical airlift forces have largely become conditioned to the conduct of limited contingency operations consistent with the conflicts in Iraq and Afghanistan. This is applicable to all airlift processes including command and control, command relationships, execution and risk. The re-focus on Large Scale Combat Operations present in today's military highlights the need for airlift forces to perform across the range of military operations. An evaluation of current processes and capabilities against the anticipated operational environment of Large Scale Combat Operations reveals that airlift forces are not well positioned for success. Large Scale Combat Operations present significant challenges including rapid tempo, increased lethality, and uncertainty. Effective tactical airlift support in Large Scale Combat Operations can respond to user requirements within 48 hours of execution, is continuous to meet increased demand, and persists to overcome the high threat environment. Airlift forces must improve in these areas to meet the increased demand, variable requirements and inherent challenges of Large Scale Combat Operations. To meet the requirements of Large Scale Combat Operations, tactical airlift forces must align planning horizons with the supported force, effectively force package, and increase direct delivery and dynamic airdrop capacity.					
15. SUBJECT TERMS Tactical Airlift, Airdrop, Large Scale Combat Operations, Apportionment, Force Packaging, Anti Access/Area Denial, Air Tasking Order					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT (U)	18. NUMBER OF PAGES 87	19a. NAME OF RESPONSIBLE PERSON
a. REPORT (U)	b. ABSTRACT (U)	c. THIS PAGE (U)			19b. PHONE NUMBER (include area code)

MASTER OF MILITARY ART AND SCIENCE

THESIS APPROVAL PAGE

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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

TACTICAL AIRLIFT SUPPORT TO THE LAND COMPONENT IN LARGE SCALE COMBAT OPERATION, by Major Jonathan Dixon, 87 pages.

Tactical airlift forces have largely become conditioned to the conduct of limited contingency operations consistent with the conflicts in Iraq and Afghanistan. This is applicable to all airlift processes including command and control, command relationships, execution and risk. The re-focus on Large Scale Combat Operations present in today's military highlights the need for airlift forces to perform across the range of military operations.

An evaluation of current processes and capabilities against the anticipated operational environment of Large Scale Combat Operations reveals that airlift forces are not well positioned for success. Large Scale Combat Operations present significant challenges including rapid tempo, increased lethality, and uncertainty. Effective tactical airlift support in Large Scale Combat Operations can respond to user requirements within 48 hours of execution, is continuous to meet increased demand, and persists to overcome the high threat environment. Airlift forces must improve in these areas to meet the increased demand, variable requirements and inherent challenges of Large Scale Combat Operations.

To meet the requirements of Large Scale Combat Operations, tactical airlift forces must align planning horizons with the supported force, effectively force package, and increase direct delivery and dynamic airdrop capacity.

ACKNOWLEDGMENTS

I dedicate this thesis to the tactical airlift community. The perseverance, professionalism, and mission first mentality of the community is truly one of a kind in today's military. It is my hope that this work aids in the community refocus on Large Scale Combat Operations.

The study of tactical airlift in Large Scale Combat Operations would not have been possible without the students and cadre of the United States Air Force Weapons School, previous Masters of Military Arts and Sciences theses and professional dialogue with the crew dogs that fly the mission every day.

I'm incredibly blessed and grateful to have the loving support of my wonderful wife Emily and amazing son Andrew. I would not have been successful in this endeavor without their support, sacrifice, and tolerance of the extra hours necessary to complete this thesis.

Finally, I'd like to thank any thesis committee members, Dr. Ken Long, Mr. Gerry Leonard, and Mr. Marty Huggard. They immediately embraced my chosen topic and allowed me the freedom to maneuver where the research led. Their assistance along the way was invaluable and I'm very grateful to have had such great support.

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ACRONYMS

A2/AD	Anti Access Area Denial
ALR	Acceptable Level of Risk
AMLO	Air Mobility Liaison Officer
AOC	Air Operations Center
ATO	Air Tasking Order
BCD	Battlefield Coordination Detachment
CAS	Close Air Support
CDM	Chief Decision Maker
COMREL	Command Relationships
FAA	Functional Area Assessment
FM	Field Manual
FNA	Functional Needs Analysis
FSA	Functional Solutions Analysis
JARN	Joint Air Request Network
JRSOI	Joint Reception Staging Onward Movement and Integration
LSCO	Large Scale Combat Operations
NDA	National Defense Strategy
OPCON	Operational Control
TACON	Tactical Control
TTP	Tactics, Techniques, and Procedures

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CHAPTER 1

INTRODUCTION

Since 2001, intra-theater airlift operations, in the United States Central Command (USCENTCOM) Area of Responsibility (AOR) have been pivotal to theater sustainment including direct support of land component forces engaged in combat with the enemy as well as normal forward operating base resupply. Due to the continued success of airlift operations, the air component has conditioned the joint force to expect and rely on continuous airlift support. The operational environment in the USCENTCOM AOR allows relative freedom of action for airlift forces but this expectation will not be possible in future large-scale combat operations (LSCO).

This study examines intra-theater airlift operations during LSCO and presents recommendations to improve airlift support to land component forces in this operational environment (OE). Consistent with the guidance contained in the National Security Strategy and National Defense Strategy, the U.S. Military is shifting its focus from limited contingency operations that have characterized the past seventeen years to LSCO. To accomplish this transition, all service components must evaluate current doctrine and processes as they relate to organization, training, and materiel against the anticipated OE during LSCO. If found deficient, it is imperative that we implement changes to better prepare our nation's military for its anticipated role.

Background

The USAF intra-theater airlift community has a long history of directly integrating its operations with its supported land component user. This integration is most recognized in the pre-dawn airborne assault during D-Day and the persistent sustainment

of besieged Marines at Khe Sanh. However, since the Global War on Terror began in 2001, USAF intra-theater airlift forces have primarily operated as an extension of the global transportation network managed by United States Transportation Command (USTRANSCOM). In this role, the USAF was pivotal in removing countless convoys from improvised explosive device-laden roads. However, as the theaters in Iraq and Afghanistan matured, the integration between airlift and ground forces declined in favor of scheduled channel missions and forward operating base resupply sorties. This trend continues today where airdrop operations require significant lead time for approval by senior USAF leaders in the Air Operations Center (AOC). Further, aircrew are conditioned to operating autonomously in a permissive environment. The risk-averse and steady-state operating model leaves USAF airlift forces ill-prepared to conduct operations during LSCO. The USAF must address its doctrine, organization and leadership deficiencies to prepare for future challenges associated with LSCO. The USAF is not alone in the shift to LSCO, the land component must also adjust to meet these challenges as it conducts operations.

The supported land component has also grown accustomed to the low threat and relatively static operations in Iraq and Afghanistan. Operations are primarily conducted from main operating bases or well established forward operating bases where scheduled resupply operations are feasible and units remain in a fixed location for long durations. For this reason, little movement, maneuver and sustainment planning is required at the tactical level. Theater wide threats and the likelihood of long lines of communication during LSCO will make planning in these areas key to survival and success. Therefore, the land component must emphasize integration with intra-theater airlift assets now to

prepare for this future operating environment. Anti-Access and Area Denial (A2/AD) capabilities associated with near-peer adversaries such as China and Russia only compound the challenges air and land component forces face as they shift their focus toward LSCO.

Significance of Study

The limited contingency operations that define the last 18 years has conditioned the U.S. Military for a low threat, relatively permissive environment. In this time nearly all processes, equipment, training and organization of our forces have aligned toward the requirements of this operational environment. This has come at the expense of high-end training and capabilities against a near-peer adversary. To provide the credible deterrent and readiness for LSCO called for by the 2018 National Security Strategy and National Defense Strategy the military must evaluate itself and quickly address deficiencies.

This study provides a thorough analysis of tactical airlift operations as they relate to supporting the land component during LSCO. The expeditionary nature of the U.S. military naturally demands robust sustainment and logistical operations to enable combat operations around the world. Anticipated adversary capabilities, during LSCO, such as A2/AD threats, present significant challenges to sustainment operations that further highlights the need for a study in this area. A comprehensive understanding of tactical airlift operations during LSCO is essential to ensure America's continued freedom of action and freedom of maneuver in any operational environment.

The purpose of this study is to develop specific, and actionable recommendations that the Chief Decision Maker (CDM) can implement to prepare the joint force for effective tactical airlift in LSCO. To do so, the author utilizes the applied professional

case study methodology described in Chapter 3. The overall goal is to better prepare land and air component forces for LSCO against a near-peer adversary

Primary and Secondary Research Questions

How should USAF intra-theater airlift operate to support land component forces during LSCO against a near-peer adversary? To fully address this question, the secondary research questions are:

1. What command relationships must exist within the air component and between the supporting and supported force to ensure both efficiency and effectiveness of tactical airlift operations? Should a land component user exercise operational control (OPCON) or tactical control (TACON) over airlift forces?
2. What is the appropriate airlift operating model, including the request process and timeline change to account for the dynamic nature of LSCO?
3. Can airlift forces operate in the high threat environment associated with LSCO? What Acceptable Level of Risk (ALR) is necessary to permit airlift operations in this environment?
4. What employment tactics, techniques, and procedures (TTP) will airlift forces execute in concert with the supported force to meet user requirements and survive during LSCO? How will aircrew and land component forces prepare for this operating construct?

Definitions

To ensure a mutual understanding of this study, the reader must be familiar with some key terms. The study strives to use doctrinal definitions to the maximum extent

possible. Where appropriate, the author adds amplifying information to better articulate and define some key concepts as they relate to the research topic.

Large Scale Combat Operations (LSCO). According to U.S. Army Field Manual 3-0, “LSCO present the greatest challenge to Army forces” (HQDA 2017, 1-2). These operations include intense, lethal, and brutal conditions that induce “chaos, fear, violence, fatigue, and uncertainty” (HQDA 2017, 1-2). The joint force can expect an adversary to combine conventional tactics, terror, criminal activity and multi-domain warfare (HQDA 2017, 1-2). The environment associated with LSCO demands increased operational tempo and lethality (HQDA 2017, 1-2). Adversaries will likely employ A2/AD capabilities to deny freedom of maneuver and freedom of action. To provide a credible deterrent and to ensure survivability in this environment, the military must shift focus from limited contingency operations to the high-end fight consistent with LSCO.

Intra-theater and/or Tactical Airlift. “Intra-theater airlift provides air movement of forces, personnel, and material within a Geographic Combatant Commander’s area of responsibility. (JCS 2019, IV-3). Intra-theater airlift employment missions include combat employment and sustainment missions that enable transport of forces directly into combat and to maintain a force’s level of effectiveness through the delivery of equipment, personnel, and supplies (JCS 2019, IV-1). Regularly scheduled channel missions that prioritize overall system efficiency to ensure access to airlift to all common users typically accomplish these missions (JCS 2019, IV-3).

Up until now, this thesis has used the term intra-theater airlift exclusively when discussing airlift support to the land component. However, the challenging operational environment associated with LSCO may require direct delivery support to the land

component conducted by inter-theater airlift. These operations remain within the scope of this study, therefore, the term “tactical airlift” is more appropriate for this thesis when discussing support to the land component engaged in combat operations. The author uses the term “tactical airlift” for the remainder of this document to describe any airlift operations conducted in this manner regardless of the distance flown or area of responsibility traversed.

Command Relationships (COMREL). This term describes the relationships based on established authorities between different organizations (JCS 2013a, V-1). The intent is to assure unity of effort and unity of command among the joint force. *Joint Publication 1* includes various options and their specific authorities. An understanding of command relationships and how they impact tactical airlift in LSCO is key. For this reason, the reader should be familiar with this term.

Airlift Employment. To aid the reader in better understanding the secondary research question relating to aircraft employment, this term refers to tactical airlift mission execution and the associated tactics, techniques, and procedures utilized by the aircrew to accomplish the mission. A myriad of methods of employment exists including airdrop, airland, formation and force packaging.

Chief Decision Maker. The Chief Decision Maker is the senior leader responsible for and empowered to affect holistic change for tactical airlift forces and their operations in LSCO. The Chief Decision Maker for this thesis is the Joint Staff Director of Operations (J3) because he/she is responsible for integrating the operations of the services for presentation to the Combatant Commands. Though the Chief Decision Maker is the ultimate authority for implementing change to better support LSCO he/she is

responsible to the key stakeholders directly affected by tactical airlift operations. Key stakeholders, in this case, are jointly the Combatant Command Directors of Operations (J3), the USAF Deputy Chief of Staff for Operations, Plans, and Requirements (AF/A3), and the U.S. Army Deputy Chief of Staff for Operations (DA/G3). Chapter 4 further explains the competing requirements and interests of the chief decision maker and key stakeholders to aid the author in forming the improved recommendation (R3) that is suitable, acceptable, and feasible.

Evaluation Criteria. The author uses suitable, acceptable, and feasible as the evaluation criteria in the CDM assessment in Chapter 4. Jointly, these terms evaluate and improve the author's recommendation. In this case, suitability means that the author's recommendation accomplishes what it intends to do. Said another way, does it close the capability gap or improve the situation. Acceptable means that implementing the recommendation does not incur undue risk to mission or risk to force. Lastly, feasibility means that the recommendation can be implemented within current limitations or without excessive burden or cost to budgets, training, manpower, materiel, etc.

Kotter Change Model. Originally published in the 1996 book *Leading Change*, U.S. Army adopted the Kotter Change Model for inclusion in its leader development doctrine *Field Manual 6-22* and *Army Doctrine Reference Publication 6-22*. The model includes 8 steps for affecting change within an organization. The steps are:

1. Establishing a sense of urgency
2. Creating the guiding coalition
3. Developing a vision and strategy
4. Communicating the change vision
5. Empowering broad-based action

6. Generating short-term wins
7. Consolidating gains and producing more change
8. Anchoring new approaches in the culture (Miller and Turner 2018, 2).

The author applies the Kotter Change Model in Chapter 5 to create a campaign plan for implementing the improved recommendation (R3) discussed in Chapter 3.

Assumptions

The author made the following assumptions during the research of this topic:

1. There is a minimum of 5 years before LSCO occurs. This is a necessary assumption because a timeline shorter than 5 years to prepare for LSCO significantly restricts the outcomes and holistic evaluation of tactical airlift that this thesis intends to accomplish. This is a reasonable assumption because there are not orders to prepare for active LSCO.
2. The next assumption is that preparation for LSCO must remain agnostic to an AOR or adversary. This assumption is both necessary and important because it aims to prevent too narrow of a focus and ultimately enables a holistic view of the problem set as mentioned in the previous assumption. This is reasonable because the current National Security Strategy does not focus on just one adversary.
3. The final assumption is that LSCO will primarily occur during the seize the initiative and dominate phases of conflict (Phase II and III). During these phases, adversary Anti-Access and Area Denial (A2/AD) capability and other threats to air and ground operations will remain present in the operational environment. This assumption is necessary because it allows the author and reader to fully understand the lethality of LSCO without focusing on an adversary or AOR. This

is a reasonable assumption because operations outside of Phase II and III are not likely to be significantly different than current operations in the CENTCOM AOR.

Limitations

Factors outside of the author's control imposed the following limitations on this thesis.

1. The primary limitation of this thesis is that it remains at the UNCLASSIFIED level. As such, there is no discussion of specific threat capabilities, aircraft defensive system effectiveness, or current operational plans.
2. Materiel solutions to address the challenges associated with LSCO require a higher classification and a more technical approach that exceeds the scope of this study. However, these areas must be addressed to fully explore the research topic. To do so, the author's expertise, as validated by the research committee, allows some conclusions and statements of fact without full explanation to avoid security issues. This is limited to areas sensitive in nature.
3. Due to security limitations, the author must constrain recommendations to the doctrine, organization and leadership areas of the DOTMLPF construct. Though limited to these areas, doctrine, organization, and leadership represent the key drivers of change within the military and therefore the author does not anticipate any negative impact on the research due to this limitation.

Delimitations

To narrow the scope of the study, this thesis remains focused on the airlift coordination processes, command relationships, and aircraft employment as they related to the LSCO operational environment. I, therefore, impose the following delimitations:

1. This thesis will only address inter-theater airlift or normal theater sustainment operations as they relate to tactical airlift. These areas will surely present significant challenges to the joint force during future LSCO. For this reason, they demand their own comprehensive study and therefore omitted at this time.
2. This study will not address airlift capacity, supply and other similar constraints that would surely be present in the LSCO operational environment presented. Supply chains, extended lines of communication and airlift capacity versus demand are all critical issues when addressing the challenge of airlift in LSCO. For this reason, they also demand their own independent study.
3. Finally, this thesis excludes tactical level planning associated with aircraft load planning, cargo restrictions, or aircraft performance. While important to intra-theater airlift, these areas remain mostly static across the range of military operations.

Initial Personal Recommendation (R1)

In accordance with the research methodology outlined in Chapter 3, the author's R1 serves as a starting point to guide the research and is based on the author's professional judgment, background, and experience. The author is a C-130 Evaluator Pilot with worldwide experience flying in over 50 countries. Additionally, the author is a Graduate and Instructor of the United States Air Force Weapons School. This

background provides a bedrock of tactical and operational level expertise to form the R1 and to guide the research necessary for this thesis and its subsequent recommendations.

The author's R1 includes 4 main areas that align with secondary research questions:

1. Operating Model: To overcome extended lines of communication and A2/AD threats, tactical airlift forces should utilize direct delivery as the primary operating model for LSCO. Direct delivery meets user requirements without the burden of massing supplies at large fixed locations consistent with the hub and spoke model. Direct delivery also allows the logistics system to remain agile to variable user requirements in LSCO. Additionally, due to the rapid tempo of LSCO airlift apportionment and scheduling should occur as close to mission execution as possible. The intent here is to minimize excessive planning that is likely to change immediately prior to or during execution and assure airlift forces support the highest priority users at the time of execution.
2. Command Relationships: Based on the rapid tempo and non-linear operations anticipated with LSCO, the author recommends that COMREL be as flexible as possible during LSCO. To maximize flexibility and responsiveness to user requirements the supported land component user should exercise Tactical Control (TACON) of airlift forces in direct support the user. TACON of tactical airlift forces to the supported user will also maximize integration between the supported and supporting force in the highly dynamic LSCO environment. A key limitation of allowing the land component TACON of airlift forces is the reduced operational efficiency of the mobility system due to fewer aircraft available for common use.

3. Acceptable Level of Risk (ALR): The highly lethal environment of LSCO demands an increased ALR above the normal Low or Medium level. This is to account for advanced A2/AD and non-kinetic threats expected in LSCO. Additionally, airlift leaders should separate a selected level ALR from the prescriptive execution guidance. The uncertainties and dynamic nature of LSCO will prevent adherence to rigid operational restrictions during execution. Rather, airlift planners should plan missions within the parameters of the selected ALR and then allow aircrew the flexibility to accomplish the mission without additional restrictions. To mitigate some of the risks to the force associated with LSCO and an increase ALR, airlift operations must force package with Combat Air Forces and other forces to allow survivable operations.

4. Airlift Execution: Fixed operating locations such as airfields or landing zones and the extended timelines required to offload cargo via airland is largely not feasible during LSCO. Therefore, the primary method of aerial delivery during LSCO will be airdrop. Airdrops afford maximum flexibility in terms of delivery location and increase survivability for airlift forces that can quickly egress the area once the airdrop is complete. Airdrops require increased coordination between the supported and supporting force and are not suitable for all types of sustainment. However, the increased flexibility and survivability necessary for tactical success in LSCO demand this tradeoff.

Chapter Conclusion

The reader should now understand the purpose and scope of this thesis including the primary and secondary research questions and definitions of key terms. Additionally,

the reader is aware of the author's R1 that establishes the starting point and guides the research for the remainder of the thesis. Figure 1 below summarizes the R1 and graphically depicts the research methodology described in Chapter 3.

Capabilities Based Assessment		Functional Solutions Assessment					Campaign plan	Pri: ABC ST(1-2yrs) LT(2-5yrs)
Functional area assessment		Functional Needs Assessment		Functional Solutions Assessment				
Pre-research position	DOTMLPF- P domains	Problems	Opportunity	Requirement	Possible Solutions	Refined (R2)	Final (R3)	Kotter Model Lens applied
		Stakeholder Lens Analysis						

Figure 1. Research Methodology with Author's R1

Source: Figure outline by Dr. Kenneth Long, data by author.

CHAPTER 2

LITERATURE REVIEW

There are four categories of literature relevant to this study; strategic guidance, joint and service doctrine, independent academic works, and finally Tactics, Techniques, and Procedure manuals. Strategic guidance frames the shift toward LSCO and defines priorities and future roles for the military. Next, joint and service doctrine articulate established best practices, processes, and procedure for the conduct of operations. Sources in this area are primarily concerned with tactical airlift operations but also include land component operations to develop an understanding of the supported commander's operations. The independent academic study category provides an external perspective on the complex problem set. Finally, TTP manuals establish an understanding of current capabilities resident in the tactical airlift community. The purpose of this category is to develop an understanding of the current force, its fitness for future LSOC, and evaluation of the suitability of the author's recommendations at the end of the study.

After a review of the literature, the author provides an analysis of the record that includes trends, gaps, and significance as it relates to the research question. This analysis permits the author to articulate a preliminary thesis before moving on to the remainder of the study. Chapter 3 describes the specifics of this methodology.

Strategic Guidance

The *National Defense Strategy* (NDS) articulates the Secretary of Defense's vision and priorities. The NDS directs the department to "compete, deter, and win in a complex security environment" (DoD 2018, 1). The NDS explains that "the strategic environment demands increased strategic flexibility and freedom of action" (DoD 2018,

7). Specifically related to tactical airlift and LSCO, the NDS emphasizes the need for “agile and resilient logistics . . . to ensure logistics sustainment while under persistent multi-domain attack (DoD 2018, 7).

Current Joint and Service Doctrine

Joint and service doctrine documents provide foundational knowledge of how the military intends to operate today and in future conflicts. Therefore, a thorough review and a general understanding of applicable documents in this category are essential to this study. The first such document is Joint Publication (JP) 3-17 *Joint Air Mobility Operations* which defines and describes the air mobility system including operating principles and processes. *Joint Air Mobility Operations* states that air mobility operations utilize centralized control and decentralized execution operations to maximize the efficiency of the global air mobility system. Specific command and control procedures discussed include the role of the supported and supporting forces and movement request timelines. Further discussed is the need for well-defined requirements and user coordination for successful airlift operations.

While JP 3-17 focuses on air mobility operations, JP 3-30 *Command and Control of Joint Air Operations* describes operational and strategic level coordination and procedures to plan and oversee joint air operations. *Command and Control of Joint Air Operations* defines the Air Tasking Order (ATO) process, timeline, requirements, and limitations. Briefly outlined is the Theater Air Ground System, its components and coordination process. *Multi-Service Tactics, Techniques, and Procedures (MTTP) for Theater Air-Ground System (TAGS)* goes into greater detail of these processes including functions of the service components, the Theater Air Control System and the Army Air

Ground System. Another element addressed is Battlefield Coordination Detachment (BCD) and the coordination processes for requesting Close Air Support (CAS) and air movement. Also addressed are key responsibilities of the tactical air control party and Air Mobility Liaison Officers (AMLO) in this process. The key observation from *JP 3-30* and *MTTP TAGS* is that the request and execution processes for tactical airlift require significant coordination and lead-time. To understand the tactical airlift application of concepts found in *JP 3-30* and *MTTP TAGS* a review of *JP 3-52 Joint Airspace Control* is also necessary.

Joint airspace control “increases operational effectiveness by promoting the safe, efficient, and flexible use of airspace while minimizing restraints on airspace users. Airspace control includes coordinating, integrating, and regulating airspace to increase operational effectiveness” (JCS 2014b, VII). To accomplish this goal, *JP 3-52* prescribes “close liaison and coordination among all airspace users” and further emphasizes the need for “flexible and simple control measures” to meet the needs of all joint airspace users (JCS 2014b, VIII). When planning for future airspace control operations, *JP 3-52* cautions that every conflict is different and that planners are not to apply an established model to a different operational environment (JCS 2014b, III-1). Successful tactical airlift operations logically rely on the concepts found in the air-centric doctrine reviewed thus far. However, as an extension of the global transportation system, airlift operations also incorporate the principles of logistics and sustainment.

As the title implies, *Joint Logistics* (JP 4-0) describes the joint logistics system and its operating principles. The seven principles of logistics are responsiveness, simplicity, flexibility, economy, attainability, sustainability, and survivability (*JCS*

2013b, I-10). Due to the highly dynamic and lethal environment associated with LSCO, the principles of primary importance to this study are responsiveness, simplicity, flexibility, and survivability. Therefore, these principles aid the evaluation of for the current operating model for employment during LSCO. A thorough review of applicable doctrine related to the research topic also requires an understanding of Army doctrine.

Published in 2017, *Field Manual (FM) 3-0* is the Army's capstone doctrine for operations. The document reflects the Army's shift in focus from limited contingency operations to LSCO and describes the land component's expected operational environment. *FM 3-0* re-introduces the Corps and Division as formations, which increases the scale of support required from tactical airlift during LSCO. Also addressed are the significant challenges in operational tempo and lethality due to robust multi-domain, A2/AD threats. In addition to the increased scale of tactical airlift support, *FM 3-0* clearly highlights that LSCO will demand dynamic and persistent tactical airlift support.

The doctrine documents reviewed for this study help create a baseline understanding of best practices for the joint force. To provide these best practices, doctrine typically looks back at historic examples instead of leading change in the conduct of war based on emerging capabilities and threats. Therefore, to understand how tactical airlift should operate in LSCO, a review of current and emerging capabilities is necessary.

Tactics, Techniques and Procedure Manuals

Joint and service Tactics, Techniques and Procedure (TTP) manuals provide detailed instruction on how to plan and accomplish specific tasks across the range of

military operations. USAF Weapons School papers are also applicable to this category of literature. These graduate-level theses address current tactical and operational level issues and produce tangible recommendations to solve problems. In the context of this study, a review of these documents informs the reader on how operational forces conduct operations at the tactical level today and how they may conduct operations in future LSCO.

The primary TTP manuals applicable to this study are *C-130J Combat Operations (AFTTP 3-3.C-130J)* and *C-17 Combat Operations (AFTTP 3-3.C-17A)*. Both manuals prescribe unclassified operational procedures including basic aircraft operation, aerial delivery methods, and combat employment considerations. An understanding of the advantages, limitations and planning guidance for airdrop and airland operations are essential to any discussion of current operations or future LSCO employment. Both manuals state that airland operations are the preferred method of airlift support due to increased efficiency, cargo survivability, and simplicity. However, the tactical situation may dictate airdrop operations. Airdrop operations enable direct delivery of cargo and the movement and maneuver of land component forces. Both AFTTP manuals specify combat considerations, specifically, that mobility aircraft are capable of autonomous operations in low threat environments. However, operations in a higher threat environment require appropriate force packaging. After review of these TTP manuals, it is evident that airlift operations during LSCO will employ the same basic aerial delivery methods though they will require modifications for the LSCO operational environment.

A recent USAF Weapons School paper addresses modification to existing TTP that are applicable to LSCO. On-call airdrop is a method of aerial delivery that loosely

follows Close Air Support (CAS) procedures (ALSA 2016, 126). Captain John Adam offers a new concept of conducting on-call airdrop coordination and procedures with the goal of increasing flexibility and reducing time and communication requirements (Adam 2016, 3). Tactics manuals are surely important to this study but they do not address all the challenges in preparing for LSCO. Additional topics such as force structure, organization, basing, and command relationship all influence the force in this quest.

Miscellaneous Academic Works

Major David McCarthy's Naval War College paper, *Chinese Anti-Access/Area Denial: The Evolution of Warfare in the Western Pacific* offers key insight into Chinese A2/AD capabilities and their impact on future LSCO. Though this thesis is adversary and AOR agnostic, Major McCarthy's analysis of Chinese A2/AD capabilities is of significant value to the understanding of LSCO. Major McCarthy explores the history and motivation behind A2/AD capabilities. His research shows that as early as the 1980s adversary nations sought to deny freedom of action in the air, land, sea, space and information domains to disrupt U.S. power projection capability (McCarthy 2010, 1). This is of critical concern because the U.S. military has come to depend on the ability to freely deploy forces and quickly gain superiority across multiple domains (McCarthy 2010, iii). Due to the proliferation and rapid advances in theater ballistic missiles, the long-range surface to air missiles, and cyber-based fires, the U.S. cannot expect this trend to continue in future LSCO. Therefore, it is critical for the military to understand and prepare for the impacts of contested deployment operations. Theater access is a critical challenge but the area denial portion of A2/AD is the primary concern for tactical airlift forces because employment of tactical airlift forces assumes theater access. Unlike Anti-

Access capabilities, Area Denial weapons such as global positioning system jamming and shorter-range surface to air and surface to surface fires are primarily mobile targets. As such, successfully targeting and mitigating all an adversary's area denial capabilities is impossible. Major McCarthy concludes that to overcome A2/AD challenges and succeed in an A2/AD environment the U.S. military must better integrate planning and operations centers to mass effects and overcome capability gaps at the service component level (McCarthy 2010, 10).

In his USAF Weapons School paper, Captain Joseph Waldon explores command relationships in the context of airlift support to special operations. Captain Waldon's study is relevant in that it provides insight into how airlift can support geographically isolated land component forces. This concept of operations has parallels to LSCO and is, therefore, can assist in answering the primary research question of this thesis. Captain Waldon recommends against a Change in Operational Control (CHOP) of airlift forces to the supported commander (Waldon 2015). His recommendation is based on the additional responsibilities associated with OPCON that exceed the capability of a land component commander to perform for airlift forces. To satisfy the occasional need for dedicated, direct support to a land component commander, Captain Waldon only recommends a change in Tactical Control (TACON) for limited durations and for specific purposes.

Major William Percival's thesis; *Integrating Joint Intra-Theater Airlift Command and Control with the Needs of the Modular Army* explores the airlift request, allocation, and apportionment processes in the context of the U.S. Army's shift to the Brigade Combat Team as the primary maneuver echelon. Major Percival's work does not address LSCO implications, although his conclusions do provide a framework for evaluating

these processes. This work also highlights underlying issues with Command and Control of airlift forces. Of note, Major Percival states that as the USAF strives for the overall efficiency of the global transportation network, it loses effectiveness at meeting the end user's requirements (Percival 1995, 35). The key conclusion of Major Percival's study comes from his requirements for effective and efficient tactical airlift. He concludes that effective and efficient tactical airlift meets the following criteria (Percival 1995, 92):

1. Provides flexible support while maintaining centralized control of airlift forces
2. Processes respond to requirements within 48 hours of notification
3. Has detailed air-ground coordination
4. Balances effectiveness with acceptable efficiency

These criteria and measures are valid for evaluation airlift processes regardless of the environment.

Historical Analysis

The doctrinal shift to LSCO from limited contingency operations represents a significant change for much of the military's population that entered service in the post-9/11 environment. Luckily, there is a historical precedent in terms of doctrine, battle history and academic analysis from the Cold War era that assists in the transition.

Field Manual 100-5, commonly referred to as Air Land Battle was the U.S. military's warfighting doctrine to counter Soviet aggression in Europe from 1982 to the late 1990s. Air Land Battle recognized the rapid pace and lethality of modern Soviet capabilities at that time and sought to integrate combined arms and cross-Service capabilities in response (HQDA 1986, 25). The parallels between the Cold War and the forecast operational environment of LSCO are clear. For this reason, Air Land Battle

serves as a point of departure for integrating tactical airlift into LSCO. Air Land Battle is primarily concerned with integrating fires but also recognizes that sustainment and tactical are critical to success in LSCO. According to this doctrine, sustainment operations must fully control and exploit air and land lines of communication to enable continuous and adequate sustainment of engaged units (HQDA 1986, 72). Air Land Battle further states that due to the heavy demands of high-intensity conflict, engaged units should receive “push packages” rather than the normal requisition process of sustainment (HQDA 1986, 60). Finally, Air Land Battle cites the Battle of the Bulge of 1944 and the Tet Offensive of 1968 to highlight the necessity for improvisation in sustainment operations to prevent mission failure (HQDA 1986, 63). The lesson learned from these examples is that sustainment forces must retain flexibility in their operations to adapt to unforeseen circumstances.

Major Garry Schnelzer’s 1977 thesis *Aerial Resupply of Encircled Army Units during a Mid-Intensity European War* explores many of the tactical challenges associated with tactical airlift in the context of LSCO. Though technological advances since the 1970s mitigate some of the challenges Major Schnelzer addresses, his analysis is still applicable to airlift during modern day LSCO. According to Major Schnelzer, adversary threats and airlift requirements are the primary planning factors for tactical airlift during sustained combat operations (Schnelzer 1977, 72). Major Schnelzer’s thesis uses the 1968 siege of Khe Sanh to highlight both the massive scale of tactical airlift sortie requirements and the methods of aerial delivery necessary during sustained combat operations (Schnelzer 1977, 37). Finally, Major Schnelzer addresses tactical and

logistical challenges of continuous airdrop operations in support of an engaged land component force (Schnelzer 1977, 68).

Trends

The thorough review of applicable literature identified a few notable trends. These trends serve as the primary areas of emphasis for the remainder of this thesis and therefore deserve mention to assist the reader going forward. The first trend is that many sources highlight the rapid tempo, lethality, and uncertainty of LSCO. These factors present a significant change from current operations and will challenge tactical airlift forces to assure survivability and the adaptability necessary to meet user requirements during LSCO. Second, the sustainment requirements of land component forces during LSCO are on a huge scale. To meet the enormous requirements of the land component, airlift forces must maximize both efficiency and effectiveness in its operations. Finally, continuous and detailed integration between the supported and supporting force is necessary to achieve mission success in LSCO.

Gaps in the Record

As stated in Chapter 1, the primary research question for this thesis is: How should USAF intra-theater airlift operate to support land component forces during LSCO against a near-peer adversary? The literature review process did a good job of framing the operational environment, identifying challenges, and giving historical context for LSCO but offers little assistance to the tactical airlift community to define how tactical airlift forces will operate in LSCO. Specific areas absent from the record include:

1. How to integrate tactical airlift support with the supported unit's operations?
2. What, if any changes to airlift coordination processes must occur in LSCO?

3. What primary methods of aerial delivery to expect in LSCO?
4. What, if any changes to ALR are necessary for LSCO?

Conclusion

The goal of the literature review process was to establish a comprehensive understanding of the topic and identify shortcomings in the record. The trends and gaps noted above serve to direct the remaining chapters of this thesis where the author analyzes the topic and offers recommendations to better prepare for LSCO.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter defines the research methodology used to address the primary and secondary research questions posed in Chapter 1 by identifying the logical framework, steps taken to obtain information, and evaluation criteria for both information collected and the author's recommendations.

Logical Framework

This study utilizes the applied professional case study methodology. This is a qualitative methodology that facilitates a capability-based analysis while accounting for the professional body of knowledge (Long 2016). Leveraging expertise in this area of study, the author's initial personal recommendation (R1) to address the primary and secondary research questions is in Chapter 1. The R1 serves as a starting point to guide the research and logical process of fully exploring the research question. As the research methodology progresses, the author updates this recommendation twice to account for the research accomplished and finally by approaching the issue from the CDM's perspective.

With the author's R1 established, the first step of the methodology is the functional area assessment. The functional area assessment explores the current state of tactical airlift. This includes current capabilities, operating models, methods of employment, etc. The purpose of this step is to develop a holistic understanding of how tactical airlift forces currently operate to compare current capabilities against the anticipated requirements of LSCO. The author highlights the pertinent findings of the functional area assessment in Chapter 4 for further evaluation during the next step of the methodology.

The second step of the methodology is the functional needs assessment. The purpose of this step is to refine tactical airlift requirements during LSCO and identify capability gaps. Comparing the current capabilities identified in the functional area assessment against anticipated LSCO requirements enables this process. Specific LSCO factors used to evaluate current capabilities include threats, airlift requirements, operational tempo, etc. The resultant capability gaps identified directly feed the functional solutions assessment.

The functional solution assessment is the next step. Here the author identifies and analyzes potential solutions across the doctrine, organization and leadership aspects of DOTMLPF to address the capability gaps. A comparison of the adopted solutions against R1 creates the author's informed recommendation (R2) in Chapter 4. The informed recommendation concludes the capability-based analysis portion the methodology. However, the professional case study aspect of the methodology continues.

The final step of the research methodology is to evaluate R2 from the perspective of the CDM. Evaluating R2 in this manner assures that the author's conclusions and recommendations for addressing the capability gaps are suitable, feasible, and acceptable for implementation. The result of the final evaluation is the author's recommended solution (R3). The recommended solution is at the end of Chapter 4.

Chapter 5 finalizes this study with a campaign plan for implementing the author's R3. The author utilizes the Kotter Change Model to identify and prioritize specific actions and the timelines necessary to implement R3. Chapter 5 concludes with the author's recommendation for further research and individual lessons learned.

To aid the reader in fully understanding the methodology, Figure 2 below graphically depicts the methodology. The author utilizes this same figure to summarize the findings of each step of the methodology in Chapter 4.

		Capabilities Based Assessment								
		Functional area assessment		Functional Needs Assessment	Functional Solutions Assessment					
Pre-research position	DOTMLPF-P domains	Problems	Opportunity	Requirement	Possible Solutions	Refined (R2)	Stakeholder Lens Analysis	Final (R3)	Kotter Model Lens applied	Campaign plan
	Doctrine									
	Organization									
	Leadership									Pri: ABC ST(1-2yrs) LT(2-5yrs)

Figure 2. Research Methodology

Source: Figure outline by Dr. Kenneth Long, data by author.

Strengths and Weaknesses of Methodology

The applied professional case study methodology's primary strength is that follows a logical flow. The flow identifies capability gaps by defining the current capabilities and/or processes and comparing them against future requirements. A secondary strength of this method is that the author can include personal expertise and experience toward the research. This process also has weaknesses worth addressing.

The principal weakness of the selected method is that to identify capability gaps and characterize the future operating environment of LSCO, the author must make assumptions. The author mitigates this weakness through significant research to develop an understanding of the future operating environment and specifies what is fact and what is an assumption. Further, the author acknowledges that the recommendations offered in chapter 5 may only be applicable in the context of the operational environment specified in this thesis.

CHAPTER 4

ANALYSIS

Consistent with the research methodology described in Chapter 3, this chapter begins by evaluating current capabilities against the anticipated requirements of LSCO. The functional area assessment establishes a common understanding of current capabilities before studying the future operating environment for LSCO. The functional needs analysis characterizes the operational environment of LSCO to determine the requirements for tactical airlift. Comparing the result of these two steps identifies capability gaps between the current operating construct and anticipated LSCO requirements. This enables the functional solutions analysis where the author outlines potential solutions that form the author's informed recommendation (R2) to answer the primary and secondary research questions. The reader should note that although there is significant overlap between the secondary research questions, they are addressed independently to help isolate them. The author's R2 and the subsequent R3 later in the chapter accounts for the overlap by blending potential solutions to answer the primary research question from a holistic approach. Chapter 4 concludes by improving the author's R2 by viewing the recommendations from the perspective of the CDM and key stakeholders. The final result is the author's improved recommendation (R3).

Functional Area Assessment Overview

The functional area assessment is critical as it establishes a baseline understanding from which to draw conclusions and ultimately the recommendations that will better prepare tactical airlift forces for LSCO. Factors that influence the current tactical airlift model generally fall into two distinct categories: command and control

(C2) and execution. The execution category includes operating models, aerial delivery methods, and integration across the joint force. A baseline understanding of the current tactical airlift model is critical to evaluating its utility in LSCO.

The literature review and analysis of current tactical airlift processes and capabilities supports two main conclusions. The first is that the tactical airlift C2 model has adapted itself to the limited contingency operations of USCENTCOM. Here, C2 processes reside almost exclusively in sustainment channels and prioritize operation efficiency over tactical effectiveness. These factors result in extended planning timelines via the ATO and a lack of flexibility to meet dynamic mission requirements. The second conclusion is that tactical airlift execution is largely an extension of the C2 issues just mentioned. Because tactical airlift operations rarely demand detailed coordination with the supported land component user or the CAF in the form of SEAD or DCA, aircrew and leaders are largely detached from the demands of tactical airlift outside of limited contingency operations. Though limited contingency operations account of the preponderance of operations since September 11th, 2001, tactical airlift forces must be prepared to operate across the range of military operations. To evaluate the ability of tactical airlift forces to operate in LSCO, the functional needs assessment identifies the specific requirements LSCO will demand of USAF tactical airlift forces.

Functional Needs Assessment Overview

The next step is to analyze the expected operating environment of LSCO to ultimately compare the current capabilities previously identified by the Functional Area Assessment against the anticipated future requirements of LSCO. Analysis of LSCO is also divided between 2 main categories; threats and user requirements. Before outlining

the functional needs assessment findings, it is necessary to review the definition of LSCO from Chapter 1 to assure a common understanding of the topic at hand.

According to *U.S. Army Field Manual 3-0*, “LSCO present the greatest challenge to Army forces” (HQDA, 2017, 1-2). These operations include intense, lethal, and brutal conditions that induce “chaos, fear, violence, fatigue, and uncertainty” (HQDA 2017, 1-2). The joint force can expect an adversary to combine conventional tactics, terror, criminal activity and multi-domain warfare (HQDA 2017, 1-2). The environment associated with LSCO demands increased operational tempo and lethality (HQDA 2017, 1-2). Adversaries will likely employ A2/AD capabilities during LSCO to deny freedom of maneuver and freedom of action. This baseline definition guides the remaining analysis of LSCO that begins with anticipated threats.

The functional needs assessment seeks to identify the key attributes of effective tactical airlift during LSCO. The key conclusion of the assessment is that flexible, continuous, and persistent support define effective support during LSCO. Flexibility is necessary to meet the dynamic and variable user requirements in terms of timing, location, and type of support (HQDA 2017, 7-48). LSCO presents significant uncertainty for the supported ground user and therefore tactical airlift forces must be ready to provide agile support based on dynamic requirements. Specifically, tactical airlift forces must be able to respond to user requirements within 48-hours of execution (Percival 1995, 92). Next, continuous support is necessary to account for extended lines of communication due to A2/AD threats and increased user demand during LSCO (HQDA 1986, 61). User demand will also be variable in terms of the type and amount of sustainment required. The cumulative result of these two factors is a loss of operational efficiency for the

sustainment system. This is because planners cannot accurately forecast requirements to maximize the efficient use of aircraft and flight schedules. Continuous support is, therefore, necessary to overcome the loss of operational efficiency to achieve tactical effectiveness. Without continuous support, the supported force may culminate due to the many challenges of LSCO. Finally, persistent support is critical to overcoming the high threat environment of LSCO (HQDA 2017, 1-2.) Persistence, in this case, refers to the air component accepting prudent risk and supporting the land component with tactical airlift despite the threat to air operations. Though broad and seemingly simple, these attributes are critical for effective tactical airlift support to the land component during LSCO and therefore directly support the primary research question. With the functional need for LSCO established, the next step is to accomplish gap analysis before offering recommendations in Chapter 5.

Functional Solutions Analysis Overview

The functional solutions analysis explores the secondary research questions independently and outlines potential solutions to close the capability gaps previously discussed. Discussion of each secondary research questions includes a summary of findings from the FAA and the FNA before outlining potential solutions for the R2 and the subsequent R3.

Airlift Operating Model

Functional Area Assessment. The cornerstone of airlift operational doctrine is Centralized Control and Decentralized Execution (JCS 2019, II-2). The Air Mobility Directorate (AMD) within an Air Operations Center (AOC) plans, schedules, and manages tactical airlift operations (JCS 2019, II-4). The AMD integrates with the other

directorates within the AOC to accomplish theater air operations via the Air Tasking Order (ATO) Cycle. The ATO cycle is an iterative, 72 to 96-hour process that deliberately develops an air strategy then plans and executes a day's air operations on behalf of the Air Component Commander (JCS 2014a, III-20). The daily ATO is published approximately 24 hours prior to execution. Once published, individual Wings, Groups, and Squadrons finalize the plan and execute their assigned missions from geographically separated locations. The doctrinal 72 to 96-hour timeline strives to balance the benefits of deliberate planning with the flexibility to respond to emerging requirements (JCS 2014a, III-20). However, the steady state operations consistent with USCENTCOM operations for the past 18 years, air operations and user requirements have become very predictable. This has allowed planners to extend planning horizons beyond 96 hours to maximize the efficiency of the air mobility system. Extended planning horizons reduce the flexibility of airlift operations to respond to dynamic user requirements. The hub and spoke operating model compounds this issue by massing supplies and aircraft at large fixed locations.

In response to near steady state operations, USCENTCOM AMD and theater sustainment planners rely heavily on Channel Missions to efficiently schedule and plan tactical airlift sorties. Channel Missions utilize fixed route structures and schedules that allow access to all common use customers (JCS 2019, I-6). Fixed route structures and schedules are viable in limited contingency operations because requirements are predictable, regular, and quantifiable (JCS 2019, IV-3). The hub and spoke method illustrated in figure 1 accomplishes most Channel Missions. The concept is that main operating bases (hubs) consolidate cargo, equipment, and personnel which is then flown

to forward operating bases or to their end user via tactical airlift at fixed, regular intervals. A benefit of fixed route structures and schedules is that planning and scheduling for tactical airlift operations can occur prior to the ATO cycle. To maximize efficiency and predictability for both airlift users and airlift forces, AMD planners take advantage of this to the maximum extent possible. The efficiency and predictability gained by planning in this manner comes at the expense of flexibility and therefore, at times, effectiveness.

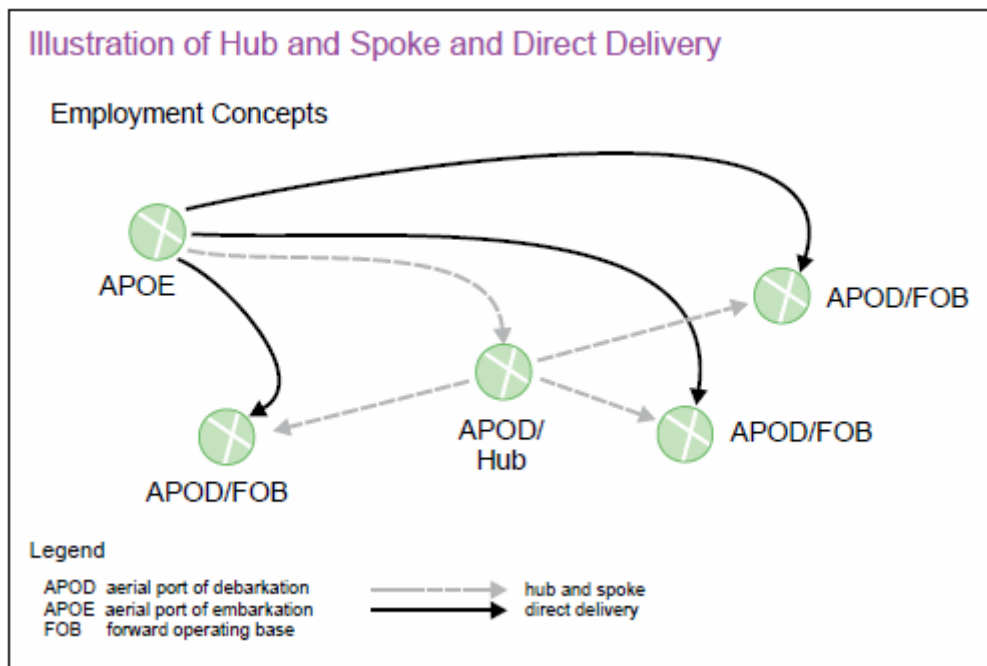


Figure 3. Hub and Spoke Model

Source: Joint Chiefs of Staff, Joint Publication 3-17, *Air Mobility Operations* (Washington, DC: Government Printing Office, 2019), accessed 4 February 2019, [https://www.jcs.mil/Portals/36/Documents/ Doctrine/pubs/jp3_17.pdf ?ver=2019-03-05-122331-027](https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_17.pdf?ver=2019-03-05-122331-027), 81.

The limited contingency operations since 2001 have made land component user requirements relatively static and predictable (JCS 2019, IV-23). Conversely, the highly lethal and rapid tempo of LSCO will be significantly more demanding of land component forces (HQDA 2017, 1-3). The key factors that influence land component airlift requirements during LSCO include the expeditionary nature of U.S. operations, non-linear operations, adversary capabilities, and rapid tempo. These factors combined result in a significantly increased and unpredictable demand for tactical airlift support. To meet the demand, tactical airlift forces must first understand the requirement.

Functional Needs Analysis. The primary challenges of LSCO as they relate to the tactical airlift operating model are extended lines of communication and increased, dynamic, and variable user requirements. Anti-access capabilities inhibit adversary movement into a theater while area-denial operations deny an adversary freedom of action in a specific geographic area (McCarthy 2010, 1). A2/AD threats first influence tactical airlift because they significantly challenge USTRANSCOM's ability to project forces into a theater of operations. Successful deployment and the Joint Reception, Staging, Onward Movement, and Integration (JRSOI) of friendly forces rely on deliberate planning and execution via the Time-Phased Force Deployment Data process. Also crucial to successful JRSOI are ports of debarkation (air and sea) outside an adversary's area of influence. This is because port operations and JRSOI require freedom of action and maneuver for the offload of ships and aircraft, equipment distribution, maintenance activities, and unit integration into the theater. The A2 portion of A2/AD clearly impacts and potentially denies the ability of friendly forces to project, JRSOI, and sustain forces

in a theater. The result as it relates to airlift is that establishing fixed main operating hubs are not feasible until the joint force mitigates Anti Access threats.

Area Denial threats further challenge tactical airlift operations as their ubiquitous nature prevents freedom of action for airlift aircraft that are not suited for autonomous operations in a high threat environment. This relates to the airlift operating model because airlift planners must now also account for the force protection capability of combat air force assets when planning and scheduling missions. Channel mission and their inherent fixed schedules and route structures are not viable in this case because the times, locations and availability of combat air forces are not known until the ATO cycle has apportioned and allocated forces (JCS 2019, III-22).

The historically expeditionary nature of U.S. operations requires deployment and JRSOI before a unit is capable of successful combat operations. However, A2/AD threats and their impact on JRSOI previously addressed may require a land component force to immediately begin combat operations upon arrival in a theater (HQDA 2017, 1-3). These operations are likely to be in an austere environment, with little external support and against an adversary that has overmatch in terms of numbers and capability (HQDA 2017, 1-3). Starting LSCO in this manner combined with continued area denial threats results in extended lines of communication, non-linear operations and significantly increased demand for tactical airlift to sustain operations (HQDA 1986, 60). These factors result in a land component increasingly reliant on persistent and continuous tactical airlift support to its operations (HQDA 1986, 62) In addition to an increased demand for tactical airlift, specific requirements are likely to be unpredictable and

variable (JCS 2019, IV-23). Doctrine characterizes sustainment requirements in this manner because of consumption rates vary significantly based on the tactical situation.

To summarize, an appropriate airlift operating model for LSCO can meet the increased and variable user requirements, overcome extended lines of communication and does not rely on fixed hubs. Next, the functional solutions analysis explores options to better understand how to meet overcome these challenges.

Functional Solutions Analysis. The hub and spoke model and channel missions currently employed are not optimal for use in LSCO due to challenges of A2/AD threats, the resulting extended lines of communication and the increased and variable user requirements of LSCO. Direct delivery, as outlined in *Joint Air Mobility Operations*, is a method of airlift that skips the intermediate hub and, as the name states, deliver the required personnel, equipment, and cargo directly to the end user (JCS 2019, V-13). Direct delivery is a viable solution for improving the tactical airlift operating model because by skipping intermediate hubs, direct delivery meets user requirements faster than hub and spoke (JCS 2019, V-13). Direct delivery retains inherent flexibility to meet a user's dynamic requirements because it does not mass cargo and equipment or rely on fixed route structures or schedules. An additional benefit of direct delivery is that it can overcome the challenges A2/AD threats pose to large, fixed operating locations.

Direct delivery is useful to overcome specific challenges of LSCO. However, it is a less efficient operating model because it pairs aircraft directly with an end user instead of maximizing the cargo carrying capability of each aircraft. Depending on the distances involved, direct delivery may also require significant aerial refueling support (JCS 2019, V-14). Aerial refueling aircraft are low density, high demand assets. Therefore, using

aerial refueling aircraft to enable direct delivery means the reduced capacity for other aircraft, including fighters where aerial refueling support is critical to mission success. Finally, direct delivery relies on complex C2 and COMREL via the theater direct delivery cell of the AMD (JCS 2019, II-6). Though the direct delivery model has negative impacts, it is still a viable option to meet the dynamic and variable user requirements and overcome A2/AD threats in LSCO. For this reason, the author concludes that direct delivery operations will occur more frequently and take on an increasingly important role in LSCO.

Command Relationships

Functional Area Assessment. Command relationships (COMREL) define the authorities and responsibilities between different echelons of command (JCS 2013a, V-I). Command relationships significantly impact tactical airlift operations in two main areas. The first area is between USTRANCOM and the Combatant Commands. At any given time, a Combatant Commander normally only has operational control (OPCON) of a limited number of C-17s and other inter-theater capable aircraft. This number is usually less than half of an operational C-17 squadron. Due to the strategic capability and inter-theater range that C-17s provide, the majority of C-17s remain under the OPCON of USTRANCOM and receive their C2 from the 618th AOC at Scott Air Force Base in Illinois (JCS 2019, II-2). This arrangement allows USTRANCOM to allocate and apportion its forces based on the competing daily needs of all the Combatant Commanders. However, this complicates the C2 of tactical airlift in two circumstances. The first is when the tactical airlift requirement exceeds the capability or capacity of aircraft OPCON to a Combatant Commander. This can be due to cargo requirements such

as size or the number of pallets and passengers. The second is if circumstances dictate direct delivery from outside the Combatant Command's AOR. Figure 2 illustrates the previously discussed direct delivery model. In either circumstance, a Combatant Commander must request support from USTRANSCOM. External coordination can slow the air movement request timeline and operational level planning. The result is reduced flexibility to meet dynamic and variable user requirements in LSCO.

The second, and arguably most critical area of COMREL to tactical airlift operations in LSCO is between airlift forces and their supported user. The air component normally retains OPCON and TACON of assigned forces airlift forces (JCS 2019, I-9). Airlift forces then primarily support common user requirements via general support (JCS 2019, I-9). The supported and supporting relationship in general support affords equal opportunity for access to airlift support to all joint users (JCS 2019, III-15). The AOC prioritizes airlift allocation and tasking in accordance with the Joint Force Commander's approved air apportionment as part of the ATO cycle (JCS 2014a, III-22). Higher priority users are likely to receive support during ATO execution, while lower priority users are less likely. This process is well suited for circumstances when user requirements are well defined and communicated as part of the ATO cycle. When this is not possible due to dynamic or emerging requirements high priority airlift requirements may not receive support. Because the supported force is likely to have dynamic and variable requirements during LSCO, the supporting airlift forces must address COMREL shortcomings to assure maximum effectiveness at meeting user requirements.

Functional Needs Analysis. The primary purpose of COMREL is to organize joint forces to achieve unity of effort and unified action (JCS 2013a, IV-3). This is critically

important during LSCO because operations are inherently joint and require detailed coordination across the service components (HQDA 2017, 1-3). COMREL is particularly important to airlift forces because they simultaneously support operational objectives via theater sustainment mission and tactical level objectives via common user support (JCS 2019, V-I). Therefore, COMREL that affect airlift forces must balance operational efficiency against tactical effectiveness (JCS 2019, I-13). For tactical level success in the highly lethal and rapid tempo operational environment of LSCO, COMREL should enable maximum flexibility and speed to meet dynamic, increased and variable user requirements (HQDA 2017, 7-48). Conversely, to support operational efficiency, COMREL should afford maximum support opportunities across the joint force (Percival 1995, 35). Because of the competing requirements between operational efficiency and tactical effectiveness, appropriate COMREL for airlift forces in LSCO must balance these competing requirements and/or enable flexibility to adjust the priority as the operating environment changes.

Functional Solutions Analysis. As previously noted, ideal COMREL for tactical airlift forces in LSCO must balance operational efficiency with tactical effectiveness. For circumstances that demand maximum tactical effectiveness, *Joint Air Mobility Operations* suggests that airlift forces can operate in direct support of their supported user (JCS 2019, I-9). Major Joseph Waldon argues that direct support or TACON of airlift forces to a supported user should be limited in scope and duration to those areas that truly demand maximum tactical effectiveness that cannot be achieved via common user support (Waldon 2015). In his 1995 study of airlift support to the modular Army, Major William Percival similarly recommends that the air component retain centralized control

of tactical airlift forces (Percival 1995, 35). Though scoped to Brigade level support in the mid-1990s, Percival's study is applicable to LSCO because modular army support and LSCO are both inherently dynamic and non-linear. Both Waldon and Percival cite the competing demands of operational efficiency and tactical effectiveness as the primary argument against direct support or TACON of airlift forces to a supported user.

The balance between operational efficiency and tactical effectiveness in current COMREL means any change to improve tactical effectiveness is likely to negatively impact efficiency. Because operational efficiency is critical to overcoming the force projection challenges of LSCO, the author, agrees with both Waldon and Percival; airlift forces should remain under the OPCON and TACON of the air component and fly missions as tasked via the ATO.

Airlift Execution

Functional Area Assessment. Airlift operations doctrinally fall into two categories, theater support, and combat employment. Theater support missions include unit movements, general support airlift, aeromedical evacuation, and operational support airlift (JCS 2019, IV-3). These are the routine missions that help sustain the joint force within an AOR. In limited contingency operations, most tactical airlift sorties are theater support missions (JCS 2019, IV-4). Conversely, combat employment sorties rapidly support joint user requirements in response to the dynamic situation on the battlefield (JCS 2019, IV-3). These missions deliver personnel and their equipment to the decisive point on the battlefield or sustain land component forces directly engaged with the enemy. The battle of Khe Sanh and the Airborne Assault of Normandy on D-Day are the quintessential examples of combat employment sorties. Clearly, combat employment

carries higher risk due to the proximity to enemy forces and requires more detailed coordination than normal theater support sorties. Regardless of the type of airlift mission flown, the two methods aerial delivery of personnel, equipment, and cargo are airland and airdrop.

Airland is the primary method of tactical airlift because it is the most efficient method of aerial delivery (JCS 2019, IV-11). Therefore, planners default to this method unless the tactical situation dictates otherwise. In airland operations, personnel, equipment, and cargo are offloaded from the aircraft after it has landed at its destination. Airland operations can occur at any suitable landing site for the aircraft type which ranges from large international airports or main operating bases to small unimproved dirt landing zones as short as 3000 feet long. The efficiency of the airland method of employment is based on three primary factors. The first is that airland operations maximize the use of available cargo space within an aircraft because airland operations do not require additional rigging or parachutes associated with airdrop operations. Second, airland operations permit the transport of sensitive equipment or cargo not suitable for airdrop. Finally, and arguably the most important is that airland allows for the backhaul of cargo or the evacuation of personnel from the landing site (JCS 2019, IV-12). This is truly a force multiplier because it maximizes the use of available aircraft. While efficient and viable for most theater support missions, airland operations do have some drawbacks.

The primary drawback for the airland method of delivery is that it requires a fixed, suitable landing site for the aircraft (JCS 2019, IV-12). Suitable landing sites are not always available in remote areas or may be too far from the end user. Threats may

also make a landing unfeasible for tactical airlift forces. Aircraft are most vulnerable when they are on the ground, particularly to indirect fires such as mortars and artillery (Schnelzer 1977, 37). Khe Sanh highlights this fact. Here, the USAF took heavy airlift losses attempting to sustain the besieged airbase via airland before switching to airdrop (Schnelzer 1977, 37). High threat environments of the future will similarly preclude airland operations. Finally, the offload of cargo usually requires materiel handling equipment and can take an extended period depending on the type and size of the equipment and cargo (JCS 2019, IV-11). If the supported force requires an expeditious offload or no equipment is available, airland operations are not viable. Despite the limitations of airland, it is still the preferred method of aerial delivery and accounts for most tactical airlift sorties in today's operating environment.

As the name implies, the second method of aerial delivery, airdrop, delivers personnel, equipment, and cargo via parachute while the aircraft remains in flight. Airdrop is desirable for the joint force when supporting a force directly engaged with the enemy when surprise is essential, or in poor weather conditions that preclude airland operations (JCS 2019, IV-17). Airdrop operations are highly flexible because they do not require an aircraft landing site. The only ground requirement for an airdrop is a drop zone large enough for the airdrop load to land upon. There are various types of drop zones that support user and load requirements. These range from traditional rectangular drop zones with a pre-established run-in course and point of impact to circular drop zones that permit flexibility in terms of run-in course and area drop zones that allow the supported force to change the point of impact to meet mission requirements (JCS 2013b, IV-20). Airdrops deliver equipment and cargo via numerous methods that are tailored to the tactical

situation and the supported force's sustainment requirements. In addition to sustainment via airdrop, tactical airlift can also enhance the ground force's movement and maneuver plan via mass parachute assault of personnel (JCS 2013b, IV-19). Personnel airdrops are scalable up to an entire Airborne Brigade in size and require detailed planning by both the air and land component. Through flexible sustainment and movement and maneuver enhancement, airdrop operations quickly and effectively support the joint force. Airdrops have many advantages but just like airland operations, they do have limitations.

The primary limitation of airdrops is that they are less efficient than airland operations because they do not maximize the available cargo load of an aircraft due to parachute rigging and offer no backhaul capability (JCS 2019, IV-17). Additionally, cargo and equipment require special rigging and inspections prior to airdrop. The time and materiel demand for rigging and inspections add to the complexity and burden on the sustainment system to support airdrops over the course of an operation or campaign. Finally, airdrop operations require detailed planning and integration between the air and land component (JCS 2019, IV-17). This coordination goes well beyond that of airland operations that normally remain in sustainment channels (J4). In addition to sustainment coordination, airdrops demand integration between the land component's movement and maneuver and fires cells (S/G3) with the air component's tactical planners to assure deconfliction and that the airdrop supports the ground scheme of maneuver. Personal lessons learned from the USCENTCOM AOR highlight that early coordination between operations planners is crucial for successful airdrop operations. Though these limitations can hinder operations at times, airdrop operations have been and will continue to be a vital capability for the joint force going forward.

Functional Needs Analysis. Like the operating model and COMREL requirements for LSCO, the primary requirement for airlift execution in LSCO is the ability to meet dynamic user requirements. Specific to airlift execution, dynamic user requirements include unknown times, locations and methods of aerial delivery. Dynamics in these areas are primarily linked to the increased tempo of LSCO. The increased tempo and lethality of LSCO means that a land component force must rapidly adapt to the operational environment to achieve positions of relative advantage (HQDA 2017, 1-19). To do so, the unit must maneuver to both achieve positions of relative advantage but also to assure survival in the face of a highly capable and lethal adversary. As a result, a supported force cannot remain in a fixed position for an extended period (HQDA 2013, 6-18). This impacts tactical airlift support to the land component in that planning horizons are likely to be shorter than the 72-hour ATO cycle. As a result, airlift planning timelines must adapt to that of the supported force. Specifically, airlift forces must be able to respond to emerging requirements within 48-hours of execution (Percival 1995, 92). Also, airlift planners must afford aircrews maximum flexibility during execution to adapt to the dynamic tactical situation. This includes the flexibility to change the location of an airdrop or to deliver supplies on demand. User requirements always drive tactical airlift operations and therefore airlift forces must adapt to the expected dynamics of LSCO.

Functional Solutions Analysis. The literature review in Chapter 2 and the subsequent analysis produced 3 primary findings that can enhance the flexibility of airlift execution and therefore help answer the primary and secondary research questions. The first finding is that airdrop operations should be the primary method of aerial delivery.

This is to account for the rapid pace of LSCO and that a supported user is not likely to remain in a fixed location due to threats. The inherent flexibility of airdrop previously described makes it the ideal method of aerial delivery over airland operations that require fixed operating sites such as landing zones or runways (JCS 2019, IV-11). Next, to meet dynamic requirements in terms of times and locations for aerial delivery, dynamic, on-call airdrop should be the norm. In his USAF Weapons School Paper *Rethinking On-Call Airdrop for the C-130J: Concept through Execution*, Captain John Adam describes tactics, techniques, and procedures that improve on-call airdrop by adopting procedures like Close Air Support. The on-call airdrop operations described by Captain Adam, integrates airlift forces into the supported user's planning and the ground scheme of maneuver, to pre-identify suitable airdrop locations that meet the requirements of both the user and aircrew (Adam 2016, 3). On-call airdrop in this manner affords the aircrew maximum flexibility during execution to change the time, location, and even airdrop load. Empowering the aircrew to respond to dynamic user requirements during execution also has the secondary benefit of streamlining prior coordination to meet the rapid pace and compressed planning timelines anticipated in LSCO. Though the pre-coordination and requests via the Joint Air Request Network (JARN) described by Captain Adam can best achieve user requirements in LSCO, on-call airdrop via the procedures described in *Joint Fires* is still a viable option (ALSA 2016, 126). The last finding for how airlift execution should perform in LSCO is "push" procedures. In circumstances where a supported user is unable to communicate their requirements or their requirements remain dynamic until execution, tactical airlift forces can use push procedures to assure continuous support to a user instead of waiting for requests from a force in direct contact

with the enemy (HQDA 1986, 72). Push procedures send pre-identified supplies at pre-coordinated intervals to a user without the need for normal requisition paperwork or coordination. Based on the need for flexible aerial delivery in LSCO, a combination of on-call airdrop and push procedures can achieve the required flexibility to overcome the rapid pace and unknowns of LSCO.

Acceptable Level of Risk

As a reminder, in accordance with the classification limitation noted in Chapter 1, discussion of ALR only includes the overall concept and general impacts to operations. This is to threat capabilities and current operational ALR guidance that exceed the classification level of this thesis.

Functional Area Assessment. To understand ALR and how it relates to tactical airlift operations in LSCO it is necessary to explore both current guidance and how airlift forces presently operate under that guidance. Acceptable level of risk is the Air Component Commander's willingness to accept risk for a given period, normally for an ATO cycle (JCS 2014a, D-1). The Air Component Commander specifies ALR for each mission type in the Air Operations Directive. The prescribed ALR defines the conditions necessary to operate within the weapons engagement zone for different types of threats. Mobility operations are normally restricted to low threat environments. This is primarily because airlift aircraft have limited organic defensive capabilities and rely on threat avoidance as their primary countertactic (JCS 2019, III-8). Low or Medium ALR is appropriate for low threat, limited contingency operations prevalent in USCENTCOM because it does not normally impede operations. However, the specific limitations of ALR Low and Medium can prevent tactical airlift operations in higher threat

environments without force packaging or external protection. The low threat environment of USCENTCOM and the limited contingency operations that have endured for the last 18 years have conditioned leaders and aircrew for a low tolerance for risk. This is an area of concern should LSCO arise in the future.

An understanding of current airlift integration and flight profiles completes the functional area analysis of ALR. As noted in the Airlift Execution section, most tactical airlift sorties are theater support via airland delivery in low threat environments. These sorties are the simplest to plan and execute because they do not normally require detailed coordination outside sustainment channels and permit autonomously operation by the assigned aircrew. For this study, autonomous operations mean that the aircrew operates the aircraft independent of external support such as Suppression of Enemy Air Defenses, Defensive Counter Air or Intelligence Surveillance and Reconnaissance. Because these sorties do not routinely require this level of support, and the propensity for mobility planners to schedule missions in advance of the ATO cycle, tactical airlift forces do not regularly integrate outside the airlift community. This concept of employment is appropriate for limited contingency operations and the USCENTCOM AOR where requirements remain relatively fixed but are not suitable for the lethality of LSCO.

Functional Need Analysis. Consistent with joint principles of effective sustainment, survivability is critical to overcoming the inherent lethality and operational level challenges of LSCO (JCS 2013c, I-10). To enable survivable operations, senior leaders, mitigate risk and issue ALR by balancing the risk to mission against the risk to force (CJCS 2016, C-3). In the case of tactical airlift in LSCO, appropriate ALR and risk mitigation enables sustained, survivable operations in a robust and highly lethal operating

environment. Threats to air operations in LSCO include mobile, long-range surface-to-air missiles, air defense artillery, and non-kinetic effects (McCarthy 2010, 2). The lethality, integration, proliferation, and mobile nature of modern A2/AD threats deny true freedom of action in the air domain. Therefore, friendly forces cannot expect to achieve overall air superiority in LSCO (USAF 2016, 2). Rather, air superiority is limited in terms of time and space to those areas of the operating environment necessary to achieve joint objectives (USAF 2016, 2). The limited defensive capability of most airlift aircraft increases the threat these A2/AD systems pose to airlift operations and the imperative for integrations with Combat Air Forces. Based on this reality, autonomous airlift operations and low or medium ALR under the current construct are not feasible or survivable in LSCO.

Functional Solutions Analysis. Appropriate ALR and risk mitigation for tactical airlift in LSCO balances risk to mission with risk to force (CJCS 2016, C-3). Force packaging is a tactic employed to increase the survivability of air operations by packaging air-to-air, SEAD, ISR and other capabilities necessary to counter the anticipated threats and ultimately achieve the tactical or operational objective. Tactical airlift assets such as C-130s and C-17s have limited defensive capability and therefore will likely require force packaging for the duration of LSCO. Force packaging has the benefit of increasing survivability for tactical airlift operations but will not come without limitations. Force packaging limits the flexibility of tactical airlift operations because it requires coordination and scheduling among the apportioned assets during the ATO cycle and constraints operations to those areas that protective assets are available. The conclusion is that during LSCO, tactical airlift operations cannot operate autonomously

and must be integrated with both the supported user and the apportioned air component force package to be successful. Additionally, due to the limitations of the ATO cycle previously discussed, this integration must occur within 72 hours of execution. The challenging and lethal operational environment of LSCO surely influence air operations but it also influences the land component user requirements for tactical airlift.

Informed Recommendation (R2)

As described in Chapter 3, the author's R2 is an informed recommendation to answer the primary and secondary research question based on an analysis of the research performed. The author divides the R2 into sections that address the secondary research questions. Each section briefly reviews the R1 before articulating the R2 for that section. The reader will note that unlike the R1, there is now an overlap between the individual areas to better address the primary research question in a holistic manner.

Operating Model. The author's R1 recommended direct delivery as the primary operating model. The author also recommended delaying the apportionment and scheduling of airlift forces if possible, to account for the rapid tempo and dynamic environment of LSCO. Based on the literature review and analysis, the author generally maintains a similar position as the R1 with a few modifications. The author still believes that direct delivery will play a major role in LSCO, especially early in the conflict to overcome extended lines of communication and to establish operating locations for JRSOI. However, due to increased user demand and the inherent loss of efficiency with direct delivery, the hub and spoke model should remain the primary and preferred operating model for airlift. The hub and spoke model enables maximum efficiency for the finite number of airlift forces and aircraft. Though the author no longer recommends

direct delivery as the primary operating model for LSCO, the necessity for increased flexibility to meet the dynamic and variable user requirements remains.

The author's R1 recommendation to delay apportionment and scheduling of airlift forces as long as possible remains valid because it enables flexibility in either the direct delivery or hub and spoke operating model. To implement this, airlift planners must reduce their reliance on fixed schedules and channel missions. Though this recommendation enables operational flexibility for LSCO, it does not address tactical flexibility. The reader will find that the author's R2 for airlift execution accounts for this requirement.

Command Relationships. The R1 for COMREL stated that to enable maximum flexibility and integration, the supported land component user should exercise TACON of airlift forces. Based on the research and a holistic analysis of tactical airlift in LSCO, the author now recommends against transferring TACON to a supported user. Instead, the author agrees with Waldon and Percival and recommends maintaining the USAF doctrinal arrangement of Centralized Control and Decentralized Execution. Specifically, USTRANSCOM should retain OPCON of assigned inter-theater capable airlift forces and allow the air component TACON when operating in a direct delivery capacity. Additionally, the air component should retain OPCON and TACON of assigned airlift forces. Like the previous R2 discussion, the increase in tactical effectiveness and flexibility gained by a TACON transfer to a supported user comes at the cost of operational efficiency. A TACON transfer loses operational efficiency because the aircrew and aircraft assigned to a land component user are no longer available to the Joint force. Because of the increased demand for airlift in LSCO, and a finite amount of airlift

forces the author concludes that this tradeoff is not acceptable for LSCO. Retaining centralized control of airlift forces enables support highest priority users via the Joint Force Commander's approved apportionment and the daily ATO.

Airlift Execution. The author's R1 recommended airdrop as the primary method of aerial delivery during LSCO. This recommendation was primarily driven by the inherent flexibility of airdrop over airland operations. The analysis of current capabilities, limitation and the anticipated requirements of LSCO lead the author to still conclude that airdrop will be the primary method of aerial delivery to the supported user. However, the author has a few notable additions to this recommendation.

First, though airdrop can best achieve flexibility in terms of time and location of delivery, airdrop is less efficient than airland. Maximum efficiency is necessary in all areas of tactical airlift to account of the increased demand for airlift in LSCO. For this reason, the author concludes that though airdrop may be the primary method of aerial delivery, airland will still be the preferred method and should be utilized whenever possible.

Next, based on the high threat environment and the rapid pace of LSCO, airdrop employment should be as dynamic as possible. Threats impact airdrop execution because even if airlift forces force package with combat air forces, there will likely be areas of the operational environment that airlift aircraft cannot fly without undue risk. The rapid pace of LSCO similarly demands dynamic airdrop because a supported user will not remain in a fixed location and may not be able to predict the exact time and location of their next airdrop for deliberate planning in the ATO cycle. For these reasons, airdrop and superficially dynamic airdrop should be the primary method of aerial delivery in support

of a land component user. The TTP described by Captain Adam blend deliberate planning and dynamic execution and serve as the baseline for this method of aerial delivery.

Acceptable Level of Risk. As a review, the author's R1 recommended an increase in ALR to account for the high threat environment of LSCO. The author also recommended force packaging to increase the survivability of airlift forces. Upon review of applicable literature and an analysis of anticipated LSCO requirements, the author continues to recommend force packaging to improve survivability but no longer recommends an increase to ALR.

The high threat environment of LSCO and the ubiquitous and mobile nature of modern threats to air operations demand measures to overcome the limited defensive capability of airlift aircraft. Force packaging integrates airlift forces with combat air forces to capitalize on existing SEAD, DCA and ISR capabilities and ultimately improve the survivability of airlift forces. Though force packaging improves survivability, it does impose limitations on airlift operations. As noted in the analysis of ALR, to capitalize on force packaging opportunities, airlift forces must align their scheduling and apportionment processes with the combat air forces inside the ATO cycle. Additionally, the necessity to force package removes the flexibility of airlift forces to operate autonomously and can complicate airspace control with additional aircraft operating in the same area. However, the author concludes that the high risk to force in LSCO without force packaging will ultimately cause a high risk to mission if airlift forces are destroyed in high numbers.

The same balance between risk to mission and risk to force is also what caused the author to conclude that ALR should not be increased for LSCO. As discussed in the

operating model section of the R2, user demand for airlift should increase significantly in LSCO. Increased demand, combined with some loss of efficiency caused by direct delivery and force packaging makes the survivability of airlift forces critical to success in LSCO. Increasing ALR for LSCO would surely increase the attrition of airlift forces as they would be permitted to operate in higher threat environments with less external support. The author concludes that in rare circumstances this may be required to accomplish a mission or meet a critical user requirement. But from a holistic perspective raising, ALR would increase both risk to mission and risk to force. Therefore, the author recommends that ALR remain at its current level.

Together, the four R2 sections above represent the author's informed recommendation. Figure 4 below summarizes the R2. Though informed by research, the R2 is not yet actionable. The next section, the CDM assessment, strives to improve the R2 for implementation.

<u>R2 Summary</u>	
Operating Model:	Hub and Spoke as primary and preferred model Increased direct delivery as necessary Reduced reliance on channel missions
COMREL:	Centralized Control Decentralized Execution Air Component retains OPCON and TACON of airlift forces Airlift forces apportioned via normal ATO process
Airlift Execution:	Airdrop as primary method of aerial delivery Airland as preferred method of aerial delivery Dynamic airdrop as required
ALR:	No increase to ALR Force packaging critical to survivable airlift operations

Figure 4. R2 Summary

Source: Created by author.

Chief Decision Maker Assessment

The purpose of the CDM assessment is to evaluate and improve the author's R2 by viewing the issue from the perspective of the CDM and key stakeholders. The Chief Decision Maker is the senior leader responsible for and empowered to affect holistic change for tactical airlift forces and their operations in LSCO. The Chief Decision Maker for this thesis is the Joint Staff Director of Operations (J3) because he/she is responsible for integrating the operations of the services for presentation to the Combatant Commands. Though the Chief Decision Maker is the ultimate authority for implementing change he/she is responsible to the key stakeholders directly affected by tactical airlift operations. Key stakeholders, in this case, are jointly the Combatant Command Directors of Operations (J3), the USAF Deputy Chief of Staff for Operations (AF/A3), and the U.S. Army Deputy Chief of Staff for Operations (DA/G3). Below is a brief overview of the roles and responsibilities of each stakeholder for the reader to better understand the perspectives the author used to evaluate the R2. This includes the author's assessment of concerns that relate to suitable, acceptable, and feasible from the perspective of each stakeholder. Next, the author describes the key issues from the CDM assessment and modifies the R2 to address the concerns of the stakeholder. The result of this process is the author's improved recommendation, the R3.

As a reminder, to address the research subject holistically and to avoid classification issues, this thesis is AOR agnostic. This means that the author addresses the interests and requirements of the CDM and key stakeholders from a macro perspective.

Combatant Command Director of Operations (J3). The Combatant Command J3 integrates joint forces to perform operations in accordance with Combatant Command and national security objectives. The Combatant Command J3's evaluation criteria are:

1. Suitability: Does the recommendation facilitate operational level support between the supported and supporting force to enable continuous operations? Does the recommendation preserve the operational efficiency of the mobility system? Does the recommendation preserve other combat capabilities?
2. Acceptable: Does the recommendation incur undue risk to mission or risk to force from an operational perspective? Specifically, does the cumulative risk of the recommendation impact the long-term sustainability of operations in the AOR?
3. Feasible: Are the presented forces capable of performing their assigned missions in accordance with the recommendation? Can operations consistent with the recommendation be planned, controlled, executed and assessed with the existing force structure and C2 apparatus?

J3 Assessment. As expected, the author assesses that the Combatant Commander's perspective favors operational efficiency and effects over tactical level issues. As such, the author concludes that the J3's will agree with the author's R2, that airlift forces must remain OPCON and TACON to the air component. However, the J3 is likely to express concern that the necessity to force package for survivable airlift operations may reduce the capability of the combat air forces. The author also assesses that despite the rapid tempo of LSCO, the J3 will want to preserve operational level planning. Finally, due to the expected increase in demand for tactical airlift, the J3 will be concerned with the reduced efficiency associated with airdrop operations.

USAF Deputy Chief of Staff for Operations (AF/A3). The AF/A3 determines operational requirements, capabilities, and training required to meet national security,

defense, and military objectives. Additionally, the AF/A3 implements operational and force management policies that directly support global operations across the air, space, and cyber domains. The AF/A3's evaluation criteria are:

1. Suitable: As a force provider, does the recommendation meet the requirements of the Combatant Command J3?
2. Acceptable: Are the operations survivable for both the aircraft and aircrew with minimal increases in materiel or personnel costs? Does the recommendation preserve centralized control and decentralized execution?
3. Feasible: Are tactical airlift aircrew trained and capable of force packaging and performing dynamic airdrop? Can the air component implement the recommendation with existing force structure and current C2 apparatus?

AF/A3 Assessment. The author concludes that as a force provider, the AF/A3 is primarily concerned with meeting the requirements of the Combatant Commands. Secondly, the AF/A3 is concerned with the appropriate use of airpower and the well-being of its forces. Like the J3 above, the author assesses that the AF/A3 will agree that the air component must retain OPCON and TACON of airlift forces and that operational planning via the 72 ATO cycle must be preserved. Both measures retain the doctrinal concept of centralized control and decentralized execution. The author also assesses that the AF/A3 will question the capability of airlift forces and the supported user to regularly perform dynamic airdrop operations. Finally, the author assesses that although force packaging will increase the survivability of airlift forces, the AF/A3 will not permit airlift forces from flying in a truly high threat environment. Rather, the air component must

develop a deliberate and graduated approach to maximize survivability and combat capability.

U.S. Army Deputy Chief of Staff for Operations (DA/G3). Like the AF/A3, the DA/G3 determines operational requirements and implements Army level policies to achieve military and national security objectives. The DA/G3 evaluation criteria are:

1. Suitable: As a force provider, does the recommendation meet the requirements of the Combatant Command J3? As the supported force, is the recommendation tactically effective?
2. Acceptable: Does the recommendation meet the tactical requirements of the supported force without increasing risk or the administrative burden? Is the recommendation possible with minimal increases to existing force structure and equipment?
3. Feasible: Is the supported force trained and capable of carrying out operations consistent with the recommendation?

DA/G3 Assessment. Due to the rapid tempo and lethality, the land component will surely face significant challenges in LSCO. These challenges and others, lead the author to believe that the DA/G3 will view the topic from a more tactical lens. The author, therefore, assesses that the DA/G3 will want a degree of TACON over airlift forces to assure effective airlift support in LSCO. The author also assesses that the DA/G3 will question the flexibility of the 72-hour ATO cycle to meet the dynamic needs of the land component. Finally, the author assesses that the DA/G3 will express concern over the increased risk and complexity of concurrent airdrop and combat operations.

Chief Decision Maker Summary

The collective concerns of the CDM and key stakeholders highlighted above represent the final areas for refinement before the R3 is possible. The reader will note that the findings below do not align with a research question. This is to capture the CDM and stakeholder's interests from a macro and holistic perspective. The macro level findings from the CDM assessment are:

1. Changes to improve tactical effectiveness must maintain operational efficiency to the maximum extent possible (J3, AF/A3).
2. The air component should retain OPCON and TACON of airlift forces (J3, AF/A3).
3. The air component must be flexible and responsive to meet dynamic requirements in execution (DA/G3).
4. Force packaging for airlift forces should minimally impact the capabilities of combat air forces (J3, AF/A3). Additionally, airlift forces shall not rely solely on force packaging to maximize survivability (AF/A3).

Improved Recommendation (R3)

The author's final recommendation, the R3, is an improved recommendation based on the CDM and stakeholder analysis in the previous section. The intent of this section is to answer the primary research question of how should tactical airlift forces support the land component in LSCO. For each section, the author briefly reviews the R2 then articulates changes based on the CDM assessment. Major areas of interest are in italicized here and in Figure 5 below that summarizes the R3.

Operating Model. The author draws two main conclusions from the CDM assessment that impact the airlift operating model. The first is that efforts to increase tactical effectiveness should not negatively impact operational efficiency. Because airlift forces have the dual mission of theater sustainment and combat employment, an efficient model is critical to each component. Though this finding is like the line of thinking in the R2, the CDM assessment *underscores the importance of operational efficiency*. Therefore, the author maintains that the hub and spoke model should be the primary and preferred model during LSCO. However, based on the CDM assessment, the author adds that despite the challenges of A2/AD threats and extended lines of communication airlift forces should use the *hub and spoke system to the maximum extent possible*.

The second conclusion from the CDM assessment is that the air component must be flexible and responsive to meet dynamic requirements during execution. Consistent with the R2, reduced reliance on channel missions and direct delivery operations improve both areas. However, to maximize flexibility and responsiveness the author now recommends that the *air component should schedule some forces and aircraft on the ATO for on-call airlift*. The number and type of aircraft scheduled in this manner are driven by the tactical situation and the communicated requirements of Joint users. On-call Close Air Support or “XCAS” provides precedent and established procedures and guidance for scheduling and tasking assets in this manner. By combining with the dynamic airdrop recommendation in the airlift execution section below, the author believes that the air component can maximize tactical effectiveness while retaining operational efficiency.

Command Relationships. The CDM assessment confirmed for the author that because operational efficiency is paramount to success in LSCO, the air component must

utilize the doctrinal concept of Centralized Control and Decentralized Execution for airlift forces. This means that consistent with the R2, airlift forces should remain under the OPCON and TACON of the air component. The air component should also continue to apportion forces based on the communicated requirements of Joint user and the priorities of the Joint Force Commander.

Airlift Execution. The interests and concerns of the CDM and stakeholders result in no major changes to the author's airlift execution R2. Rather, the CDM assessment merely refines the recommendation to answer the primary research question more fully. First, the author maintains that although airland is the preferred method, airdrop will be the primary method of aerial delivery in LSCO. The author now adds that the existing *AMLOs attached to the land component must integrate airlift operations into the ground scheme of maneuver*. Integrating airlift into the ground scheme of maneuver can enable a deliberate approach to airlift planning that maximizes effectiveness and efficiency. AMLOs are air-minded by nature and can help identify airlift options and opportunities that may otherwise be overlooked by maneuver planners. Specifically, AMLOs should plan for *airland as the primary option, preplanned airdrop secondary, and dynamic airdrop tertiary*. This deliberate approach to airlift planning with the land component balances the need for effective and efficient airlift operations.

The second refinement to the airlift execution R2 is that if dynamic airdrop is necessary, *airlift users and aircrew should use the established Joint Air Request Network (JARN) for coordination*. This refinement is linked to the on-call airdrop recommendation in the operating model section above. The JARN is the primary method for coordinating XCAS and utilizing an established network and coordination process meets the concerns

of the J3 and AF/A3 that recommendations should utilize existing force structure and C2 networks. Additionally, *closely aligning on-call airdrop with XCAS* means the only difference between the two is the effect that the aircraft provides, a bomb or an airdrop. This minimizes any training or proficiency burden on the Joint force and should help ease some of the uncertainty imposed by LSCO.

Acceptable Level of Risk. The final aspect of the R3 is ALR. Like airlift execution, the CDM assessment mostly validated the author's R2 while also highlighting areas for refinement. The primary aspect for refinement is that through force packaging is necessary to enable survivable airlift operations in LSCO, it does not fully address the concerns of risk and its impact on the Joint force. Force packaging combat air forces with airlift assets reduce the number of assets available for air interdiction, counterair and other mission sets critical to the air component's operations. Airlift leadership and planners can implement two measures to reduce the burden of force packaging on the Joint force. First, airlift leaders must *modify ALR to meet the realities of LSCO*. This means realistically evaluating the impact of confirmed threats on airlift operations and then balancing the risk to mission vs risk to force as previously mentioned. Second, a realistic view of ALR in LSCO will enable airlift planners to assign each mission tasking to one of three categories: Go, Force Packaging Required, and No-Go. By assigning each mission to its most appropriate category, airlift planners maximize survivability by either not allowing operations in an un-survivable environment or force packaging when necessary. A secondary impact is that airlift forces will minimize their burden on the combat air forces by only requesting force packaging when truly necessary.

<u>R3 Summary</u>	
Operating Model:	-Must maximize use of Hub and Spoke as primary and preferred model -Increased direct delivery as necessary -Reduced reliance on channel missions -Air component retains some aircraft for dynamic tasking in execution
COMREL:	-Maintain Centralized Control Decentralized Execution -Air Component retains OPCON and TACON of airlift forces -Airlift forces apportioned via normal ATO process
Airlift Execution:	-Deliberate approach to aerial delivery method selection -AMLO adds airlift planning into ground scheme of maneuver -Airdrop as primary method of aerial delivery -Airland as preferred method of aerial delivery -Dynamic airdrop via JARN as required
ALR:	-No increase to ALR; but modified for LSCO realities -Create 3 mission categories: Go, Force Package Required, No-Go -Force packaging critical to survivable airlift operations

Figure 5. R3 Summary

Source: Created by author.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to conclude the study in three main areas, a campaign plan, areas for future study, and personal lessons learned. The campaign plan applies the Kotter Change Model to translate the author's R3 into specific actions that can better prepare the Joint force for LSCO. The areas of future study and evaluation seek to add depth to the holistic breadth established by this study. The final section identifies the author's personal lessons learned because of this study.

Campaign Plan

The author's R3 identified in Chapter 4 technically answers the primary and secondary research questions posed by this study but it does not yet have practical application. Based on the methodology described in Chapter 3, the goal of the study is to produce specific, actionable recommendations for the Joint Force. By applying the main ideas presented in the Kotter Change Model, the campaign plan outlined below accomplishes that goal. Unlike previous chapters, the campaign plan does not explore each of the secondary research questions independently. Rather the campaign plan offers holistic recommendations and includes both short term (1-3 years) and long term (3-5 years) horizons. The short term tasks are primarily linked to steps 1-6 of the Kotter Change Model while the long term tasks are primarily linked to steps 7 and 8. A summary of the campaign plan that includes areas for future study is found in Appendix B.

Short Term Tasks

The campaign plan's short term tasks are primarily linked to steps 1-6 of the Kotter Change Model. Specifically, the goal of these tasks is to produce quick and tangible results for the joint force and to improve understanding of LSCO challenges. These short term goals also condition the Joint Force for change and can help ensure support for future, long term improvement. Each recommendation below identifies the aspect(s) of the R3 it aligns with and its justification.

Eliminate Unnecessary Channel Missions. As noted in the R3, the joint force will not be able to rely on channel missions during LSCO. Therefore, the mobility enterprise should eliminate unnecessary channel missions now to condition itself to not rely on these predictable and steady-state operations. This includes airlift planners and their supported users. Reducing the number of channel missions will require airlift planning inside the ATO cycle where each movement request will be validated and scheduled based on its priority and the JFC's approved apportionment. Pushing airlift planning inside the ATO cycle will also help refine processes and condition the joint force to better communicate and prioritize airlift requests. This should also net an increase in capacity for on-call operations because airlift assets will no-longer operate on underutilized or unnecessary channels.

The reader should note that without enough data to evaluate the utility of current channel missions, it is inappropriate for the author to define "unnecessary" in specific terms. However, the author does offer that frequency of mission cancelation, percentage of available cargo load utilized, and frequency of airfield overflight are possible metrics to identify unnecessary or underutilized channel missions. A study of channel missions carries forward to areas of further study section.

Tabletop Exercise Apportionment Processes. The next recommendation is to perform a series of tabletop exercises (TTX) of airlift apportionment. This is primarily linked to the operating model and COMREL portions of the R3. The purpose of an apportionment TTX is to better prepare air and land component users for the operational realities of LSCO. By observing and participating in the apportionment processes, land component users will gain exposure to the competing interests across the joint force and learn how to better articulate and nest their priorities with higher headquarters. Land component users will also benefit by shifting their mindsets away from limited contingency operations and toward LSCO realities. Air component planners will similarly benefit by better understanding user requirements and how airlift forces can achieve the desired effects within the constraints of LSCO. Additionally, these TTXs will aid the air component to refine the apportionment of assets for on-call airdrop tasking and the demand for force packaging that the R3 proposes.

Operationalize the AMLO. Due to the increased demand and variable requirements for airlift during LSCO, AMLOs will play a critical role in achieving desired effects for a supported user. Additionally, and increased reliance on dynamic airdrops means AMLOs must be integrated into operational and tactical planning like the way Joint Terminal Attack Controllers and the Tactical Air Control Party are used to plan and coordinate CAS. Operationalizing the role of the AMLO will aid the supported user in identifying potential drop zones, controlling airdrops and landing zones, and relaying user requirements to airlift forces. An informed reader will note that these are all things that AMLOs can and should already be doing. However, these tasks are normally relegated to sustainment planning and not used to enhance the ground scheme of

maneuver. The reliance on airlift in LSCO dictates that the supported user must integrate airlift and therefore the AMLO into the ground scheme of maneuver. During mission execution, if not required for drop zone or landing zone control duties, the AMLO should also operate as part of the JARN to coordinate on-call airdrop requests. Operationalizing an AMLO requires no additional training or resources. It simply requires better utilization of the individual and an appreciation for their contribution to the mission.

Prioritize High-end Training. Based on the necessity to force package and the detailed integration with the land component during LSCO, the joint force must prioritize integrated high-end training that includes airlift operations. This recommendation aligns with the ALR and airlift execution areas of the R3. Current exercises such as Red Flag, Warfighter, and National Training Center rotations exercise high-end capabilities against near-peer adversaries but they rarely include airlift operations. Consistent with this study, airlift operations are likely to occur concurrently with CAS and other combat operations so they must be exercised in peacetime to identify capability gaps and best practices. Based on the author's experience instructing at the USAF Weapons School, tactical tasks such as force packaging, terminal control of dynamic airdrops, and threat reactions are all feasible with current training and TTP. However, the mindset of the joint force and their associated TTP are optimized for limited contingency operations. In addition to refining TTP for LSCO, high-end training that includes airlift operations should also validate the concept of dynamic airdrop to the key stakeholders for inclusion in the overall airlift operating model. Finally, high-end exercises will also condition leaders for the type of risk and losses airlift forces can expect in LSCO. Conditioning leaders in this manner will aid in the future refinement of ALR as a long term task.

Long Term Tasks

The long term tasks of the campaign plan are primarily linked to steps 7 and 8 of the Kotter Change Model and seek to translate the results of the short term tasks, and areas of further study listed below into future improvements for tactical airlift in LSCO. As with the short term tasks, this section describes the proposed tasks, their intent, and the desired impact. The reader will note that the long term tasks lack some specificity. This is because these tasks are dependent on the results of the short term tasks and areas for further study. As such, the long term tasks are more conceptual than their short term counterparts.

Update TTP. Integrated exercises, operationalized AMLO use, and study of airlift survivability will surely yield significant lessons learned. To truly affect holistic change, these lessons must be captured in future iterations of TTP manuals. Specific items to capture include threat reaction effectiveness, contracts between mobility and combat air forces, and dynamic airdrop control methods. Documenting these items and others will allow TTP manuals to achieve their intended purpose of providing a point of departure when planning and executing operations. TTP updates will also assure allow standardization among units and individuals that are unable to attend integrated exercise or participate in survivability studies.

Modify ALR. Consistent with the author's R3, ALR guidance should be modified for the realities of LSCO. To do so, airlift force must first study their survivability in LSCO. The areas for further study section below describes this study. The results of the study including the effectiveness of defensive systems, threat reactions, and force packaging will influence ALR modifications. The reader will remember that the ALR guidance for LSCO should not be restrictive. Rather ALR for LSCO should be used as a

tool for airlift planners to categorize mission recommendations as Go, Force Package, and No-Go. To enable this recommendation, the modified ALR should balance the risk to mission against the risk to force. Risk to force in this case includes a myriad of environmental factors including threat types, availability of force packaging, and defensive system status. Airlift planners will mitigate risk to maintain the prescribed ALR to the maximum extent possible but ultimately the Director of Mobility Forces must be prepared to make the ultimate decision of Go, Force Package, or No-Go. The modified ALR produced by this step will facilitate this process.

Edit Doctrinal Processes. The final recommendation for the campaign plan is to modify doctrinal processes in a manner that works across the ROMO. This recommendation is holistic and applicable to all areas of the author's R3 and should consider the results of both the short term steps of the campaign plan and the areas for further study. Specifically, the airlift operating model should balance utility for today's contingency operations but retain the ability to meet LSCO's challenges. The airlift request process and timeline should also be the same in steady state operations and LSCO. The author acknowledges that it is difficult to create processes that cover a wide variety of scenarios. However, if the joint force had not allowed processes and mindsets to fully adapt to limited contingency operations for the past 18 years, the re-focus on LSCO would not have been such a significant shift for the military. The author offers further thoughts on this topic in the personal lessons learned section below.

Areas for Further Study

The goal of this study has always been to adopt a macro level view of airlift operations in LSCO. Though the author believes this has been a successfully

accomplished, this study does not provide THE answer to how airlift forces will operate in LSCO. Rather this study simply contributes to the record for the topic. The research and writing process for this thesis has uncovered a few areas that require their own independent study to understand airlift operations more fully during LSCO. In this section, the author describes these areas for further study including the scope necessary and key factors that influence the topic.

Utility of Existing Channel Missions. As discussed in the short term tasks section above, the author recommends eliminating unnecessary or underutilized channel missions but does not believe it appropriate to define “unnecessary” without more data available. Therefore, the first recommended area for additional study is to evaluate existing channel missions. Applicable quantitative metrics for this study include the frequency of mission cancelation, available cargo load utilization, and frequency of airfield overflight. These metrics can highlight to airlift leaders if a specific channel mission is appropriately utilized but does not fully address the issue. Because airlift operations are also responsible for theater sustainment, airlift leaders must also perform a qualitative assessment. This includes isolated locations reliant on scheduled airlift, anticipated future requirements, and seasonal variations. The result of this study should yield one of three recommendations for each channel mission evaluate. The three recommendations categories are: retain, reduce, and cancel. Retain and cancel categories are self-explanatory. If the study finds that a channel mission should be retained or canceled the recommendation should be immediately acted upon. If the study finds that a channel mission should be reduced further study is necessary to determine the ideal frequency of the mission or a change in aircraft type to maximize efficiency. Once complete, this study

will impact the overall airlift operating model and capacity for both steady state and LSCO operations.

LSCO Airlift Requirements. The increased and variable demand for airlift in LSCO is apparent from this thesis. To better understand and plan for this demand during LSCO, a comprehensive study of expected airlift requirements is necessary. The sustainment community of the U.S. Army has substantial data for the overall sustainment demand by unit type. However, this future study must be tailored to airlift operations. Specific factors that impact airlift include suitability for airdrop, cargo dimensions, and types of hazardous cargo. These factors impact airlift planning and execution and should, therefore, be understood before operations commence. The result of this study should be to develop standardized push packages that will ease coordination in LSCO and to identify shortfalls in terms of parachutes, rigging material, materiel handling equipment, etc. These conclusions will influence future force management and acquisition processes for land and air component forces.

Survivability of Airlift Forces in LSCO. The final area for future study is to evaluate the survivability of airlift forces in LSCO. A key weakness of this study is that the UNCLASSIFIED level prevented the author from more fully exploring threat capabilities and aircraft defensive systems. These are key factors to airlift employment in LSCO and directly relate to ALR and force packaging requirements. Therefore, airlift forces must continue to evaluate their survivability against present and future threats. At a minimum, this study should be performed at the SECRET level. The deliverable for this study should be specific recommendations that influence the ALR categories of Go, Force Package, No-go as proposed in the author's R3. These recommendations should

include, threat types, aircraft defensive system requirements, and type of force packaging (dedicated or detached) recommended. Like the R3, the goal of this study should not be to create rigid ALR recommendations. The dynamic nature of LSCO precludes the use of rigid policies. Rather the goal of this study should be to aid a commander's evaluation of risk to mission and risk to force for future operations.

Personal Lessons Learned

In addition to the learning specific to the topic of tactical airlift in LSCO, the research process and MMAS degree program has facilitated a few noteworthy professional lessons learned.

The first lesson is that there is always more to a problem set than is readily apparent. As a C-130 pilot that has primarily operated at the tactical level, I initially approached this study from a purely tactical mindset. I thought that I could figure out how to make tactical airlift work in LSCO through creative TTP. However, this study highlighted that the best TTP and tactical execution are useless if they negatively impact operational level processes or aren't sustainable. This lesson drove a more holistic approach to the thesis and will certainly influence my decision making and professional judgment in my future roles.

The next lesson learned is that the best answer to a problem is likely to a Joint answer. Airlift is an inherently joint capability and therefore demands Joint consideration and investment when studying or modifying processes. The COMREL aspect of this thesis is a perfect example. The land component clearly views effective COMREL of airlift forces differently from the air component who view it differently than the J3. The takeaway here is that the competing interests of all stakeholders must be considered when

implementing change, but ultimately, the Joint priorities are what will prevail. This is a good thing because it forces the components to work together for the collective benefit of all stakeholders.

The final lesson is that continuous, incremental improvement is imperative for established organizations. This lesson is primarily linked to the operating model section aspect of this thesis and the doctrinal edits long term recommendation above. The author recognizes that although the hub and spoke model is not optimized for LSCO, it could not be completely abandoned because of its utility across most of the ROMO. To do so would have been a radical change that would likely create more problems than it would solve. Organizational changes and improvements should not be focused on extreme or niche scenarios. This is not to say that we should not plan for these scenarios. Rather, the best method for organizational improvement is to make continuous, incremental gains that refine processes and enhance the military's ability to operate across the ROMO instead

CONSOLIDATED THEME CATCHER

Source: Figure outline by Dr. Kenneth Long, data by author.

APPENDIX B
CAMPAIGN PLAN

Area	Short Term 1-2 years	Long Term 3-5 years
Operating Model	-Model LSCO user requirements (FS) -Eliminate unnecessary channel missions (FS)	-Edit doctrinal processes that work across ROMO (B)
Command Relationships	-Increase AMLO use at Div and below (A) -TTX LSCO apportionment processes (B)	
Airlift Execution	-Validate dynamic airdrop to CDM (A)	-Update TTPs based on LL (A)
Risk	-Increase high end aircrew training including integration (A) -Study/model threat capability vs mobility forces (FS)	-Modify ALR based on LL and LSCO reality (B)

Source: Created by author.

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