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Research Report

An Operational Architecture for Improving Air Force Command and Control Through Enhanced Agile Combat Support Planning, Execution, Monitoring, and Control Processes

Kristin F. Lynch, John G. Drew, Robert S. Tripp, Daniel M. Romano,
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Preface

Operational commanders who prioritize and allocate scarce resources need to know how combat support enterprise constraints and alternative resource allocation decisions would impact planned and potential operations. Currently, agile combat support (ACS) planning, execution, monitoring, and control processes cannot support such resource allocation trade-off decisions. Processes are not adequately defined and delineated in doctrine and guidance, and the tools, systems, training, and organizations needed to execute these ACS processes either do not exist or are inadequate.

This document presents an architecture that describes a TO-BE[1] vision for integrating enhanced ACS processes into Air Force command and control (C2) as it is defined in Joint Publications. This architecture addresses the near-term—what C2 processes could be in the next 4–5 years using current Air Force assets. It first identifies C2 processes and the echelons of command responsible for executing those processes and then describes how enhanced ACS planning, execution, monitoring, and control processes need to be integrated with operational-level and strategic-level C2 processes to provide senior leaders with enterprise ACS capability and constraint information. We use this architecture to identify and describe where shortfalls or major gaps exist between current ACS processes (the AS-IS) and this vision for integrating enhanced ACS processes into Air Force C2 (the TO-BE).[2]

The research reported here was commissioned by the Deputy Chief of Staff for Logistics, Installations, and Mission Support (AF/A4/7) and the Air Force Materiel Command Vice Commander and conducted within the Resource Management Program of RAND Project AIR FORCE.

This document will interest combatant commanders (CCDRs) and their staffs; component numbered Air Forces (C-NAFs) and their staffs; major commands (MAJCOMs) and their staffs; and logisticians, planners, operators, and employers of air and space C2 capabilities throughout the U.S. Department of Defense (DoD), especially those involved with C2 of forces during combat operations.

Related RAND publications include the following:

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[1] In this report, we use *AS-IS* to indicate current conditions and *TO-BE* to indicate future ones.

[2] Also see Kristin F. Lynch, John G. Drew, Robert S. Tripp, et al., *Implementation Actions for Improving Air Force Command and Control Through Enhanced Agile Combat Support Planning, Execution, Monitoring, and Control Processes,* Santa Monica, Calif.: RAND Corporation, RR-259-AF, 2014.

- Robert S. Tripp, Kristin F. Lynch, John G. Drew, and Robert DeFeo, *Improving Air Force Command and Control Through Enhanced Agile Combat Support Planning, Execution, Monitoring, and Control Processes*, Santa Monica, Calif.: RAND Corporation, MG-1070-AF, 2012. This monograph compares the current state of ACS planning, execution, monitoring, and controlling with the suggested implementation actions designed to address shortfalls identified in the 2002 Project AIR FORCE operational architecture. It further recommends implementation strategies to facilitate changes needed to improve Air Force C2 through enhanced ACS planning, execution, monitoring, and control processes.
- Kristin F. Lynch and William A. Williams, *Combat Support Execution Planning and Control: An Assessment of Initial Implementations in Air Force Exercises*, Santa Monica, Calif.: RAND Corporation, TR-356-AF, 2009. This report evaluates the progress the Air Force has made in implementing the TO-BE ACS operational architecture as observed during operational-level C2 warfighter exercises Terminal Fury 2004 and Austere Challenge 2004 and identifies areas that need to be strengthened. By monitoring ACS processes, such as how combat support requirements for force package options that were needed to achieve desired operational effects were developed, assessments were made about organizational structure, systems and tools and training and education.
- Patrick Mills, Ken Evers, Donna Kinlin, and Robert S. Tripp, *Supporting Air and Space Expeditionary Forces: Expanded Operational Architecture for Combat Support Execution Planning and Control*, Santa Monica, Calif.: RAND Corporation, MG-316-AF, 2006. This monograph expands and provides more detail on several organizational nodes in our earlier work that outlined concepts for an operational architecture for guiding the development of Air Force combat support execution planning and control needed to enable rapid deployment and employment of the Air and Space Expeditionary Force (AEF). These combat support planning, execution, and control processes are sometimes referred to as ACS C2 processes.
- Kristin F. Lynch, John G. Drew, Robert S. Tripp, and Charles Robert Roll, Jr., *Supporting Air and Space Expeditionary Forces: Lessons from Operation Iraqi Freedom*, Santa Monica, Calif.: RAND Corporation, MG-193-AF, 2005. This monograph describes expeditionary combat support experiences during the war in Iraq and compares these experiences with those associated with Joint Task Force Noble Anvil in Serbia and Operation Enduring Freedom in Afghanistan. This monograph analyzes how combat support performed and how combat support concepts were implemented in Iraq, compares current experiences to identify similarities and unique practices, and indicates how well the combat support framework performed during these contingency operations.
- Don Snyder and Patrick Mills, *Supporting Air and Space Expeditionary Forces: A Methodology for Determining Air Force Deployment Requirements,* Santa Monica, Calif.: RAND Corporation, MG-176-AF, 2004. This monograph outlines a methodology for determining manpower and equipment deployment requirements. It describes a prototype policy analysis support tool based on this methodology, the Strategic Tool for the Analysis of Required Transportation

(START), which generates a list of capability units called unit type codes that are required to support a user-specified operation. The program also determines movement characteristics. A fully implemented tool based on this prototype should prove to be useful to the Air Force in both deliberate and crisis action planning.

- James A. Leftwich, Robert S. Tripp, Amanda B. Geller, Patrick Mills, Tom LaTourrette, Charles Robert Roll, Jr., Cauley von Hoffman, and David Johansen, *Supporting Expeditionary Aerospace Forces: An Operational Architecture for Combat Support Execution Planning and Control*, Santa Monica, Calif.: RAND Corporation, MR-1536-AF, 2002. This report outlines the framework for evaluating options for combat support execution planning and control. The analysis describes the combat support C2 operational architecture as it is now and as it should be in the future. It also describes the changes that must take place to achieve that future state.
- Robert S. Tripp, Lionel A. Galway, Timothy L. Ramey, Mahyar A. Amouzegar, and Eric Peltz, *Supporting Expeditionary Aerospace Forces: A Concept for Evolving to the Agile Combat Support/Mobility System of the Future*, Santa Monica, Calif.: RAND Corporation, MR-1179-AF, 2000. This report describes a vision for the combat support system of the future based on individual commodity study results.
- Robert S. Tripp, Lionel A. Galway, Paul Killingsworth, Eric Peltz, Timothy L. Ramey, and John G. Drew, *Supporting Expeditionary Aerospace Forces: An Integrated Strategic Agile Combat Support Planning Framework*, Santa Monica, Calif.: RAND Corporation, MR-1056-AF, 1999. This report describes an integrated combat support planning framework that can be used to evaluate support options on a continuing basis, particularly as technology, force structure, and threats change.

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Summary

There has always been disparity between the availability of combat support resources and process performance and the capabilities needed to support military operations. There are several reasons for this imbalance, including the inability to precisely predict resource requirements for contingency operations, inherent uncertainty in supply chain actions associated with providing combat support resources to the battlefield, unanticipated demands for resources to meet training and other operational requirements, and budgets developed to meet estimated requirements constructed several years in advance of when the monies become available. In the current defense environment, characterized by budget pressures, the withdrawal from Iraq and Afghanistan, and a new defense strategy, these imbalances between the availability of combat support resources and the need for them will likely be exacerbated.

Because of these imbalances, operational commanders, the authorities who prioritize and allocate scarce resources among operational commanders, and resource providers need to know how combat support enterprise constraints and alternative resource allocation decisions would impact planned and potential operations. They also need to know when current agile combat support (ACS) process performance breaches the control parameters set to meet the specific contingency operations requirements under consideration.

Previous RAND analyses found deficiencies in the Air Force ACS planning, execution, monitoring, and control processes[3] that support Air Force operations. These deficiencies include poor integration of combat support into operational planning and the inability to configure combat support processes and resource levels to achieve specific operational objectives.[4] The purpose of this analysis is to develop an operational architecture for strategic- and operational-level command and control (C2) processes as defined in Joint Publication 3-30 that addresses these deficiencies. The architecture defines a TO-BE vision for Air Force and Joint C2, focusing on how enhanced ACS

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[3] By *control processes* we mean those processes that set a control parameter or acceptable threshold, track actual combat support performance against those thresholds, signal when a combat support parameter falls outside the set limits, and notify combat support planners so plans can be developed to bring the process back within control limits.

[4] See Robert S. Tripp et al., *Improving Air Force Command and Control Through Enhanced Agile Combat Support Planning, Execution, Monitoring, and Control Processes*, Santa Monica, Calif.: RAND Corporation, MG-1070-AF, 2012, for discussions on the deficiencies identified through these research efforts.

planning, execution, monitoring, and control processes interface with and can be integrated into C2. It focuses on the near-term—what C2 processes could be in the next 4–5 years using current Air Force assets. In the architecture, we describe enhancements in the combatant command (COCOM), Headquarters Air Force, component major command (C-MAJCOM), component numbered Air Force (C-NAF), supporting MAJCOM, and other (global ACS resource managers) nodes. We then use the architecture to identify and describe where shortfalls or major gaps exist between current ACS processes (the AS-IS) and the vision presented in the architecture for integrating enhanced ACS processes into Air Force C2 (the TO-BE).

Research Approach

There were two key aspects of the research approach we used to develop the architecture:

1. evaluating previous RAND-developed operational architectures from 2002 and 2006[5]
2. refining the previous work in light of the current operational and fiscal environments.

The architecture developed in 2002 identified issues and potential solutions that were, at that time, endorsed by Air Force senior logistics leaders.[6] We reviewed the recommendations of the previous analyses and evaluated Air Force progress in addressing the issues. We then evaluated how changes in the operational and fiscal environment, including changes in planning guidance and transformational initiatives, had affected ACS processes to determine the applicability of the 2002 and 2006 operational architectures to today's military environment. We found that the processes themselves had not changed, although the environment in which they operate, as well as the roles and responsibilities of C2 organizations, had shifted. Because of changes in the operational environment, we modified the 2002 architecture, expanding and improving it to meet today's military needs.

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[5] James Leftwich et al., *Supporting Expeditionary Aerospace Forces: An Operational Architecture for Combat Support Execution Planning and Control*, Santa Monica, Calif.: RAND Corporation, MR-1536-AF, 2002; and Patrick Mills et al., *Supporting Air and Space Expeditionary Forces: Expanded Operational Architecture for Combat Support Execution Planning and Control,* Santa Monica, Calif.: RAND Corporation, MG-316-AF, 2006.

[6] "A New Vision for Global Support, C2 Combat Support," *Air Force Journal of Logistics*, Vol. XXVII, No. 2, Summer 2003; and Maj Gen Terry L. Gabreski et al., "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," *Air and Space Power Journal*, Spring 2003.

Once we refined the processes to address identified deficiencies (in accordance with Joint doctrine), we evaluated structural designs for the architecture and considered how best to present the information gleaned from our analysis. We reviewed the DoD Architecture Framework (DoDAF)[7] and determined that the Operational Viewpoint (OV) (as opposed to other potential viewpoints) most closely aligned with the purpose and goals of this analysis.[8]

With the OV being information-centric, we chose the Integrated Definition (IDEF) methodology to capture and convey all of the information associated with each task.[9] Though IDEF is a sufficient model for the operational architecture presented here, we learned that an expanded activity model was developed in 2005 and is currently used by the Air Force architects in the Office of the Under Secretary of the Air Force, Business Transformation and Management Office (SAF/US(M)) (see Figure S.1). This expanded model includes more influences on a process—triggers, controls, constraints, human resources, and physical resources. Each of these influences is defined in Table S.1.

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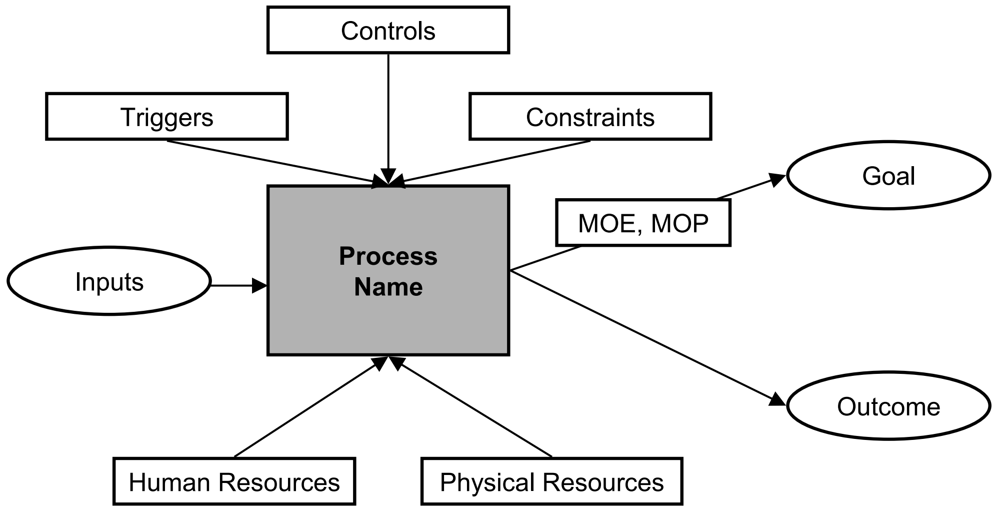
[7] DoDAF was established as a guide for the development of architectures for the Department of Defense (DoD).

[8] DoDAF defines the OV as capturing "the operational nodes, the tasks or activities performed, and the information that must be exchanged to accomplish DoD missions. It conveys the types of information exchanged, the frequency of exchange, which tasks and activities are supported by the information exchanges, and the nature of information exchanges." See U.S. Department of Defense, *DoD Architecture Framework*, Version 1.5, *Volume I: Definitions and Guidelines*, April 23, 2007a.

[9] IDEF grew out of the Air Force-established Integrated Computer-Aided Manufacturing (ICAM) program, which was developed in the mid-1970s to improve manufacturing operations. It was designed as a regimented approach to analyzing an enterprise, capturing AS-IS process models, and modeling activities (organizational units) within an enterprise.

Figure S.1
Expanded IDEF Model



SOURCE: Michael McFarren, informational briefing, May 2010.

Table S.1
Expanded IDEF Model Components

Name	Description
Input	Action, information, and/or data required by the process
Process	Activity triggered by the input; also includes subtasks required to complete the process
Output	Activity information or data generated by the process
Trigger	An action that governance dictates should start a process
Control	Laws, rules, and policies that govern the process; time and event independent
Constraint	Controls that are time and event dependent
Human Resource	Person or organization with skills, education, training, or shift availability
Physical Resource	Systems or items required by the process or process tasks, such as information technology (IT) systems, communication systems, facilities, and equipment

In the architecture, we outline the roles and responsibilities at each echelon—from the President, Secretary of Defense (SECDEF), COCOM, Joint Task Force (JTF), C-NAF, and C-MAJCOM to global ACS functional managers, supporting commands, units, and sources of supply—across the activities in the operations process—readiness, planning, deployment, employment and sustainment, and reconstitution.[10] The result is an

[10] The *operations process*, a term defined in U.S. Army Field Manual 5-0, consists of planning, preparing, executing, and assessing (U.S. Army, Field Manual 5-0, *The Operations Process*, March 2010). We revise the terms here to *readiness, planning, deploying, executing and sustaining, and reconstituting* to

architecture that articulates a vision for how ACS planning, execution, monitoring, and control processes could be integrated into Air Force and Joint C2 processes to better support the warfighter (see the architecture operational viewpoint [OV-1] shown in Figure S.2).[11]

The OV-1 is a graphic depiction of the vision. It shows the nodes that play a role in C2, some of which (shown in orange) do not currently exist. The vision focuses on a single ACS integrator bringing together and balancing individual stovepiped ACS processes to provide capability and constraint assessments to senior leaders for priority and allocation decisionmaking.[12] Because ACS resources are limited, they are shared across competing demands. Priority and allocation decisions will impact operations, and senior leaders need to understand the cost and risk associated with these decisions.

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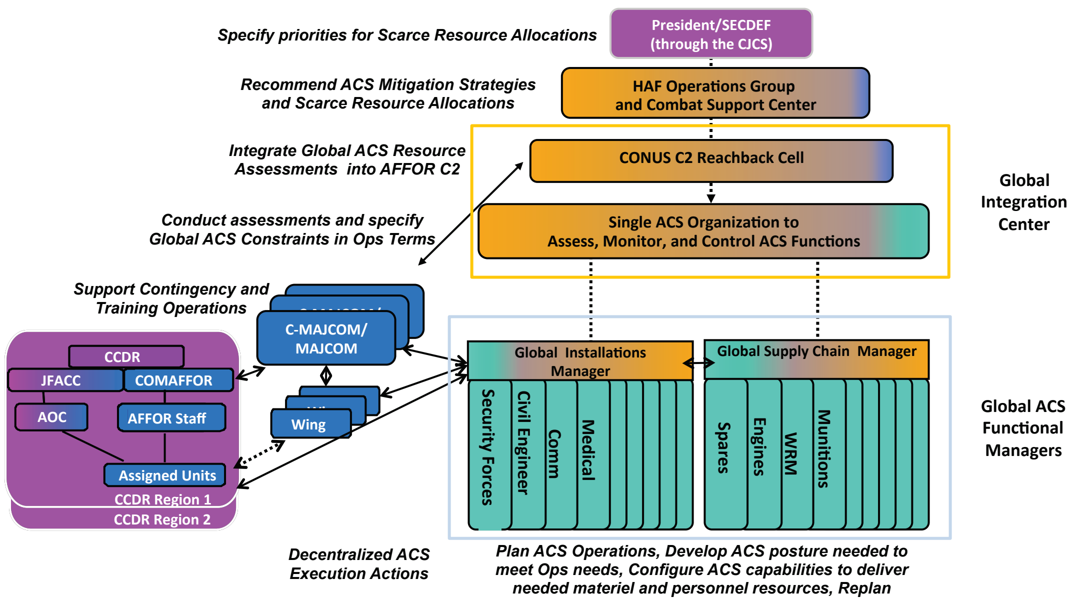
correspond with the master processes outlined by the U.S. Air Force (U.S. Air Force, *Agile Combat Support Command and Control [ACS C2] Supporting CONOPS*, November 15, 2008, Figure 2).

[11] DoDAF defines an OV-1 as a high-level graphic description of a concept.

[12] The TO-BE vision presented in Figure S.2 shows one organization responsible for integrating and balancing ACS functions. Other organizational options are outlined in Chapter Five and in Lynch, Drew, Tripp, et al. (2014).

Figure S.2
OV-1 for Enhanced ACS Processes



NOTES: Purple represents Joint processes, blue represents Air Force processes, green represents ACS processes, and orange represents processes defined in this architecture that are not currently assigned to a specific organization. Here we show ACS functional capabilities grouped by installation support and supply chain management. There are other ACS functional capabilities that fall outside these groupings (for example, chaplain, historian, acquisition, test and evaluation) that also need to be managed globally and integrated with the other ACS functional capabilities to provide a complete picture of ACS capabilities and constraints.

We use an operational viewpoint 5 (OV-5) to document in detail each process and the interaction of the nodes shown in the OV-1. Using the Joint planning processes outlined in Joint Publications 3-0 and 5-0 as the baseline,[13] the focus of the architecture is on contingency planning from the Air Force perspective. We identify where processes interact with Joint and other services, but the focus remains on Air Force processes with current Air Force assets at the strategic and operational levels. We do not focus on tactical-level processes, although we do show where this architecture touches other tactical architectures.

We developed the architecture with three levels of detail. First, we developed an overarching architecture broad enough to describe processes for all functional

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[13] Joint Publication 3-0, *Joint Operations*, Washington, D.C.: Joint Chiefs of Staff, September 17, 2006, incorporating Change 1, February 13, 2008; U.S. Joint Chiefs of Staff, Joint Publication 5-0, *Joint Operation Planning*, Washington, D.C., December 26, 2006.

capabilities. We call this *the overarching C2 architecture from an ACS viewpoint*.[14] We then developed architectures tailored specifically to each ACS functional capability.[15] We call these *functional architectures*.[16] Finally, we developed two summary architectures—one for Generating the Mission and another for Establishing, Protecting, and Sustaining the Base. These two architectures combine the functional capabilities needed in each of the mission areas. For example, the Generate the Mission architecture combines the CAF and MAF maintenance, spares, fuels, engines, WRM, vehicles, support equipment, and munitions functional architectures to show the integration needed between the functions to generate a mission.

We present the architecture through both a visual representation developed using Microsoft Visio and spreadsheets compiled using Microsoft Excel. The Visio diagram shown in Figure S.3 provides a single high-level view of processes across operational activities for all echelons involved. Arrows show the flow of the processes' inputs and outputs within and across the operational activities; however, the diagram does not show the details of what tasks are required within a process or what information is being inputted or outputted. These details are contained in the Excel spreadsheets.

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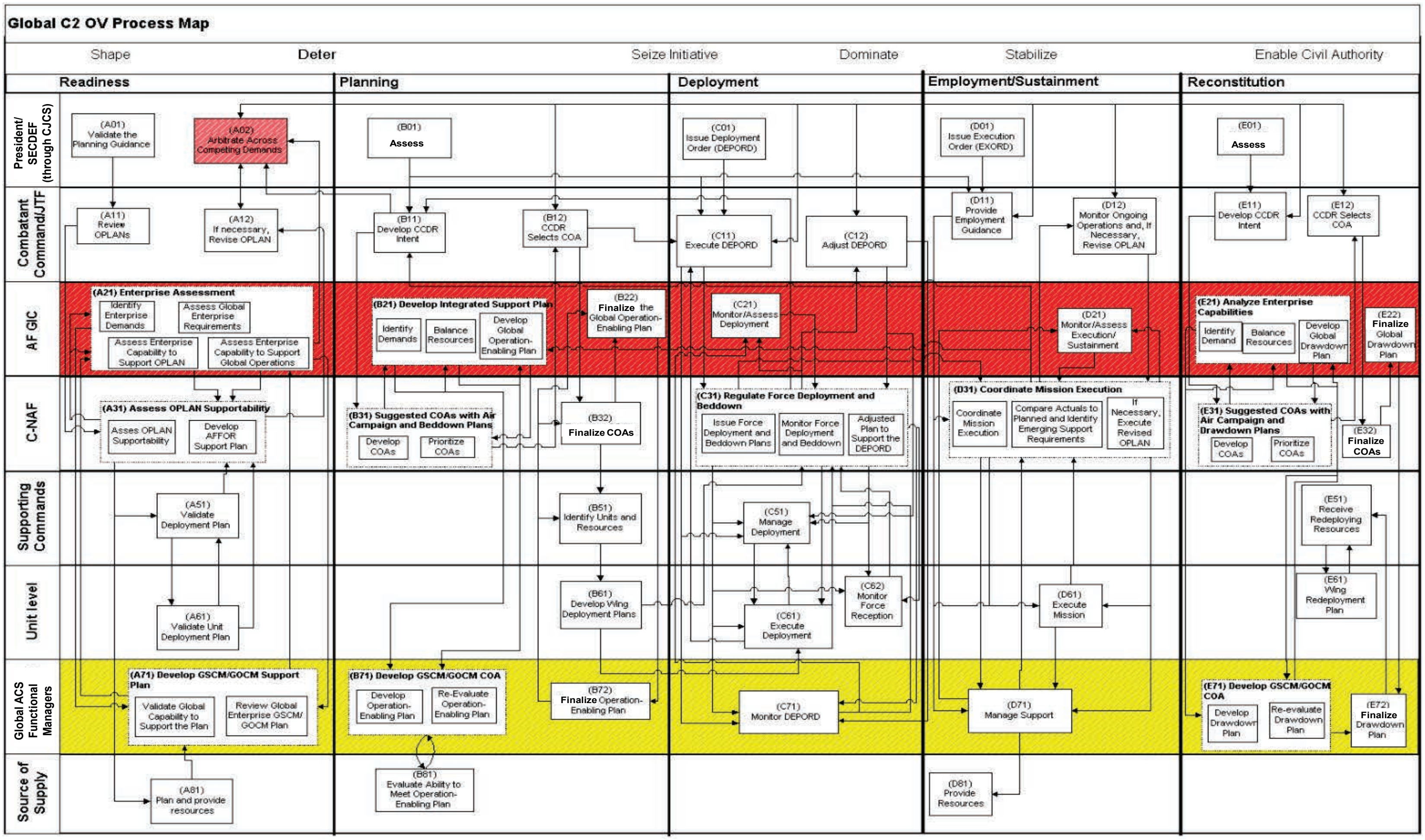
[14] The overarching architecture can be found on the enclosed CD. (If you do not have access to this CD, please contact Kristin Lynch at lynch@rand.org to obtain a copy of the files.)

[15] U.S. Air Force, *Agile Combat Support CONOPS*, November 15, 2007, Figure 3 lists the functional capabilities included in this analysis.

[16] Two functional architectures can be found in this document—one in Chapter Four and one in Appendix A. The rest are on the enclosed CD.

Figure S.3
Visio Diagram of the Operational Architecture



NOTES: The processes highlighted in red are defined in this architecture but are not currently assigned to a specific organization. Processes in yellow may exist today in some manner but not to the level outlined in this architecture. We discuss these gaps in detail in Chapter Five, as well as in Lynch, Drew, Tripp, et al. (2014). For ease of viewing and enlarging, a copy of the Visio diagram can be found on the enclosed CD.

The complete architecture consists of the Visio diagram and a workbook of five sets of spreadsheets—one set of spreadsheets for each operational activity—readiness, planning, deployment, employment and sustainment, and reconstitution. These can be found on the enclosed CD.

Finally, we used the updated architecture to identify shortfalls and gaps in current processes. The architecture was designed to be broad enough to convey the vision but detailed enough to use to perform a doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) analysis to identify gaps and shortfalls that would prevent the Air Force from achieving the vision. The findings from the DOTMLPF analysis are documented here. We identify such shortfalls and present options to address them and help move the Air Force toward the vision presented in the updated TO-BE operational architecture.

Findings and Recommendations

The architecture presented in this analysis documents a vision for integrating ACS processes to enhance Air Force C2 as shown in the OV-1 in Figure S.2. The concepts and processes we describe in the architecture have been widely vetted with senior operational and ACS leaders and there is agreement that the enhanced processes are needed; however, current ACS processes do not fully support the vision—there are deficiencies that need to be addressed.[17]

In the process area, the overarching shortfall is the inability to provide an enterprise assessment of combat support capabilities and constraints to inform trade-off decisions so that scarce resources can be effectively and efficiently used to meet Air Force operational priorities. This is a gap that spans across planning, execution, monitoring, and control—from evaluation of deliberate plans through deployment, employment, and reconstitution when plans are being executed, monitored, and controlled. To address this shortfall, processes need to be enhanced

- within individual ACS supply chains and functional capabilities: Global capabilities need to be assessed in a standard, repeatable manner that is linked directly to the ability to meet operational requirements.
- across individual supply chains and functional capabilities: Individual supply chain and functional capability assessments need to be integrated and balanced into a set of capabilities that can be used in planning (both deliberate and contingency) and replanning processes.

[17] See Table 2.1 for a list of key stakeholders who helped shape and refine the vision.

- within the Air Force: there should be a defined process to arbitrate between and among competing operational demands.

While progress has been made since 2002 to improve ACS planning, execution, monitoring, and control, there are still further improvements to make. Clearly defined processes that specify ACS planning, execution, monitoring, and control roles and include what information flows where should lead to better integration of combat support and operations. Parts of these processes are in place today while others do not exist or are not assigned to specific organizations. Also, there are many options for how these processes could be implemented (see Chapter Five).

While there is general agreement about the need for and the value of the new processes we describe, the responsibility for developing them may cross many organizations. Our architecture can be of particular importance if enhanced ACS processes are developed separately by several organizations and the information from these processes is integrated across organizations. From an architecture perspective, it does not matter who develops the processes and their associated systems.

However the Air Force chooses to proceed, those processes that are implemented need to be codified in doctrine and guidance. The roles and responsibilities of each C2 node, including logistics, operational, and installation staff; Air Force commanders; MAJCOMs; and others, should be delineated in doctrine and guidance. Without clear guidance, enhanced ACS processes may not become institutionalized within the Air Force. Also, advancements and enhancements in ACS could be lost without clear directives providing roles, responsibilities, and authorities.

Finally, we found that the processes are larger than any one Air Force organization. They cross many lines of authority, responsibility, and Air Force core functions. To implement the enhanced processes as documented in the architecture, a commander needs to be identified and given the authority to move the Air Force toward an integrated C2 vision enhanced by ACS processes. Establishing a single ACS authority would be a large cultural and organizational change for the Air Force and would take time to implement. In the meantime, there are many additional actions the Air Force can take to improve ACS planning, execution, monitoring, and control.

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Numerous people both within and outside the Air Force provided valuable assistance and support to our work. They are listed here with their rank and position as of the time of this research. We thank Lt Gen Terry Gabreski, Air Force Materiel Command Vice Commander (AFMC/CV); Lt Gen Janet Wolfenbarger, AFMC/CV; and Lt Gen Loren Reno, Deputy Chief of Staff for Logistics, Installations and Mission Support (AF/A4/7), for commissioning this work. We also thank their staffs for their time and support during this research.

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Responsibility for the content of the document, analyses, and conclusions lies solely with the authors.

Abbreviations

A3/5	Air, Space, and Information Operations Directorate
A4	Logistics Directorate
A7	Installations and Mission Support Directorate
ACC	Air Combat Command
ACC/A4R	ACC, Directorate of Logistics, Logistics Readiness Division
ACS	agile combat support
ACS C2	agile combat support command and control
ADL	activity decomposition list
AEF	Air and Space Expeditionary Force
AF/A3/5	Deputy Chief of Staff, Operations, Plans and Requirements
AF/A3O	Deputy Chief of Staff, Operations, Directorate of Operations and Training
AF/A4/7	Deputy Chief of Staff, Logistics, Installations, and Mission Support
AF/A4/7P	Deputy Chief of Staff, Logistics, Installations, and Mission Support, Directorate of Resource Integration
AF/A4/7Z	Deputy Chief of Staff, Logistics, Installations, and Mission Support, Directorate of Global Combat Support
AF/A4I	Deputy Chief of Staff, Logistics, Installations, and Mission Support, Directorate of Transformation
AF/A4L	Deputy Chief of Staff, Logistics, Installations, and Mission Support, Directorate of Logistics
AF/A5X	Deputy Chief of Staff, Plans and Requirements, Directorate of Operational Planning, Policy and Strategy
AF/A7C	Deputy Chief of Staff, Logistics, Installations, and Mission Support, Air Force Civil Engineer
AF/A7S	Deputy Chief of Staff, Logistics, Installations, and Mission Support, Directorate of Security Forces
AF/IL	Deputy Chief of Staff for Installations and Logistics
AFAFRICA	Air Forces Africa

AFC2IC	Air Force Command and Control Integration Center
AFCENT	Air Forces Central
AFCESA	Air Force Civil Engineer Support Agency
AFDD	Air Force Doctrine Document
AFEUR	Air Forces Europe
AFFOR	Air Force Forces
AFGLSC	Air Force Global Logistics Support Center
AFI	Air Force Instruction
AFIT	Air Force Institute of Technology
AFJECT	Air Force Joint Exercise Coordination Team
AFKOR	Air Forces Korea
AFMC	Air Force Materiel Command
AFMC/A3X	AFMC Operational Plans Division
AFMC/A8/9	AFMC Strategic Plans, Programs, and Analyses Directorate
AFMC/A8XI	AFMC Wargaming Integration Office
AFMC/CV	Air Force Materiel Command, Vice Commander
AFMCI	Air Force Materiel Command Instruction
AFPAC	Air Forces Pacific
AFRC	Air Force Reserve Command
AFSO21	Air Force Smart Operations for the 21st Century
AFSOC	Air Force Special Operations Command
AFSOUTH	Air Forces Southern
AFSPC	Air Force Space Command
ALC	Air Logistics Complex
ALEX	Agile Logistics Experiment
AMC	Air Mobility Command
ANG	Air National Guard
AOC	Air and Space Operations Center
AOR	area of responsibility

ART	AEF Reporting Tool
ATO	air tasking order
AV	All Viewpoint
BEAR	basic expeditionary airfield resources
C2	command and control
CAF	Combat Air Forces
CAPE	Cost Assessment and Program Evaluation
CAT	Crisis Action Team
CC	Commander
CCDR	combatant commander
CDDOC	CENTCOM Deployment and Distribution Operations Center
CE	civil engineering
CENTCOM	U.S. Central Command
CFMP	Core Function Master Plan
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CJCSM	Chairman of the Joint Chiefs of Staff Memorandum
C-NAF	component numbered Air Force
C-MAJCOM	component major command
C-NAF/CC	component numbered Air Force commander
COA	course of action
COCOM	combatant command
COMAFFOR	commander of Air Force forces
CONOPS	concept of operations
CONUS	continental United States
COOP	Continuity of Operations
COS	Combat Operations Squadron
CRP	Contract Repair Process
CRRA	Capabilities Review and Risk Assessment

CSAF	Chief of Staff, United States Air Force
C-SPEC	combat support planning, execution, and control
CSSC	COMAFFOR Senior Staff Course
CV	Capability Viewpoint
DCP	Defense Continuity Program
DDOC	Deployment and Distribution Operations Center
DEPORD	deployment order
DIV	Data and Information Viewpoint
DLA	Defense Logistics Agency
DoD	Department of Defense
DoDAF	DoD Architecture Framework
DOTMLPF	doctrine, organization, training, materiel, leadership and education, personnel, and facilities
DPG	Defense Planning Guidance
DREP	Depot Repair Enhancement Program
DRU	direct reporting unit
ECS	expeditionary combat support
EDDOC	EUCOM Deployment and Distribution Operations Center
eLog21	Expeditionary Logistics for the 21st Century
ESP	expeditionary site plan
ESSP	Expeditionary Site Survey Process
EUCOM	U.S. European Command
EXORD	execute order
EXPRESS	Execution and Prioritization of Repair Support System
FAM	Forward Operating Location Assessment Model
FOA	Field Operating Agency
FOL	forward operating location
GACP	Global Ammunition Control Point
GDF	Guidance for Development of the Force

GEF	Guidance for Employment of the Force
GFM	global force management
GIC	Global Integration Center
GSU	geographically separated unit
ICAM	Integrated Computer-Aided Manufacturing
ICC	Installation Control Center
IDEF	Integrated Definition
IDEF0	Integrated Definition Function Modeling Method
IG	Inspector General
IGESP	In-Garrison Expeditionary Site Plan
IPO	Input-Process-Output
IT	information technology
JCS	Joint Chiefs of Staff
JEFX	Joint Expeditionary Force Experiment
JEP	Joint Exercise Program
JOPES	Joint Operation Planning and Execution System
JSCP	Joint Strategic Capabilities Program
JTF	Joint Task Force
JTF NA	Joint Task Force Noble Anvil
LFF	Logistics Factors File
LIMFAC	limiting factor
L-MAJCOM	Lead Major Command
LOGCAT	Logistician's Contingency Assessment Tools
LSA	Logistics Sustainability Analysis
MAF	Mobility Air Forces
MAJCOM	major command
MCC	Materiel Command Center
MCO	major contingency operation
MEF	mission essential functions

MOE	measure of effectiveness
MOP	measure of performance
NEP	National Exercise Program
NSCS	National Security Council System
OAF	Operation Allied Force
OCR	office of coordinating responsibility
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OPLAN	operation plan
OPORD	operation order
OPR	office of primary responsibility
OSC	operational support center
OSD	Office of the Secretary of Defense
OSF	operational support facility
OT&E	organize, train, and equip
OV	operational viewpoint
PACAF	Pacific Air Forces
PACOM	U.S. Pacific Command
PAD	Program Action Directive
PAF	Project AIR FORCE
PDDOC	PACOM Deployment and Distribution Operations Center
POC	point of contact
POM	Program Objective Memorandum
RAT	Rapid Augmentation Team
SAF/US(M)	Secretary of the Air Force, Business Transformation and Management Office
SAF/XC	Secretary of the Air Force, Office of Warfighting Integration Chief Information Office
SCMG	Supply Chain Management Group
SECAF	Secretary of the Air Force

SECDEF	Secretary of Defense
SF	security forces
SOR	Source of Repair
SPD	system program director
SSSP	Steady State Security Posture
START	Strategic Tool for the Analysis of Required Transportation
StdV	Standard Viewpoint
SV	Systems View
SvcV	Services Viewpoint
TPFDD	time-phased force and deployment data
USAFE	U.S. Air Forces, Europe
USFK	U.S. Forces Korea
USTRANSCOM	U.S. Transportation Command
UTC	unit type code
WMP-1	War and Mobilization Plan Volume 1
WMS	Wartime Materiel Support
WR-ALC	Warner Robins Air Logistics Center
WRM	war reserve materiel

1. Introduction, Background, and Motivation

Air Force Doctrine Document (AFDD) 1 states that command and control (C2) of air, space, and cyber power is a core function of the United States Air Force. C2 enables the United States to conduct operations that accomplish specific military objectives. Agile combat support (ACS),[18] another core function of the Air Force, plays an integral role in C2. Often referred to as *agile combat support command and control* (ACS C2), the planning, execution, monitoring, and control of ACS processes are an integral part of Air Force and Joint C2. Prior Project AIR FORCE (PAF) research[19] found that ACS planning, execution, monitoring, and control processes[20] critical to informing C2 decisions are not adequately defined and delineated in doctrine, and tools or systems to support these ACS processes either do not exist or are insufficient.

Objective

The purpose of this analysis is to document, in an operational architecture, strategic- and operational-level C2 processes with a focus on how enhanced ACS planning, execution, monitoring, and control processes interface with and can be integrated into Air Force and Joint C2. This architecture is a TO-BE architecture looking at the near-term—what C2 processes could be in the next 4-5 years using current Air Force assets. The result is a global C2 network that involves ACS process enhancements at the combatant command (COCOM), Headquarters Air Force, component major command (C-MAJCOM), component numbered Air Force (C-NAF), supporting MAJCOM, and other

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[18] In this document, the term *ACS* refers to the 26 functional capabilities outlined in U.S. Air Force, *Agile Combat Support Command and Control (ACS C2) Supporting CONOPS*, November 15, 2008, p. 10, Figure 2. ACS is broader than just logistics; it includes personnel, services, communications, and installation and mission support functions, just to name a few.

[19] James Leftwich et al., *Supporting Expeditionary Aerospace Forces: An Operational Architecture for Combat Support Execution Planning and Control*, Santa Monica, Calif.: RAND Corporation, MR-1536-AF, 2002; Patrick Mills et al., *Supporting Air and Space Expeditionary Forces: Expanded Operational Architecture for Combat Support Execution Planning and Control,* Santa Monica, Calif.: RAND Corporation, MG-316-AF, 2006; and Robert S. Tripp et al., *Improving Air Force Command and Control Through Enhanced Agile Combat Support Planning, Execution, Monitoring, and Control Processes*, Santa Monica, Calif.: RAND Corporation, MG-1070-AF, 2012.

[20] By *control processes* we mean those processes that set control parameters or acceptable thresholds, track actual combat support performance against those thresholds, signal when a combat support parameter falls outside the set limits, and notifies combat support planners so plans can be developed to bring the process back within control limits.

(global ACS resource managers) nodes. We then use the architecture to identify and describe where shortfalls or major gaps exist between current ACS processes (the AS-IS[21]) and the vision for integrating enhanced ACS processes into Air Force C2 (the TO-BE).[22]

Background and Research Motivation

The current defense environment is shaped by several particularly challenging demands—increasing budget pressures, withdrawal from Iraq and Afghanistan, and a new defense strategy. A significant portion of the force is continuously engaged in a range of operations—from active combat to humanitarian assistance—over wide geographical areas where force requirements are often difficult to predict. Even after operations in Iraq and Afghanistan have concluded, it is likely the Air Force will still be called upon to support theater security cooperative efforts to shape the world situation and avoid future combat operations.

In addition to these demands, there is increasing pressure to conduct all Department of Defense (DoD) operations more efficiently. For the Air Force (as well as the other services), that means providing quick, tailorable support packages optimized to meet specific operational needs. Economic pressures are likely to continue and may result in further reductions in the resources needed to support military operations.

In addition to continuous operational demands and constrained economic realities, there are many other factors that contribute to the imbalance between needed ACS resources and those available for contingency and training operations. These factors include: the inability to precisely predict resource requirements, budgets developed to meet estimated requirements constructed several years in advance of when the monies become available, inherent uncertainty in supply chain actions associated with providing combat support resources to the battlefield, the potential need to reallocate funding to meet unanticipated requirements, and unforeseen world events with new and emerging requirements. Component numbered Air Force commanders (C-NAF/CCs) and component major command commanders (C-MAJCOM/CCs) and their staffs develop contingency courses of action (COAs) without information about global ACS resource

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[21] In this report, we use *AS-IS* to indicate current conditions and *TO-BE* to indicate future ones.

[22] Also see Kristin F. Lynch, John G. Drew, Robert S. Tripp, et al., *Implementation Actions for Improving Air Force Command and Control Through Enhanced Agile Combat Support Planning, Execution, Monitoring, and Control Processes,* Santa Monica, Calif.: RAND Corporation, RR-259-AF, 2014, which identifies and describes shortfalls or major gaps that exist between current ACS processes and the vision for integrating enhanced ACS processes into Air Force C2 as presented in this architecture.

availabilities and constraints. The assumption that sufficient ACS resources exist to simultaneously meet all worldwide operational priorities is not credible. As a result, C-NAF/CCs, C-MAJCOM/CCs, and their staffs do not fully understand or anticipate the risks associated with specific COAs or take steps in advance (such as changes in operational plans or ACS plans) to mitigate those risks. The President and the Secretary of Defense (SECDEF), as the highest military command authorities (through the Chairman of the Joint Chiefs of Staff [CJCS]), may need to allocate scarce resources among competing demands. Individual ACS supply chain managers and functional resource managers should be integrated into important C2 nodes to provide enterprise-wide assessments of ACS capabilities and constraints. The ACS community needs to be able to provide predictions of combat support requirements and rapid response to dynamic operational needs, and to allocate scarce resources effectively and efficiently.

Today, in most cases, ACS planning, execution, monitoring, and control processes are ad hoc, with only a few functional areas managing capabilities and resources from an enterprise perspective. Munitions, for example, has a global requirements determination process and an allocation board to distribute assets worldwide. Other functional capability processes, such as those for spares, engines, and pods (for example, navigation and targeting pods), are not as well defined or standardized. Many ACS resources are viewed from a theater perspective without an enterprise view of worldwide capability. However, combat support of military operations remains successful primarily because of the efforts of individuals in the combat support community to overcome difficulties in current (AS-IS) processes, systems, tools, organization, and training. Since the Air Force will continue to operate in a resource-constrained environment, standard, repeatable analytic ACS processes to support trade-off and allocation decisionmaking should be established and implemented.

The Air Force and DoD recognize that transformation is needed to meet existing and emerging global requirements with limited resources. Both have significantly invested in improving the capabilities needed to meet the challenges posed by the current defense environment.[23] The Air Force has begun to transform its logistics enterprise to be both

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[23] For example, Program Action Directive (PAD) 06-09 established C-NAFs as the Air Force component organizational structure to enhance operational-level C2 of air, space, and information operations across a broad range of engagements (U.S. Air Force, *Implementation of the Chief of Staff of the Air Force Direction to Establish an Air Force Component Organization*, PAD 06-09, November 7, 2006b; and U.S. Air Force, *Air Force Forces Command and Control Enabling Concept*, Change 2, May 25, 2006a); the Air and Space Operations Center (AOC), a part of the C-NAF, was designated as a weapon system whose process-oriented focus is on producing war plans and executing them to achieve strategic and tactical objectives.

more responsive in meeting combatant commander (CCDR) needs and more efficient in training, organizing, and equipping forces for operational missions.[24]

In light of these recent Air Force transformations and changes in the operational environment, in 2009 senior Air Force logisticians asked PAF to examine ACS processes to meet contingency, readiness preparation, and training requirements. Specifically, we were asked to review prior RAND-developed operational architectures (OAs), identify changes resulting from transformational efforts, and evaluate whether gaps identified in previous work still existed. In previous analysis, we found that the Air Force lacks the comprehensive doctrine and guidance, processes, organizations, training, and tools and systems that would enable combat support functions to allocate and utilize limited resources to best achieve operational objectives both in contingency operations and during readiness preparation and training.[25] To address those shortfalls, we recommended that standardized assessments of global ACS capabilities and constraints be included in contingency planning and execution activities.

This analysis expands on our 2009 work by presenting an updated operational architecture that provides a vision for integrating enhanced ACS processes into Air Force C2 at the strategic and operational levels in light of the current defense environment. We document the ACS processes needed within the Air Force and Joint C2 enterprise to help the warfighter achieve the desired operational effects.

Organization of This Report

In the chapters that follow, we present an operational architecture that defines a vision for integrating enhanced ACS processes into Air Force C2. In Chapter Two, we present the research approach and architectural framework we used. Chapter Three presents the scope of the architecture. A sample architecture product is detailed in Chapter Four. In Chapter Five, we describe the gaps and shortfalls that currently exist in processes; doctrine, guidance, and instructions; training and career management; tools and systems; and organizations. We also suggest strategies to close those gaps. Chapter Six concludes with findings and recommendations for improved ACS planning, execution, monitoring, and control. In addition, Appendix A details the operational architecture for Mobility Air Force maintenance. Appendix B is an annotated bibliography.

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[24] For example, the Expeditionary Logistics for the 21st Century (eLog21) program aims to modernize and streamline logistics operations, allowing them to address the challenges of a more demanding environment while working within limited budgets. ELog21 is an umbrella program comprising many transformational logistics and supply chain initiatives with the overall goal of improving availability and reducing costs.

[25] Robert S. Tripp et al., 2012.

2. Research Approach and Architectural Framework

In this chapter, we present the research approach used in this analysis. We then discuss the framework used to develop and present this operational architecture.

Research Approach

There were two key aspects to our research approach for developing the architecture. First, we began this analysis by evaluating previous RAND-developed operational architectures from 2002 and 2006. We reviewed the recommendations of the previous analyses and evaluated Air Force progress in addressing the identified issues. Second, we evaluated how changes in the operational and fiscal environment, including changes in planning guidance and transformational initiatives, affect ACS to determine the applicability of the 2002 and 2006 operational architectures to today's military environment. From this investigation, we identified additional ACS process improvements and enhancements to add to the updated operational architecture. Each aspect of our research approach will be discussed in detail in the following sections.

Step One: Evaluation of Previous RAND Architectures

Since 2000, RAND PAF researchers have documented the need for a well-defined, closed-loop ACS system that would enable the Air Force to achieve the goals of an Air and Space Expeditionary Force (AEF).[26] The need for an increased level of ACS functionality was realized during Joint Task Force Noble Anvil (JTF NA) and the Air War Over Serbia.[27] In response to this realization, the Deputy Chief of Staff for Installations and Logistics (AF/IL) asked RAND PAF to study the current (AS-IS) ACS system and develop a TO-BE vision for enhanced combat support. PAF researchers documented then-current processes, identified areas in need of change, and developed enhanced processes to enable a well-defined, closed-loop TO-BE ACS system incorporating lessons learned during JTF NA and the Air War Over Serbia. That vision for an enhanced ACS system included the ability to

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[26] Robert S. Tripp et al., *Supporting Expeditionary Aerospace Forces: An Integrated Strategic Agile Combat Support Planning Framework*, Santa Monica, Calif.: RAND Corporation, MR-1056-AF, 1999.

[27] Amatzia Feinberg et al., *Supporting Expeditionary Aerospace Forces: Lessons from the Air War Over Serbia*, Santa Monica, Calif.: RAND Corporation, MR-1263-AF, 2002, not available to the general public.

- quickly estimate the combat support requirements (such as the number of security forces needed to support a forward operating location) for force package options needed to achieve desired operational effects and assess the feasibility of operational and support plans
- quickly determine beddown capabilities (such as war reserve materiel required to establish a forward operating location), facilitate rapid time-phased force and deployment data (TPFDD) development, and configure a distribution network to meet employment time lines and resupply needs
- facilitate resupply planning and performance monitoring during the execution of an operation
- determine the effects of allocating scarce resources to various CCDRs, indicate when combat support performance deviates from the desired state, and implement replanning and/or "get-well" planning analysis
- provide decisionmakers with an Air Force–wide view of the combat support resources available for Joint employment operations.[28]

The processes associated with the ACS vision were documented in 2002 in an operational architecture that covered the Air Force operations process (current operations, crisis action planning, deployment/employment planning, and employment/sustainment).[29] The end result was a database organized by operational activity and organizational node.[30]

In 2006, RAND PAF was asked to again evaluate the Air Force ACS system. We used the operations being conducted in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) to expand and provide more detail on specific pieces of the 2002 architecture.[31] The work introduced new concepts for Air Force involvement in the planning, programming, budgeting, and execution processes and provided further detail on ACS contingency planning and execution processes associated with specific organizational nodes: Headquarters Air Force Materiel Command (AFMC) and commander of Air Force forces (COMAFFOR) A-Staffs. The 2006 report added detail on

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[28] James Leftwich et al., 2002.

[29] The *operations process*, a term defined in Army Field Manual 5-0, consists of planning, preparing, executing, and assessing (U.S. Army, Field Manual 5-0, *The Operations Process*, March 2010). We revise the components to readiness, planning, deploying, executing and sustaining, and reconstituting to correspond with the master processes outline in U.S. Air Force, 2008, Figure 2.

[30] Organizational nodes range from the President, SECDEF, and associated high-level Joint-service organizations to generic sources of supply for individual resources.

[31] Robert S. Tripp et al., *Supporting Air and Space Expeditionary Forces: Lessons from Operation Enduring Freedom*, Santa Monica, Calif.: RAND Corporation, MR-1819-AF, 2004; and Kristin F. Lynch et al., *Supporting Air and Space Expeditionary Forces: Lessons from Operation Iraqi Freedom*, Santa Monica, Calif.: RAND Corporation, MG-193-AF, 2005.

information flows and the decisions impacted by that information.[32] The result was a refined and expanded operational architecture.

The operational architectures developed in 2002 and 2006 identified issues and potential solutions that were, at that time, endorsed by Air Force senior logistics leaders. Over the years, incremental improvements have been made, but some issues still persist. We will discuss these remaining gaps and shortfalls in Chapter Five.

Step Two: Evaluation of the Changing Operational and Fiscal Environment

Changes in the Air Force corporate structure and the fiscal and operational environments further motivated the need to revise the previous operational architectures. The Air Force corporate structure today is not the same as it was in 2002 or 2006. Changes in Office of the Secretary of Defense (OSD) guidance and new organizational structures have changed the Air Force's operating environment. The fiscal environment today is also different from that of the early 2000s. Efficiency initiatives are driving changes to processes and organizations. While these corporate changes do not change the TO-BE vision, they may shift roles and responsibilities among different organizations.

Shifts in OSD Guidance. DoD planning guidance calls for increased operational requirements, shifting the focus from conventional military operations to irregular, catastrophic, and disruptive threats and capabilities while still requiring services to maintain the ability to engage in major contingency operations (MCOs) and homeland defense.[33] Instead of focusing on two simultaneous MCOs, the focus has shifted to maintaining homeland defense while supporting ongoing steady-state deployment commitments, which range from stability operations to irregular warfare and catastrophic attacks, as well as maintaining the capability to meet and defeat unforeseen challenges.

A parallel shift has occurred in the role the Air Force plays in these types of operations. More focus now falls on train, equip, advise, assist operations, in which Air Force personnel teach and aid host countries become responsible for their own safety and security. In many of these cases, combat support capabilities may be the main focus of the operation rather than aircraft fighting missions.

DoD Efficiency Initiatives. To meet increased operational requirements and remain a valid threat to its adversaries, the United States must improve and sustain its military capabilities. The current tight fiscal environment makes force structure improvements

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[32] Patrick Mills et al., 2006.

[33] U.S. Department of Defense, *Guidance for Development of the Force,* April 2008a, not available to the general public; U.S. Department of Defense, *Guidance for Employment of the Force (GEF)*, draft, August 31, 2007b, not available to the general public; and U.S. Department of Defense, *Global Force Management Implementation Guidance (GFMIG) FY 08–09*, June 4, 2008b, not available to the general public.

and modernization efforts difficult to afford. In 2010, under the direction of Secretary Robert Gates, DoD initiated an efficiency effort with the goal of curbing overhead costs and reinvesting the savings to recapitalize the force. Each service was tasked with finding savings in its own organizational structure and then deciding how to reinvest those savings within the service. Reinvestment in the force structure should focus on the needs of warfighters, which may lead to trade-offs in other areas. Likewise, the DoD will continue to evaluate ways to eliminate overhead costs.[34] The DoD is trying to find a cost-efficient manner in which to effectively meet current and future military requirements.

New Air Force Framework for Programming and Training–Core Functions. The Air Force has a responsibility to organize, train, and equip its forces so that they are prepared to support the warfighting mission as outlined in OSD guidance. To better meet these training and readiness requirements, the Air Force designated 12 service core functions to present warfighting capabilities to CCDRs and link resource requirements to the operational capabilities needed to support future programming requirements.[35] ACS and C2 are two of the service core functions. Therefore, an ACS Core Function Master Plan (CFMP) is currently in development by AFMC, the lead integrator for the ACS CFMP, and a C2 CFMP is being developed by Air Combat Command (ACC), the lead integrator for the C2 CFMP.

The ACS CFMP serves as a guide for better integrating combat support activities within the combat support community and with the operators. As such, it enables many other core functions, including C2. The goal is to coordinate all 26 combat support functional capabilities[36] (for example, providing security forces, maintenance, civil engineering, materiel management, and contracting) to achieve specific operational objectives (for example, readying the total force, preparing the battlespace, and positioning the total force) more efficiently and effectively. This coordination is complex because combat support functional capabilities are multi-echelon and interrelated. The

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[34] Christine Fox, Cost Assessment and Program Evaluation (CAPE), "DoD Efficiency Decisions," briefing, August 9, 2010.

[35] The 12 Air Force service core functions are Nuclear Deterrence Operations, Air Superiority, Space Superiority, Cyberspace Superiority, Global Precision Attack, Rapid Global Mobility, Special Operations, Global Integrated Intelligence, Surveillance, and Reconnaissance (ISR), C2, Personnel Recovery, Building Partnerships, and ACS.

[36] The 26 ACS functional capabilities are acquisition, airfield management, air traffic control, chaplain services, civil engineer, communications and information, contracting, distribution, education and training, financial management and comptroller, health services, historian, judge advocate, logistics planning, maintenance, manpower and personnel, materiel management, munitions, office of special investigations, postal, public affairs, safety, science and technology, security forces, services, and test and evaluation.

intent is for the Air Force to use the CFMP to "assess potential integration requirements and opportunities."[37]

The C2 CFMP serves as a strategic guide for how the Air Force can provide C2 across a range of military operations to both the Joint and Air Force communities.[38] The C2 CFMP presents a plan for how the Air Force can achieve its vision for C2 as outlined in AFDD 6-0. Since C2 is a key component of many of the other core functions, the C2 CFMP can serve to guide the integration of C2 activities, including ACS planning, executing, monitoring, and controlling activities.

Both ACS and C2 are cross-functional capabilities that affect many other core functions, including each other. Finding a way to develop ACS and C2 capabilities separately yet integrate them for use in military operations may be challenging. Senior leader discussions during a recent ACS Quarterly Update began to outline how these processes can be divided between the CFMPs.[39] As was agreed to during the video teleconference, ACS assessment, monitoring, and control processes will be developed by the ACS community and included in the ACS CFMP. The C2 community will integrate these ACS capabilities into the C2 enterprise at the operational level and the integration processes will be included in the C2 CFMP. Not discussed was who would be responsible for providing the resources for the integration—personnel, tools, and systems—and how C2 and ACS processes would be integrated at the strategic and operational levels of operations. The architecture presented in this document can help identify which processes should remain within the ACS CFMP for development and which processes should be considered within the C2 CFMP.

The Evolving Combat Support Enterprise. The Air Force continues to transform its combat support enterprise. The transformational initiatives are large in scope and cover most combat support functional capabilities including maintenance, distribution, procurement (sourcing), information, financial, and C2 activities. The goal is for the ACS system to be able to meet emerging CCDR needs while also efficiently organizing, training, and equipping the force for day-to-day operations. Programs such as eLog21 and Air Force Smart Operations for the 21st Century (AFSO21) aim to streamline and modernize ACS while also reducing operating and sustainment costs. Senior ACS leaders

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[37] U.S. Air Force, *Agile Combat Support Core Function Master Plan 2010*, draft version as of January 19, 2010a, p. 1.

[38] In the C2 CFMP, *C2* is defined as "[t]he ability of commanders to integrate operations in multiple theaters at multiple levels through planning, coordinating, tasking, executing, monitoring, and assessing air, space, and cyberspace operations across the range of military operations" (U.S. Air Force, "Command and Control Service Core Function, 2010–2030," draft, undated, not available to the general public.

[39] ACS C2 Quarterly Update meeting with AF/A4/7, ACC/CV, and AFMC/CV, August 9, 2011.

recognize that enhanced ACS processes are needed to improve Air Force and Joint C2.[40] These ACS leaders point out that in recent contingency operations, including Operation Allied Force (OAF), OEF, and OIF, the ACS processes that interacted with Air Force and Joint C2 systems were ad hoc and that processes such as those presented in this architecture are needed to enhance both ACS and C2.

Integrated ACS Management and Control Concepts. The Air Force is moving away from a commodity-centered system in which each resource is managed separately by base or by theater.[41] With budget constraints and increased contingency operations demands, not every location (base or theater) can maintain their own reserve of resources. To be able to effectively shift resources to where they are needed, the Air Force has designated global managers for some resources. The Air Force has centralized materiel management responsibilities and decision authorities across aircraft spare parts into the Air Force Global Logistics Support Center (AFGLSC), now part of the Air Force Sustainment Center, as part of eLog21. Munitions management responsibilities have been centralized in the Global Ammunition Control Point (GACP) and non-unit war reserve materiel (WRM) (including basic expeditionary airfield resources [BEAR]) is also being centralized under Air Combat Command, Directorate of Logistics, Logistics Readiness Division (ACC/A4R). The Expeditionary Vehicle and Equipment Initiative includes establishing a virtual organization linking Command Equipment Management Offices, Vehicle Equipment Management Support Offices,[42] and major command Vehicle Management Offices for centralized management (or assessment) of support equipment and vehicles, and global managers have been designated for other end items, such as propulsion.

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[40] "A New Vision for Global Support, C2 Combat Support," *Air Force Journal of Logistics*, Vol. XXVII, No. 2, Summer 2003; and Terry L. Gabreski et al., "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," *Air and Space Power Journal*, Spring 2003.

[41] Eric Peltz et al., *Supporting Expeditionary Aerospace Forces: An Analysis of F-15 Avionics Options*, Santa Monica, Calif.: RAND Corporation, MR-1174-AF, 2000; Amatzia Feinberg et al., *Supporting Expeditionary Aerospace Forces: Expanded Analysis of LANTIRN Options*, Santa Monica, Calif.: RAND Corporation, MR-1225-AF, 2001; Ronald G. McGarvey et al., *Supporting Air and Space Expeditionary Forces: Analysis of CONUS Centralized Intermediate Repair Facilities*, Santa Monica, Calif.: RAND Corporation, MG-418-AF, 2008; Ronald G. McGarvey et al., *Global Combat Support Basing: Robust Prepositioning Strategies for Air Force War Reserve Materiel*, Santa Monica, Calif.: RAND Corporation, MG-902-AF, 2010.

[42] A Command Equipment Management Office orchestrates the requirements determination process for equipment; a Vehicle Equipment Management Support Office sets the standards used in the vehicle requirements determination process.

Step Three: Document the Processes in a RAND Tool

Using information gleaned from our evaluation of the current fiscal and operational environment, we identified additional ACS process improvements and enhancements to add to the updated operational architecture. As the focus of the operational architecture is on contingency planning with current Air Force assets, we also included any tasks defined in doctrine that were not included in the previous work. To ensure we captured processes correctly, we worked with many key stakeholders (see Table 2.1). The next step was to develop a method of presenting the information that would be helpful to the Air Force.

Table 2.1
Key Stakeholders We Worked with During Our Analyses

Air Force	Joint and Other Services
COMAFFORs: AFCENT, AFEUR, AFPAC,	JCS, OSD
AFKOR, AFSOUTH, AFAFRICA, 18th Air Force	CENTCOM J4, CDDOC
AF/A3/5, AF/A3O, AF/A5X, AF/A4/7, AF/A4L,	USTRANSCOM/J3/J4/J5, USTRANSCOM DDOC
AF/A4I, AF/A4/7Z, AF/A4/7P, AF/A7C, AF/A7S	EUCOM J4, EDDOC
SAF/XC	PACOM J4, PDDOC
MAJCOMS: AFMC, ACC, AMC, AFSPC, AFSOC	USFK J4, PDDOC-K
AFGLSC	DLA
ALCs	Army G4, Army Materiel Command, AOC liaison to
Operational wings	Army Component
AFIT	

NOTE: This table lists the key stakeholders we have worked with since our initial analysis in 2002.

The Architecture Framework

Once we refined the processes (see Chapter Four and Appendix A for details) to address identified deficiencies (see Chapter Five), we considered how best to present the information. We evaluated new structural designs for the architecture. To determine which structure would be most applicable to the Air Force, we explored the DoD Architecture Framework (DoDAF).[43] DoDAF was established as a guide for the development of architectures for DoD.

Architectures are created within DoD for a number of reasons. From a compliance perspective, the DoD's development of architectures is compelled by law and policy.[44] From a practical perspective, experience has demonstrated that the management of large

[43] U.S. Department of Defense, *DoD Architecture Framework*, Version 2.0, *Volume I: Introduction, Overview, and Concepts (Manager's Guide),* May 2009.

[44] U.S. Code, Title 40, Section 1401, Clinger-Cohen Act of 1996, February 10, 1996; Office of Management and Budget, "Memorandum for Heads of Executive Departments and Agencies: Management of Federal Information Resources," Circular A-130, undated.

organizations employing sophisticated systems and technologies in pursuit of joint missions demands a structured, repeatable method for evaluating investments and investment alternatives, as well as the ability to effectively implement organizational change, create new systems, and deploy new technologies. DoDAF defines a set of products that act as mechanisms for visualizing, understanding, and assimilating the broad scope and complexities of an architecture description through graphic, tabular, or textual means.[45] The set of products defined in DoDAF are divided into the following eight viewpoints:

1. All Viewpoint (AV)
2. Capability Viewpoint (CV)
3. Data and Information Viewpoint (DIV)
4. Operational Viewpoint (OV)
5. Project Viewpoint (PV)
6. Services Viewpoint (SvcV)
7. Standard Viewpoint (StdV)
8. Systems Viewpoint (SV).

After reviewing each viewpoint, we determined that the OV most closely aligned with the purpose and goals of this analysis. DoDAF defines the OV as capturing "the operational nodes, the tasks or activities performed, and the information that must be exchanged to accomplish DoD missions. It conveys the types of information exchanged, the frequency of exchange, which tasks and activities are supported by the information exchanges, and the nature of information exchanges."

Because the OV is information-centric, we needed a method to capture and convey all of the information associated with each task. We chose the Integrated Definition (IDEF) methodology. IDEF grew out of the Air Force-established Integrated Computer-Aided Manufacturing (ICAM) program, which was developed in the mid-1970s to improve manufacturing operations. According to the IDEF Process Modeling Methodology, IDEF was designed as a regimented approach to analyzing an enterprise, capturing AS-IS process models, and modeling activities (organizational units) within an enterprise. Using IDEF, an enterprise could develop a basis for process improvement planning and have a foundation for defining information requirements.[46]

Over time, IDEF has evolved into a family of programming languages. The one we found to be most applicable to this work is the Integrated Definition Function Modeling

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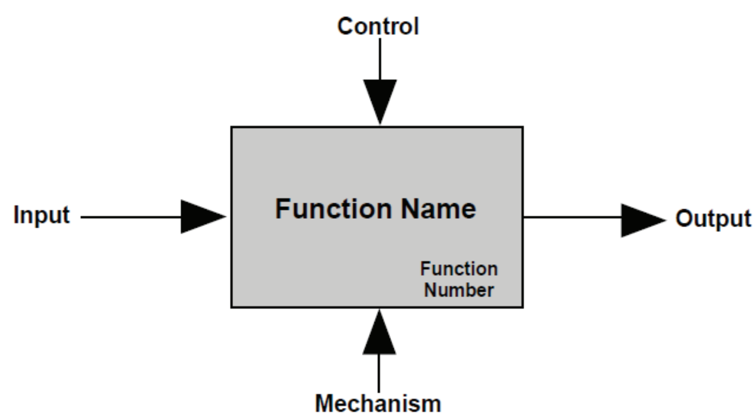
[45] U.S. Department of Defense, *DoD Architecture Framework*, Version 1.5, *Volume I: Definitions and Guidelines*, April 23, 2007a.

[46] Robert P. Hanrahan, The IDEF Process Modeling Methodology, Software Technology Support Center, June 1995.

Method (IDEF0). IDEF0 models the decisions, actions, and activities of an organization or system. Applied as an analysis tool, as it was here, IDEF0 assists the modeler in identifying the functions performed and what is needed to perform them. The primary modeling components are: functions (shown in the box in Figure 2.1) and the data that interrelate those functions (shown by the arrows in Figure 2.1).

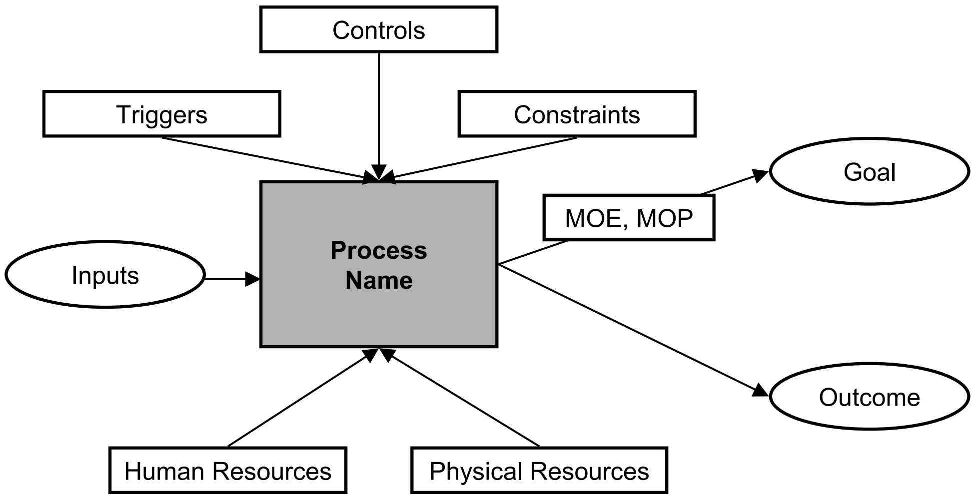
Though the IDEF0 is sufficient for modeling the operational architecture presented here, we learned that an expanded activity model was developed in 2005 and is currently used by the Air Force architects in the Office of the Under Secretary of the Air Force, Business Transformation and Management Office (SAF/US(M)). This expanded model includes more influences on a process (see Figure 2.2).

Figure 2.1
IDEF Box Format



SOURCE: Defense Acquisition University, *Systems Engineering Fundamentals*, Supplement 5-B: IDEF0, Fort Belvoir, Va.: Defense Acquisition University Press, January 2001.

Figure 2.2
Expanded IDEF Model



SOURCE: Michael McFarren, informational briefing, May 2010.

In the expanded model, the core components are the same as those in IDEF0: inputs are defined as actions, information, and/or data required by the process. The process (or function) is the activity triggered by the input. The specific actions required to complete the process are tasks, and the activity information or data generated by the process are the outputs. The additional factors considered in the extended model are triggers, controls, constraints, human resources, and physical resources. These factors are defined in Table 2.2.

Table 2.2
Expanded IDEF Model Components

Name	Description
Input	Action, information, and/or data required by the process
Process	Activity triggered by the input; also includes subtasks required to complete the process
Output	Activity information or data generated by the process
Trigger	An action that governance dictates should start a process
Control	Laws, rules, and policies that govern the process; time and event independent
Constraint	Controls that are time and event dependent
Human Resource	Person or organization with skills, education, training, or shift availability
Physical Resource	Systems or items required by the process or process tasks, such as IT systems, communication systems, facilities, and equipment

Also, in the expanded IDEF model, the output (or outcome) is not the only product of the process—a goal is achieved in addition to the physical output. The goal of a process answers the question “Why is this process being conducted?” Minimum standards of performance help determine if the capability exists to accomplish the goal, which ties to operational effects. These goals are impacted by measures of effectiveness (MOEs) and measures of performance (MOPs). When all of these components work as they should, people (human resources) conduct a process (process) within environmental constraints (controls, constraints, physical resources) to achieve an outcome.

Using the framework discussed in this chapter, we developed an updated strategic- and operational-level architecture that captures the vision for integrating enhanced ACS processes into Air Force C2. The components of the vision and the framework will be discussed in detail in Chapter Three.

3. The Vision and Scope of the Operational Architecture

The DoD Integrated Architecture Panel defines *architecture* as "the structure of components, their relationships, and the principles and guidelines governing their design and evolution over time."[47] This analysis develops an operational architecture that includes the inputs, processes, tasks, and outputs for many of the 26 ACS functional capabilities needed to support operations, including training and readiness preparation, conventional contingencies, and irregular warfare.[48] We first present the vision this architecture defines, which is broader than just the Air Force. Since we focus on the Air Force in this analysis, we then outline the architecture's scope and present the products of the framework used in this analysis.

The Vision for Integrating Enhanced ACS Processes into and Improving Air Force and Joint C2

Prior RAND analyses outlined concepts for how to improve Air Force C2 by integrating ACS planning, execution, monitoring, and control.[49] Based on those concepts, we developed an operational viewpoint 1 (OV-1) to illustrate a vision for enhanced Air Force C2 (see Figure 3.1).[50] Figure 3.1 shows how the TO-BE concepts for how ACS planning, execution, monitoring, and control processes could be integrated into and enhance Air Force and Joint C2 processes.

The OV-1 is a graphic depiction of the vision and shows the nodes that play a role in C2. Some of these nodes (shown in orange) do not currently exist. The vision focuses on a single ACS leader bringing together and balancing individual stovepiped ACS processes to provide capability and constraint assessments to senior leaders for priority

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[47] Department of Defense Integrated Architecture Panel, 1995, based on IEEE STD 610.12, 1990.

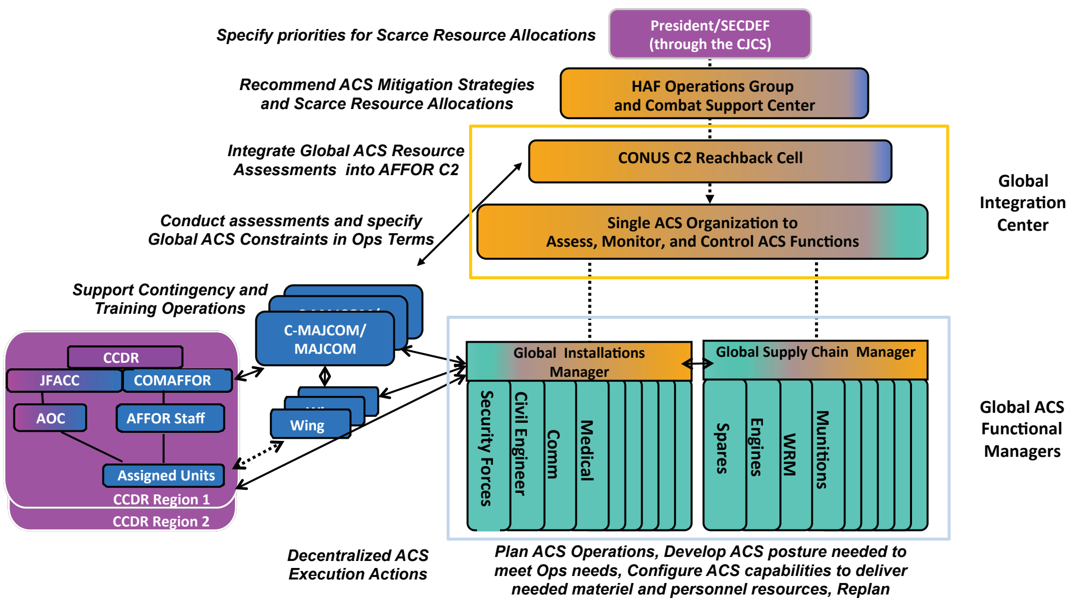
[48] We developed architectures for the following ACS functional capabilities: maintenance (Combat Air Forces [CAF] and Mobility Air Forces [MAF]), materiel management (spares, fuels, engines, WRM, vehicles, and support equipment), munitions, airfield management, air traffic control, civil engineering, communications/information, contracting, health services, security forces, and services.

[49] Robert S. Tripp et al., 2012.

[50] DoDAF defines an OV-1 as a high-level graphic description of a concept.

and allocation decisionmaking.[51] Because ACS resources are limited, they are shared across competing demands. Priority and allocation decisions will impact operations. Therefore, senior leaders need to understand the cost and risk associated with operational plans and allocation decisions.

Figure 3.1
OV-1 for Enhanced ACS Processes



NOTES: In the boxes, which represent process nodes, purple indicates joint processes, blue indicates Air Force processes, green indicates ACS processes, and orange indicates processes that are not currently assigned to a specific organization. While ACS functional capabilities are grouped in this figure by installation support and supply chain management, there are additional ACS functional capabilities that fall outside these groupings (such as chaplain, historian, acquisition, and test and evaluation) that also need to be managed globally and integrated with the other ACS functional capabilities to provide a complete picture of ACS capabilities and constraints.

Next, we define the processes associated with this vision in an operational viewpoint 5 (OV-5) architecture. Using the 2002 and 2006 operational architectures as a baseline, we refined the processes in light of the current fiscal and operational environment, incorporating enhanced ACS concepts. The OV-5 architecture is discussed in detail below and in Chapter Four.

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[51] The TO-BE vision presented in Figure 3.1 shows one organization responsible for integrating and balancing ACS functions. Other organizational options are outlined in Chapter Five and Lynch, Drew, Tripp, et al. (2014).

Scope of the Architecture

As mentioned previously, the architecture presented in this analysis was developed from an operational viewpoint and thus focuses on process. This architecture identifies what processes need to be accomplished in terms of Air Force C2 and what organizations are responsible for and participate in those processes.

The focus of this operational viewpoint is on contingency planning from an Air Force C2 perspective. While we identify where processes interact with joint forces and the other services, the focus remains on Air Force processes using current Air Force assets.

An AS-IS architecture documents processes as they are today. A TO-BE architecture documents how processes could be carried out in the future. This architecture is a TO-BE architecture that looks at the near-term—what C2 processes could be in the next 4-5 years using current Air Force assets.

The architecture documents processes at the strategic and operational levels. We do not include tactical-level processes, although we do show where this architecture touches other tactical architectures, such as the AFGLSC (now part of the Air Force Sustainment Center), the wing, and the C-NAF architectures.

The architecture itself was developed with three levels of detail. First, we developed an overarching architecture, which is broad enough to be used to describe processes for all functional capabilities. We call this *the overarching C2 architecture from an ACS viewpoint*.[52] We then developed architectures tailored specifically to each ACS functional capability. We call these *functional architectures*.[53] For many of the 26 functional capabilities defined in the *ACS Concept of Operations (CONOP),* we trace planning, execution, monitoring, and control processes through the stages of contingency operations at the strategic and operational levels to define a functional architecture.[54] We started by developing the functional architectures for the capabilities listed in Figure 3.2,[55] which have large resource movements during contingency operations. Evaluating the last three major combat operations, Operation DESERT STORM, OEF, and OIF, the preponderance of personnel and tons of cargo were moved in support of these functional capabilities.

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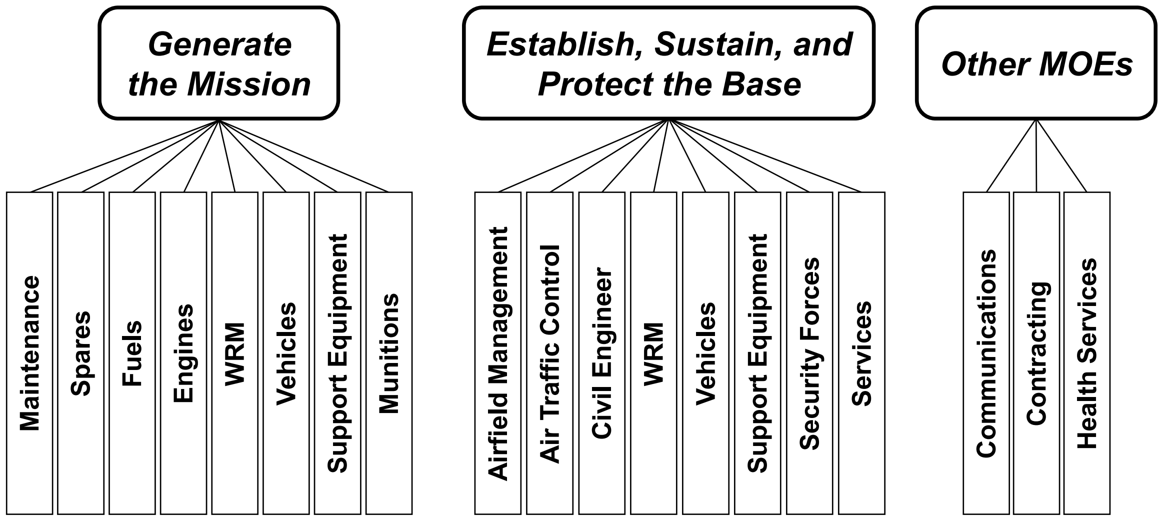
[52] The overarching architecture can be found on the enclosed CD. (If you do not have access to this CD, please contact Kristin Lynch at lynch@rand.org to obtain a copy of the files.)

[53] Two examples of functional architectures can be found in Chapter Four and Appendix A. The rest are on the enclosed CD.

[54] U.S. Air Force, *Agile Combat Support CONOPS*, November 15, 2007, Figure 3.

[55] Although we have not developed architectures for the remaining ACS functional capabilities, the method we used in this analysis can be applied to all functional areas, including those outside ACS.

Figure 3.2
ACS Functional Capabilities Architected



Finally, we developed two summary architectures—one for Generating the Mission and another for Establishing, Protecting, and Sustaining the Base. These two architectures combine the functional capabilities needed in each of the mission areas. For example, the Generate the Mission architecture combines the CAF and MAF maintenance, spares, fuels, engines, WRM, vehicles, support equipment, and munitions functional architectures to show the integration needed between the functions to generate a mission.

As mentioned previously, the vision for the architecture spans beyond just the Air Force. We looked to Joint doctrine for a logical method by which to arrange the processes in the architecture. According to Joint Publication 5-0, "Joint operation planning includes all activities that must be accomplished to plan for an anticipated operation—the mobilization, deployment, employment, and sustainment of forces. ... Planning also addresses redeployment and demobilization of forces."[56] We use these operational activities to arrange the processes in the architecture, specifically those activities in readiness, planning, deployment, employment and sustainment, and reconstitution.

Readiness, as defined by Joint Publication 1-02, is "the state of preparedness of an individual, force, or organization for carrying out an operation, mission, task, or the like."[57] In the architecture, readiness activities include processes such as reviewing,

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[56] U.S. Joint Chiefs of Staff, Joint Publication 5-0, *Joint Operation Planning*, Washington, D.C., December 26, 2006, p. ix.

[57] Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, November 8, 2010 (as amended through May 15, 2011).

assessing, and validating operation plan (OPLAN) supportability. Planning activities include processes such as developing COAs for military operations and evaluating their supportability from an Air Force enterprise perspective. Deployment activities include executing the deployment order (DEPORD) and monitoring deployment, beddown, and unit status. During employment and sustainment, the execute order (EXORD) and operation order (OPORD) are executed and monitored for the ongoing operation. Planned usage factors are compared with actual employment, and support requirements are coordinated and monitored. Finally, in reconstitution, the operation is transitioned to another mission or ended. Reconstitution activities include developing and finalizing a drawdown plan.

Many organizations have a role in each operational activity. In the architecture, we outline the roles and responsibilities at each echelon. They are as follows:

- President/Secretary of Defense—responsible for setting military priorities, uses the Chairman of the Joint Chiefs of Staff to request military action and issue DEPORDs and EXORDs
- COCOM/Joint Task Force (JTF)—responsible for planning military engagement and providing component guidance for how to achieve the desired end states in an operation
- Air Force Global Integration Center (GIC)—responsible for integrating and balancing stovepiped ACS capability analyses, monitoring and assessing ACS capabilities during execution, and presenting an enterprise view of available Air Force support[58]
- C-NAFs/C-MAJCOMs—responsible for planning, executing, monitoring, and controlling ongoing military operations
- Supporting Commands—responsible for providing capability (personnel and equipment) to engaged C-NAFs or C-MAJCOMs
- Unit Level—responsible for providing personnel and equipment to engaged C-NAFs or C-MAJCOMs
- Global ACS Functional Manager—responsible for managing and assessing enterprise capability for individual ACS resources[59]
- Sources of Supply—responsible for providing necessary bits and pieces to Global ACS Functional Managers.

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[58] Although a portion of the concept is being tested in the Agile Logistics Experiment (ALEX) series of experiments, the GIC does not exist today. The architecture defines what its role could be in the future.

[59] Some ACS resources (such as spares, engines, WRM, and munitions) could be combined under a Global Supply Chain Manager (GSCM). Other resources (such as security forces, civil engineers, communications, and medical) could be combined under a Global Installations Manager. There are other ACS functions that fall outside these grouping (such as chaplain, historian, acquisition, and test and evaluation) which should also be managed globally.

We began documenting the processes for each operational activity at each echelon as they are put forth in Joint Publications. For example, to prepare U.S. military personnel for employment in contingency or other military operations, the President and SECDEF mandate a joint operational planning process. Joint Publication 3-0 defines and delineates the seven-step joint planning process as

1. initiation
2. mission analysis
3. COA development
4. COA analysis and wargaming
5. COA comparison
6. COA approval
7. plan or order development.[60]

We use these steps to inform the processes documented and included in the planning activities of the architecture.

OSD, Joint, and Air Force publications helped us identify activities or tasks associated with the processes documented in the architecture. For example, we reviewed the Guidance for Employment of the Force (GEF), Guidance for Development of the Force (GDF), and Steady State Security Posture (SSSP) and used them to set national military strategy in the processes outlined in the readiness activities.

We also cross-referenced our processes with other existing architectures, such as the Secretary of the Air Force, Office of Warfighting Integration Chief Information Office (SAF/XC) C-NAF C2 architecture. The C-NAF C2 architecture is comprised of activity decomposition lists (ADLs) for each functional-area directorate A1 through A9. We note the links between our architecture and the C-NAF ADLs to ensure proper connections between the strategic- and tactical-level architectures.

Architecture Framework

As discussed in Chapter Two, we used the expanded IDEF model, suggested by SAF/US(M), to capture the processes within the architecture. In addition to the components of the Input-Process-Output (IPO) model, we define five other factors for each process—triggers, controls, constraints, human resources, and physical resources.[61]

The architecture itself was developed both graphically using Microsoft Visio and in a spreadsheet format using Microsoft Excel. The Visio diagram, shown in Figure 3.3,

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[60] U.S. Joint Chiefs of Staff, Joint Publication 3-0, *Joint Operations*, Washington, D.C., September 17, 2006, Incorporating Change 1, February 13, 2008, p. IV-2, Figure IV-1.

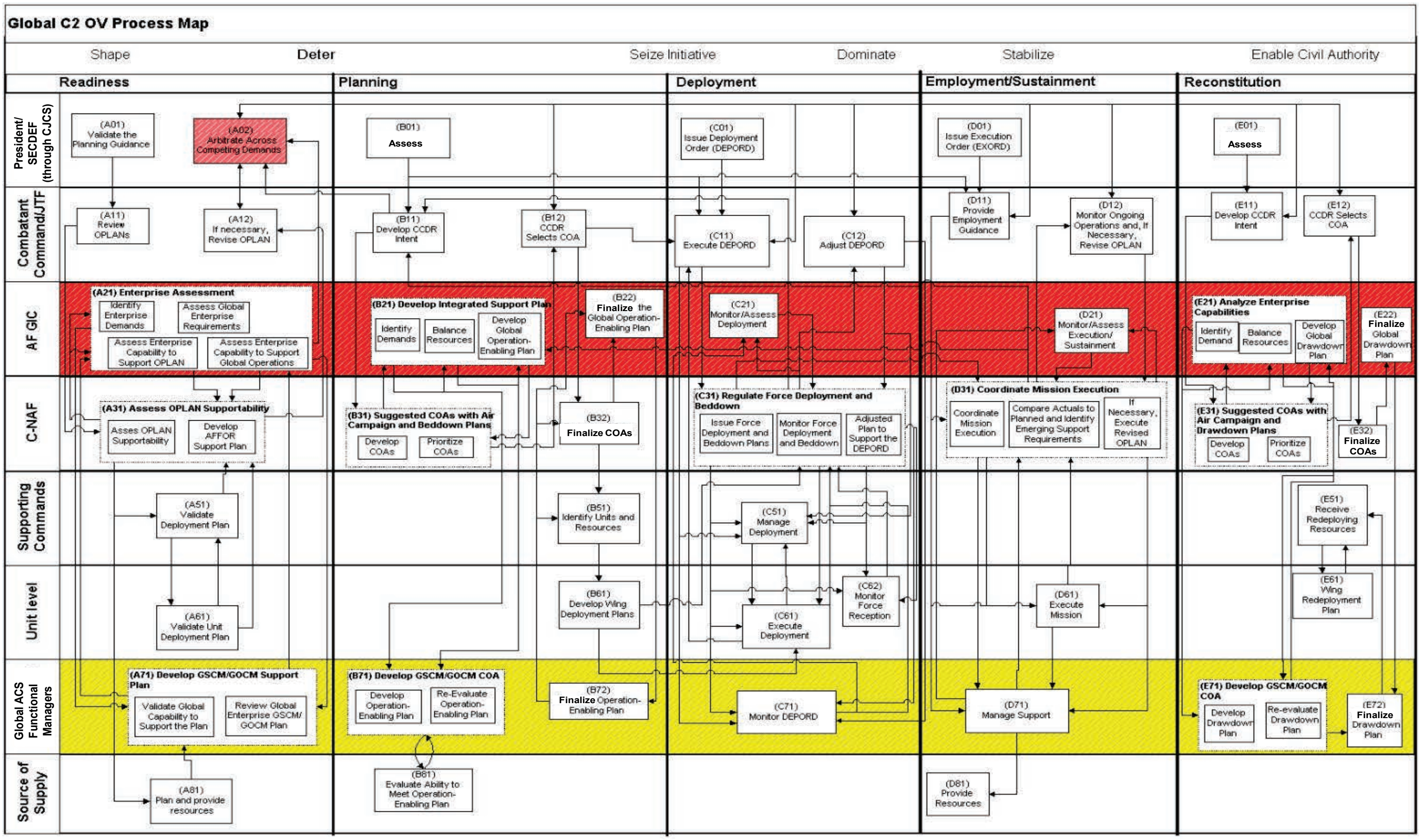
[61] See Table 2.2 for definitions of each of these factors.

provides a single high-level view of Air Force C2, integrating ACS planning, execution, monitoring, and control processes. It includes processes across operational activities (the columns) for all echelons involved in Air Force C2 (the rows).

The Visio diagram uses arrows to show the flow of the processes' inputs and outputs within and across operational activities; however, it does not show the details of what tasks are required within a process or what information is being inputted or outputted. These details are contained in the Excel spreadsheets.

It should be noted that the order of the echelons does not indicate any form of hierarchy or chain of command; the row order was chosen in such a way as to minimize the number of times the arrows crossed or overlapped between the rows and columns.

Figure 3.3
Architecture—Visio Diagram



NOTES: The processes highlighted in red are defined in this architecture but are not currently assigned to a specific organization. Processes in yellow may exist in some manner but not to the extent outlined in this architecture. See Lynch, Drew, Tripp, et al. (2014) for a discussion of the gaps and shortfalls between the current ACS system and the vision presented in the architecture. For ease of viewing and enlarging, a copy of the Visio diagram can be found on the enclosed CD.

Figure 3.4 shows an example of the architecture in spreadsheet format for one process at one node. Each process box in the Visio diagram has a corresponding row in an Excel spreadsheet. The details of what happens within that process block—input, process, output, and influences on the process—are contained in the spreadsheet.

The IPO model and the five factors that influence the process are represented in the columns of the spreadsheet. Each row represents the involvement of a different echelon at a different point in the process. In some cases, the same echelon can be involved at several different points during the process. There will be a separate row for every point in the process at which the organization/echelon is involved.

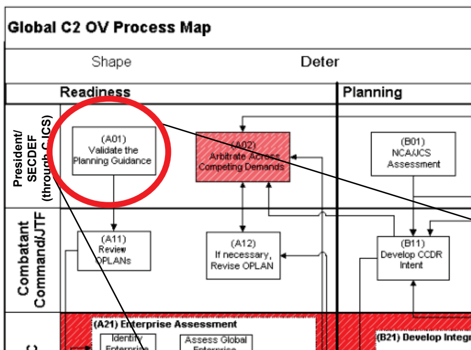
The complete architecture consists of the Visio diagram and an Excel Workbook containing five sets of spreadsheets—one set for each operational activity—readiness, planning, deployment, employment and sustainment, and reconstitution. The Visio diagram and examples can be found on the enclosed CD.

Figure 3.4
Architecture—Excel Spreadsheet

ID	Block Name	Input (Origin)	Process	Tasks	Output (Destination)	Trigger	Process Control (Rules)	Constraints	Human Resources	Physical Resources
Corres-ponds to Visio diagram block #	*Corres-ponds to the name of block on Visio diagram*	*Action, information, and/or data required by the process*	*Activity triggered by the input*	*Specific actions required to complete the process*	*Activity, information, and/or data generated by the process*	*An action that governa nce dictates should start a process*	*Laws, rules, and policies that govern the process*	*Controls that are time and event dependent (e.g. budget & inventory)*	*Person/ organization with skills, education, training, or shift availability*	*1) IT systems, 2) commun-ication systems, 3) facilities, 4) equipment*
C-NAF B31A	Develop COAs	Planning guidance for components, including military tasks and end states (B11)	Develop suggested COAs	--Translate CCDR intent into air component effects --C-NAF forms operational planning team (OPT) --Determine known facts, current status, or conditions --Determine own specified, implied, and essential tasks --Determine operational limitations --Develop assumptions --Determine own military end state, objectives, and initial effects --Determine own & enemy's center(s) of gravity and critical factors --Determine initial commander's critical information requirements --Review strategic communication guidance (when applicable) --Conduct initial force structure analysis --Conduct initial risk assessment --Develop mission statement --Develop mission analysis brief --Prepare initial staff estimates --Develop combat support resource estimates --Coordinate combat support resource estimates with Joint staff (J4/DDOC) --Establish MOEs for operation-enabling plan	--Initial UTC and resource requirements and MOEs (B21A) --Available infrastructure (e.g., bare, warm, existing) (B21A, B71A) --Available communications capacity (B21A, B71A)	Receipt of COCOM request for air component options	--OSD guidance --Treaties and agreements --JP 3-0 --JP 5-0 --CJCS instructions --CCDR guidance --AFI 10-401	--FYDP proposed force structure and resource levels --Assigned and apportioned forces --Available resources --Available air space and basing options --Impacts of other operations	AFFOR staff	--Secure communications --Secure facilities --AFFOR COP

Each process in both the Visio diagram and the Excel spreadsheets is identified by a block ID number and a block name. These ID numbers and names link the Visio diagram to the Excel spreadsheets. The process block ID numbers in the Visio diagram (for example, block A01, "Validate the Planning Guidance") corresponds to the row in the spreadsheet containing the detailed process information (in this case, President/SECDEF [through CJCS] A01), as shown in Figure 3.5.

Figure 3.5
Relationship Between the Visio Diagram and Excel Spreadsheets



ID	Block Name	Input (Origin)	Process	Tasks	Output (Destination)
Corres-ponds to Visio diagram block #	*Corres-ponds to the name of block on Visio diagram*	*Action, information, and/or data required by the process*	*Activity triggered by the input*	*Specific actions required to complete the process*	*Activity, information, and/or data generated by the process*
President/ SECDEF (through CJCS) A01	Validate the Planning Guidance	--Intelligence information --Threat assessments --National policies --Budgetary constraints	Review current planning guidance and update as needed	--Review national goals, national security strategy, and national security objectives --Review JSCP, GEF, GDF, and GFMIG --Review COCOM IPLs --Apply budgetary constraints --Review QDR, MCRS, and future force structures	Current year planning guidance (A11)

In the spreadsheets, the inputs and outputs have block ID numbers in parentheses following each input or output (see Figure 3.6). The number in parentheses shows where the input came from or where the output is going next. The arrows on the Visio diagram relay this same information visually.

Figure 3.6
ID Blocks Trace Inputs and Outputs Through the Processes

ID	Block Name	Input (Origin)	Process	Tasks	Output (Destination)
C-NAF B31A	Develop COAs	Planning guidance for components, including military tasks and end states (B11)	Develop suggested COAs	--Translate CCDR intent into air component effects --C-NAF forms operational planning team (OPT) --Determine known facts, current status, or conditions --Determine own specified, implied, and essential tasks --Determine operational limitations --Develop assumptions --Determine own military end state, objectives, and initial effects --Determine own & enemy's center(s) of gravity and critical factors --Determine initial commander's critical information requirements --Review strategic communication guidance (when applicable) --Conduct initial force structure analysis --Conduct initial risk assessment --Develop mission statement --Develop mission analysis brief --Prepare initial staff estimates --Develop combat support resource estimates --Coordinate combat support resource estimates with Joint staff (J4/DDOC) --Establish MOEs for operation-enabling plan	--Initial UTC and resource requirements and MOEs (B21A) --Available infrastructure (e.g., bare, warm, existing) (B21A, B71A) --Available communications capacity (B21A, B71A)

ID	Block Name	Input (Origin)	Process	Tasks
AF GIC B21A	Identify Demands	--Initial UTC and resource requirements and MOEs (B31A) --Available infrastructure (e.g., bare, warm, existing) (B31A) --Available communications capacity (B31A) --Notification of major support planning factor deviations requiring re-planning actions (C31B, D31B)	Identify standard set of combat support demands	--Validate UTC requirements --Sort resource requirements by GSCM/Global ACS Functional Manager --Ensure that all GSCMs/Global ACS Functional Managers are operating with the applicable standard set of requirements and MOEs

In Chapter Four, we look at an example functional architecture. Another can be found in Appendix A. Because of the large size and quantity of the architectures, we are not able to include them all in this report. The rest of the functional architectures can be found on the enclosed CD.

4. Operational Architecture Products

In this chapter, we discuss in detail the information presented in the OV-5 architecture products we developed during the course of this analysis. We worked with many key stakeholders (see Table 2.1) to document and vet the processes in several functional areas. As mentioned previously, we present the OV-5 architecture both as a Microsoft Visio diagram (shown in Figure 3.3) and in a Microsoft Excel spreadsheet format. The Visio diagram is a visual depiction of the overall process. The details of what tasks are required within individual processes and what information is being inputted or outputted are contained in the Excel spreadsheets. Here, as an example, we discuss the processes that are documented in Visio and Excel for one ACS functional capability—civil engineering.[62] The Visio diagram and Excel spreadsheets for this example, as well as the other ACS functional capabilities are included in the enclosed CD.

Operational Architecture for Civil Engineering

In this section, we present a vision of how to improve the integration of the processes of the civil engineer into Air Force C2 processes.

Air Force civil engineering (CE) capabilities consist of three primary functional capabilities: (1) facility and infrastructure construction, as well as operation, maintenance, and repair of pavements, structures, water systems, electrical systems, fuel systems, lighting, aircraft arresting systems, and base sanitation; (2) aircraft and structural firefighting and personnel rescue; and (3) explosive ordnance disposal, including the detection and disposal of unexploded ordnance and improvised explosive devices. Air Force CE capabilities also comprise specialized mission areas, including the augmentation of staff engineering; emergency management; and response to explosive, as well as chemical, nuclear, biological, and radiological incidents.[63]

We discuss military operational activities from readiness preparation to planning, deployment, employment, sustainment, and reconstitution and include all echelons of CE involved in the C2 vision. The primary mission of CE is to provide combat support to the theater commander's forces during all operational activities within a joint campaign.

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[62] Another example, MAF maintenance, is discussed in Appendix A.

[63] Kendall Brown, "The Role of Air Force Civil Engineers in Counterinsurgency Operations," *Air & Space Power Journal*, Summer 2008.

Usually, this consists of initial operations to bed down the deployed forces, followed by sustaining operations and a series of enhancements to provide the force better facilities and services.[64] In the sections below, we will outline, activity by activity, how CE could be better integrated into Air Force and joint C2 process in the future.

Readiness Preparation

Readiness begins with a significant event, such as a review mandated by law or a real-world contingency (for example, military operations, a humanitarian relief effort, or a natural disaster) that would require a Joint Strategic Capabilities Plan (JSCP) review or a change in OSD guidance. In response to such an event, the President/SECDEF and the CJCS review intelligence reports, threat assessments, national policy, and budgetary constraints and produce the current year's planning guidance for the COCOMs/JTFs to review and compare to theater OPLANs to ensure the plan meets national objectives (see Figure 3.3, Box A01).

Prior to submitting a revised OPLAN, as required, COCOMs/JTFs will review planning guidance and military objectives and send their intent and required operational effects to the C-NAF or C-MAJCOM for input about the status of Air Force forces and support availability (for example, CE personnel and resources) and to assess and validate each theater OPLAN's objectives, request for forces, and support requirements (see Figure 3.3, Box A11).

In this vision—for better-integrated ACS planning, execution, monitoring, and control—C-NAFs and C-MAJCOMs will rely on a GIC to provide integrated ACS capability assessments. The GIC, in turn, will rely on the Air Force Civil Engineer Support Agency (AFCESA) to provide CE capability analyses.[65] During this process, these organizations will conduct an individual theater OPLAN or contingency assessment and a global assessment of all theater plans to determine CE maintenance personnel and support capabilities.

The C-NAF or C-MAJCOM that is supporting an OPLAN or contingency operation will send validated force and supportability requirements to the GIC (see Figure 3.3, Box A31A).

Once it has received the theater OPLAN, the GIC considers the plan's objective and force and support requirements, integrates the unit type code (UTC) and resource

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[64] Brown, 2008.

[65] Currently, AFCESA performs some of the processes we outline for a Global ACS Functional Manager in this operational architecture. AFCESA's roles and responsibilities could be expanded to include all the processes documented in the architecture.

requirements (that is, personnel deployed, number of aircraft, beddown location, available ramp space, base size, etc.) and forwards this information to the global managers—AFCESA for CE—for assessment (see Figure 3.3, Box A21A).

AFCESA performs centralized oversight of CE planning, execution, monitoring, and controlling activities and manages CE personnel and resources across competing operational demands. AFCESA will review the information from the GIC and measure it against available CE personnel and resources. AFCESA will verify which CE resources are available, identify the shortfalls, and measure the impact of the shortfalls on the support plan objective. The result is a validated CE assessment, as well as unit sourcing information of CE personnel and resources that is sent to the GIC (see Figure 3.3, Box A71A).

The GIC will integrate and balance CE personnel and resource capabilities with other support functional capabilities (for example, airfield management, air traffic control, and communications/information) to determine an optimum support plan for implementing and sustaining an OPLAN or contingency. The GIC then sends this validated support plan, identifying any CE constraints, to the C-NAF or C-MAJCOM (see Figure 3.3, Box A21B).

The supporting command will also validate the deployment plan by evaluating unit readiness and comparing it to the OPLAN or contingency requirements. From the unit level, validated unit taskings, including any CE personnel, equipment, and training shortfalls or limitations, are also sent to the C-NAF or C-MAJCOM (see Figure 3.3, Box A31B) and supporting command. Once this theater supportability plan is developed, the GIC then assesses the global enterprise requirements (that is, across all theater objectives) for CE.

The C-NAF or C-MAJCOM from each theater provides its validated objectives, force, and support requirements to the GIC, which integrates force and support requirements from all theaters (see Figure 3.3, Box A31A). During this assessment, the GIC considers CE personnel and resource requirements across all theaters to ensure they are operating with enough personnel and resources to meet their requirements, though the C-NAF or C-MAJCOM supporting a contingency has force and resource priority, as determined by the President and SECDEF (see Figure 3.3, Box A21C).

This global enterprise-wide capability requirement is passed to AFCESA, which reviews and optimizes CE capability to meet all theaters' CE missions (see Figure 3.3, Box A71B) and then sends an optimized global support plan back to the GIC.

The GIC assesses this global CE support plan and integrates it with all other support function plans (for example, airfield management, air traffic control, communications/information, contracting, and distribution) (see Figure 3.3, Box A21D).

This global integrated support plan is forwarded to the C-NAFs or C-MAJCOMs and CJCS, providing visibility on the global state of all support functions.

Once the C-NAFs or C-MAJCOMs receive the individual and global support plans, they compare the assessments to their OPLANs and suggest adjustments and mitigation strategies to account for global support function constraints, including CE constraints (see Figure 3.3, Box A31B).

The C-NAFs or C-MAJCOMs will send a projected allocation strategy to the COCOMs/JTFs, which evaluate the support plans and compare them to the President's/SECDEF's strategy. At this time, the COCOMs/JTFs will revise OPLANs as required to meet operational effects with existing resources (see Figure 3.3, Box A12).

Finally, the revised OPLANs, with support plan details, are sent to the SECDEF, who reviews, prioritizes, and arbitrates support resources across demands (see Figure 3.3, Box A02).

This prioritized allocation strategy ends the readiness activity and is one input for the beginning stages of the COCOMs'/JTFs' other military operational activities.

Planning

In planning, the CJCS continues to review intelligence reports, threat assessments, and national policy, then provides the COCOMs/JTFs with intelligence reports and, if military action is requested, military objectives and end states (see Figure 3.3, Box B01).

COCOMs/JTFs will review this information alongside emerging CE support requirements from the C-NAFs or C-MAJCOMs, then develop planning guidance, including military tasks and end states, for the C-NAFs or C-MAJCOMs (see Figure 3.3, Box B11).

The C-NAFs or C-MAJCOMs will translate the COCOM's/JTF's guidance into COAs for air component effects, listing known facts, limitations, and assumptions, as well as COAs to reach the established military end state. The C-NAFs or C-MAJCOMs will produce initial force and resource UTCs and MOEs for the GIC to identify initial supportability demands for a COA (see Figure 3.3, Box B31A).

The GIC compares these initial UTC requirements against enterprise CE requirements, identifying any major support planning factor deviations requiring replanning. Once established, the GIC provides a draft support requirement plan (that is, personnel deployed, number of aircraft, beddown location, available ramp space, base size) to AFCESA and the other global managers (see Figure 3.3, Box B21A).

AFCESA will develop a CE supportability concept of operations (CONOPS) to meet the established MOEs. It will review CE availability to meet the UTC requirements from the GIC, tailor the UTC requirements against CE availability, and provide the GIC its assessment of the capability of CE to meet the operational needs of the COA (see Figure 3.3, Box B71A).

Upon receipt of the CE support plan, the GIC will integrate and balance CE personnel and resource capabilities with all support function capabilities (airfield management, air traffic control, communications/information, contracting, distribution, health services, logistics planning, WRM vehicles, support equipment, security forces, and services) to meet the COA's operational needs. The GIC sends AFCESA the overall support plan identifying CE constraints and the ability to meet the COA's MOEs (see Figure 3.3, Box B21B).

AFCESA will reevaluate the support plan, determine its ability to generate the mission and meet the UTC requirements, and will develop a CE mitigation strategy, as required, for the GIC to consider when developing the global support plan (see Figure 3.3, Box B71B).

The GIC will include the CE support plan with all other required support plans and identify the enterprise ability to meet the COA's MOEs. The global support plan, now vetted by all global managers, includes UTC requirements and suggested mitigation strategies and is sent to the C-NAFs or C-MAJCOMs (see Figure 3.3, Box B21C).

Using the global support plan, the C-NAFs or C-MAJCOMs will develop a list of recommended and prioritized COAs to meet the established military end state for the COCOMs/JTFs to consider (see Figure 3.3, Box B31B).

The COCOMs/JTFs will examine each COA for its ability to achieve the intended military effects and cost goals and then inform the C-NAFs or C-MAJCOMs which COA was selected for execution (see Figure 3.3, Box B12).

The C-NAFs or C-MAJCOMs finalize the selected COA by completing all the actions required to carry out the COA (such as essential tasks, force and resource requirements, and assumptions) and then sends the formal COA with a request for forces and a support plan to the GIC and supporting command (see Figure 3.3, Box B32).

The GIC works with all global managers to determine the actual support requirements and then sends an integrated support plan for the COA to AFCESA (and other global managers) (see Figure 3.3, Box B22).

The supporting command will identify and task units and resources to carry out the integrated support plan and develop a proposed TPFDD. Tasked units will assist with developing wing-level deployment plans and with TPFDD planning to posture CE to meet the integrated support plan requirements.

Upon receipt of the integrated support plan from the GIC, AFCESA will develop CE support strategies, including constraints and mitigation actions, and forward a finalized CE support plan to the C-NAFs or C-MAJCOMs, GIC, and the supporting command (see Figure 3.3, Box B72).

This ends the CE planning process.

Deployment

Deployment begins with the President's/SECDEF's decision to deploy forces. The CJCS reviews current world events, assessments, and the COCOM/JTF COA analysis and, if warranted, issues a DEPORD to a COCOM/JTF specifying a request to position military forces (see Figure 3.3, Box C01). The COCOM/JTF reviews the military end state and selected COA and provides an OPLAN and DEPORD to the C-NAF or C-MAJCOM (see Figure 3.3, Box C11).

The C-NAF or C-MAJCOM assists with force deployment and beddown plans; validates TPFDD requirements; and performs a variety of other duties, such as liaison with host nation officials, embassy personnel, and special operations forces. The C-NAF or C-MAJCOM will issue the COCOM/JTF OPLAN, DEPORD, and MOE guidance to global managers, supporting commands, and tasked units (see Figure 3.3, Box C31A).

Using the COCOM/JTF OPLAN, DEPORD, C-NAF or C-MAJCOM guidance, and unit capabilities, a supporting command assists tasked units in rapid UTC sourcing and tailoring, securing forward operating location (FOL) CE resources, and addressing unresolved shortfalls.

Tasked units will use the supporting command and wing guidance to implement the DEPORD. They will review the TPFDD to ensure CE personnel and resources are properly scheduled to depart, build load plans, and provide FOL capabilities. The units will also monitor the reception of CE personnel and resources, ensuring force beddown and readiness to later execute the mission.

AFCESA will monitor the DEPORD execution against control parameters,[66] as well as look out for any CE deviations or the inability to meet the MOEs, and will forward significant CE impacts of the deploying units' status and capabilities to the GIC and the C-NAF or C-MAJCOM (see Figure 3.3, Box C71).

The C-NAF or C-MAJCOM monitors the deployment and beddown process, coordinates capabilities with air operations center planners, and assists AFCESA and units with adjustments and minor deviations.

The GIC also monitors against control parameters, assesses the deployment, and notifies the C-NAF or C-MAJCOM of any major deviations from the plan that may require replanning actions (see Figure 3.3, Box C21).

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[66] By *control parameters*, we mean a set level or acceptable threshold by which to track actual combat support performance so that when a combat support parameter falls outside the set limits, combat support planners are notified so that plans can be developed to bring the process back within control limits.

The C-NAF or C-MAJCOM will inform the COCOM/JTF of DEPORD status, capability, and any deviations requiring a DEPORD revision or replanning actions (see Figure 3.3, Box C31B).

With this information, the COCOM/JTF will adjust the DEPORD to accommodate deviation and send a revised DEPORD to the C-NAF or C-MAJCOM, AFCESA (and other global managers), and any supporting commands (see Figure 3.3, Box C12).

The C-NAF or C-MAJCOM will adjust the support plans to accommodate the revised DEPORD and issue updated guidance to the GIC, AFCESA (and other global managers), any supporting commands, and tasked units, which will adjust accordingly (see Figure 3.3, Box C31C).

This process of the GIC monitoring the DEPORD execution and forwarding deviations to the C-NAF or C-MAJCOM, which in turn forwards deviations requiring DEPORD revisions or replanning to the COCOM/JTF, which adjusts and reissues a revised DEPORD, continues until all forces and resources are in place.

Employment/Sustainment

Employment begins when the CJCS issues the EXORD to take military action. With further review of current world events, assessments, and COCOM/JTF COA analysis, the CJCS will issue an EXORD to a COCOM/JTF to take military action (see Figure 3.3, Box D01). The COCOM/JTF reviews the EXORD's request for military action and sends force employment guidance to the C-NAF or C-MAJCOM, AFCESA (and other global managers), and tasked units (see Figure 3.3, Box D11).

Now, with the EXORD, OPLAN, and selected COA, the C-NAF or C-MAJCOM will execute the operational plans by providing AFCESA (and other global managers) and tasked units with the identified utilization of basic amenities, building/construction supplies, motor vehicle fuel, and a CE utilization plan (see Figure 3.3, Box D31A).

Tasked CE units will provide the personnel and equipment to meet the expected utilization and provide the C-NAF or C-MAJCOM and AFCESA updated inventory and unit capability information.

AFCESA will monitor CE capabilities against expected performance control parameters and provide the GIC and C-NAF or C-MAJCOM with this information (see Figure 3.3, Box D71). The C-NAF or C-MAJCOM will compare actual utilization to planned utilization and emerging CE support requirements and determine the impact, if any, that CE may have on the ability to execute the mission.

The GIC also monitors against control parameters and assesses execution and notifies the C-NAF or C-MAJCOM of any major deviations from the plan that may require replanning actions (see Figure 3.3, Box D21).

The C-NAF or C-MAJCOM will recommend any necessary OPLAN adjustments or deviations requiring replanning actions to the COCOM/JTF (see Figure 3.3, Box D31B).

The COCOM/JTF will determine whether operational effects are being achieved and OPLAN execution is generating the desired result. If necessary, the COCOM/JTF will reissue a revised OPLAN with updated operational effects or end states to the C-NAF or C-MAJCOM (see Figure 3.3, Box D12).

The C-NAF or C-MAJCOM will execute the revised OPLAN and issue any adjusted CE requirements to the GIC, AFCESA, and tasked units, then monitor the results of the revised OPLAN (see Figure 3.3, Box D31C).

This process of the GIC comparing the actual utilization and CE requirements to planned requirements, forwarding deviations to the C-NAF or C-MAJCOM, which in turn forwards deviations requiring OPLAN revisions or replanning to the COCOM/JTF, which adjusts and reissues a revised OPLAN to the C-NAF or C-MAJCOM, which issues adjusted resource requirements to the GIC, AFCESA (and other global managers), and tasked units, continues throughout the execution of operational activities.

Reconstitution

Reconstitution begins when the President/SECDEF sets terms to cease military action. After analyzing the world situation, national interests, and intelligence reports, the CJCS orders the COCOM/JTF to draw down military operations (see Figure 3.3, Box E01). The COCOM/JTF provides guidance and intent for the C-NAF or C-MAJCOM to develop a reconstitution plan (see Figure 3.3, Box E11).

From the COCOM/JTF guidance and intent, the C-NAF or C-MAJCOM develops suggested COAs and provides the GIC with suggested closure requirements and drawdown options (see Figure 3.3, Box E31A).

The GIC will draft the beddown requirements for the suggested drawdown COAs from the C-NAF or C-MAJCOM. The GIC will identify potential dates for base closure and individual unit redeployment; the last day to provide force protection, law enforcement, and base operating support; the resources to remain in place; and a drawdown plan for AFCESA (and other global managers)(see Figure 3.3, Box E21A).

From this, AFCESA will develop a CE drawdown plan and identify its impacts, if any, on the overall drawdown plan. AFCESA will identify the CE requirements to move personnel and resources and meet each COA. AFCESA will send the GIC the CE requirements with mitigation strategies in the event that there is an impact on the COA (see Figure 3.3, Box E71A).

The GIC balances the CE drawdown plans with other support function plans and develops the theater drawdown plan for AFCESA (see Figure 3.3, Box E21B). AFCESA evaluates the CE requirements to support the theater drawdown plan and sends the GIC any CE constraints, along with mitigation strategies (see Figure 3.3, Box E71B).

The GIC now develops a global drawdown plan, identifying CE constraints, for the C-NAF or C-MAJCOM (see Figure 3.3, Box E21C). Using this drawdown plan, the C-NAF or C-MAJCOM reviews the operational requirements and develops a recommended and prioritized list of COAs for the COCOM/JTF to consider (see Figure 3.3, Box E31B).

The COCOM/JTF will examine how well each COA meets the drawdown guidance and cost goals, and then select a COA for the C-NAF or C-MAJCOM to finalize (see Figure 3.3, Box E12).

The C-NAF or C-MAJCOM will finalize essential tasks, support requirements, and assumptions, then forward a formal drawdown plan to the GIC (see Figure 3.3, Box E32).

The GIC will work with AFCESA to finalize CE requirements to sustain the drawdown plan. The GIC will integrate other global manager support function plans and develop an integrated capabilities drawdown plan for the global managers (see Figure 3.3, Box E22).

AFCESA will develop the specific CE strategy to support the drawdown and forward the plan to the supporting command (see Figure 3.3, Box E72).

The supporting commands identify the personnel and resources required to support the drawdown plan and send the proposed plan to the CE units so it can be further developed it into a wing plan and the CE personnel and resources can be received. This ends the process of reconstitution.

Next Steps

The next step in this analysis is to use the architecture to perform a doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) analysis to identify and describe where shortfalls or major gaps exist between current ACS processes (the AS-IS) and the vision presented here.

5. Gaps and Shortfalls Identified Using the Operational Architecture and Recommended Strategies to Enhance Command and Control

This vision for how the Air Force C2 system could work in the future has been well vetted with senior Air Force leadership; however, the current ACS system does not fully support the vision. Using the updated architecture developed as part of this analysis, we performed a DOTMLPF analysis to uncover any gaps or shortfalls that would prohibit achievement of the vision. There are gaps and shortfalls in many areas. This chapter discusses the main process gap, the inability to provide an enterprise assessment of combat support capabilities and constraints, as well as other associated shortfalls in process, doctrine, guidance and instructions, training and career development, organization, tools, and systems. We further recommend mitigation strategies to help close these gaps.

Agile Combat Support Command and Control Processes

The overarching process gap is the inability to provide an enterprise assessment of combat support capabilities and constraints that can be used to inform trade-off decisions so that scarce resources are effectively and efficiently allocated to meet Air Force operational priorities. This gap spans across planning, execution, monitoring, and control—from evaluation of deliberate plans where a Logistics Sustainability Analysis (LSA) should inform the COCOM of capabilities and constraints to a contingency where COAs are developed, forces are deployed, employed, and reconstituted. There are shortfalls on several different levels associated with this gap:

- Within individual ACS supply chains and functional capabilities—There is no standard, repeatable process to plan, execute, monitor, and control ACS supply chains and functional capabilities within the Air Force C2 system to proactively manage scarce ACS resources across competing operational demands.
- Across supply chains and functional capabilities—Methods to incorporate individual supply chain and functional capability assessments into an integrated and balanced set of capabilities that can be used in planning (both deliberate and contingency) and replanning processes are insufficient and there is no organization tasked with this responsibility.
- Within the Air Force—Processes to arbitrate between and among competing operational demands are deficient.

Resource Assessment Processes Within Individual ACS Supply Chains and Functional Capabilities

Resource constraints are inevitable because of the funding constraints being imposed on the Program Objective Memorandum (POM) process. There are not, nor will there be in the future, enough resources for CCDRs to have everything they need to support all operations in their areas of responsibility (AORs) as envisioned in OSD planning guidance. Resources must be shared globally to meet all demands. Global management of resources improves the efficiency with which scarce resources can be allocated and reallocated as worldwide priorities shift.

Global supply chain and functional capability managers are needed to provide independent assessments of worldwide resource capability and constraints for each ACS resource.[67] In deliberate planning, this assessment could be used during the LSA process to inform CCDRs of constraints. These assessments would also help inform the COA development process during contingency planning. Global managers should also be able to effectively and efficiently shift resources to where they are needed most.

Since 2002, when the first architecture was created, the Air Force has taken steps to improve processes within individual supply chains by designating global managers for some resources—munitions at the GACP, select spare parts at the AFGLSC (which is now part of the Air Force Sustainment Center), and non-unit WRM at ACC. Munitions, for example, has a global requirements determination process and an allocation board to distribute assets worldwide. In the fuels area, the Air Force has business rules, as well as tools and systems that allow for worldwide planning. Logistics personnel input the types and number of aircraft, their expected usage during the contingency, and expected beddown locations into the fuels planning tool, Integrated Consumable Item Support, and the system calculates the fuels requirements by location.[68] It is a well-defined and easy-to-use system employed throughout the DoD to provide consistent requirements estimates. In addition, the Air Force has functional capability managers responsible for developing ACS personnel skills and career path advancement—global managers for ACS personnel.[69]

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[67] Then those individual stovepiped assessments can be combined to provide an integrated assessment of the ability to meet Air Force operational priorities.

[68] Integrated Consumable Item Support is a Defense Logistics Agency (DLA) decision support system that can calculate the deployment requirements for over two million DLA-stocked items using time-phased force and deployment data.

[69] The global managers for personnel primarily manage home-station requirements rather than expeditionary requirements, but having a global manager is a step in the right direction.

In these areas, resources are being managed from an enterprise perspective. However, in other cases, ACS planning, execution, monitoring, and control processes are ad hoc. Other resources such as services and vehicles do not have such well-defined, standardized, repeatable processes. They are managed theater-by-theater, without a global manager integrating information into an enterprise view of worldwide capability.

The Air Force will continue to operate in a resource-constrained environment in the future. Leaders will need to make tough trade-off decisions when allocating scarce resources. The ACS system currently does not support trade-off and allocation decisionmaking with standardized, analytic processes for identifying global resource capabilities and shortages and the operational outcomes associated with scarce resource allocations. Global supply chain and functional capability managers should be established for each resource area. Processes for assessing enterprise capability and shortfalls (such as requirements determination processes and real-time asset management) should be defined, practiced, and codified in doctrine, guidance, and instructions. Tools and systems should be developed to aid in these processes. Resources managed centrally and shared globally may be better suited to meet uncertain future demands.

Integrating and Balancing Across Individual Supply Chains and Functional Capabilities

As previously stated, individual resources are currently managed and controlled independently—some theater-by-theater and some globally. However, there is little integration across supply chains or among functional capabilities. Currently, there is no organization tasked with the responsibility of bringing the individual stovepiped resources together into an integrated view of ACS capability.[70] To provide senior leaders with better visibility into global combat support capabilities and constraints, improvements are needed in combat support analytic assessment capabilities, metrics, and the organizational construct used to support these processes. We discuss each of these in the sections below.

Integrated Analytic Assessment Capabilities

Currently, independent, stovepiped resource assessments are not combined to provide an integrated and balanced view of Air Force capability. For example, assessments of individual materiel resources, including WRM; vehicles and special purpose support equipment; munitions; petroleum, oil, and lubricants (POL); spare parts; personal

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[70] The ALEX experiment demonstrated this type of integrated assessment for ACS capabilities for a set of individual resources. See Lynch, Drew, Tripp, et al. (2014) for more information on ALEX.

equipment; and others, are not integrated to determine how all materiel interrelates and affects operational objectives. These materiel resources could be combined with other combat support resources, such as CE, communications, and security forces (SF) capabilities, to provide an integrated assessment of meaningful data to operational planners.

Some functional capabilities are already conducting stovepiped assessments. For example, the Air Force Sustainment Center (which includes the former AFGLSC) already provides global assessments of spare parts for the Air Force. Their charter could be expanded to include all classes of materiel, making them a global manager for materiel. The Air Force Personnel Center (Directorate of Air and Space Expeditionary Force Operations) or another organization could be the global manager for personnel. For integrated assessments to provide useful information to senior leaders, they should focus on operationally relevant metrics and show how ACS could support or constrain Air Force capabilities.

Metrics

To determine the combat support system's performance in terms of operationally relevant metrics, it is necessary to understand how materiel and nonmateriel resources interact to produce the desired capabilities. This is not currently done. Because these capability metrics depend upon more than just materiel, materiel managers need to do more than simply monitor the numbers of physical assets available in each category; they also need to understand how asset location, condition, and quantities interact with repair, if applicable, and how transportation times contribute to operational effectiveness. Ideally, those responsible for understanding combat support resources, including materiel and nonmateriel resources, would be able to relate the different categories of resources—materiel, infrastructure, personnel, and transportation[71]—to one another so the marginal contribution of individual resources can be determined against system-wide operational effectiveness output measures. Decisionmakers would then be positioned to make the most cost-effective use of combat support resources, maximizing the capability to support the warfighter with a given set of resources.

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[71] AFI 10-401 identifies requirements for conducting logistics supportability analyses to include assessments of materiel, infrastructure (usually focused on FOL ramp, runway, and other construction needs), combat support forces (usually focused on personnel issues associated with filling combat support UTCs), and lift (U.S. Air Force, Air Force Instruction 10-401, *Air Force Operations Planning and Execution*, December 7, 2006c).

Metrics should also be based on the priorities laid out in the CCDR guidance. If the CCDR's goal is bombs on target, then the ACS metric may relate ACS resources to the ability to generate sorties or the ability to open bases from which to conduct operations.

The ACS community has some ability to relate combat support resource levels and process performance to operationally relevant metrics such as mission generation capability, FOL initial operational capability (IOC), or full operational capability (FOC)—metrics used when developing COAs. For example, the sortie generation capability is a function of many combat support parameters, including removal rates of avionics components, maintenance throughput of the repair facility (both on base and at a repair facility), and movement capacity and throughput capability (for example, airlift frequency between the repair facility and a deployed location and the transportation time for these components). Degradation in any one of those combat support parameters will affect sortie generation capabilities, and the sorties projected may not meet the requirement.

Ultimately, the goal should be to determine how alternative resource allocations impact bombs on target or other desired effects. In the meantime, several operationally relevant metrics, such as the ability to generate desired missions, the ability to establish and sustain a desired number of FOLs, the ability to provide required security, and the ability to evacuate specific numbers of wounded or sick, can help guide the allocation of scarce resources. The analysis of these metrics provides meaningful data to operations planners for any necessary replanning caused by constraints in ACS capabilities.

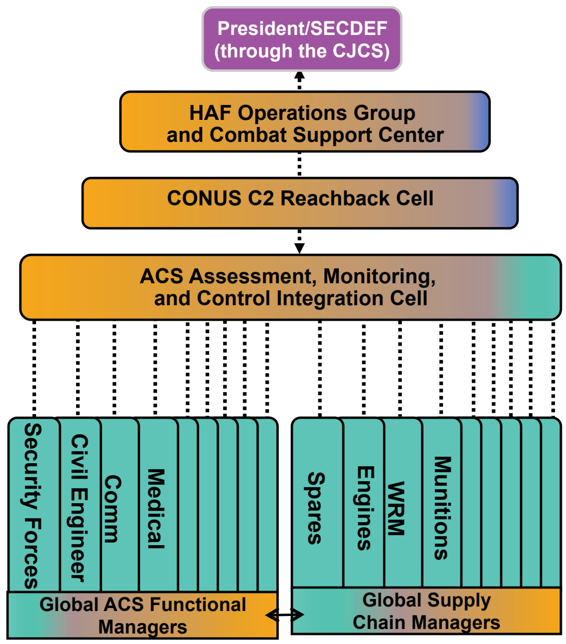
To conduct integrated and balanced capability assessments, models and tools are needed to help relate combat support resource levels and process performance to operationally relevant metrics. Also, trained and assigned personnel who know how to use available models to access relevant and authoritative data and identify constraints in global resource availabilities are needed to perform the integrated assessments. A C2 symposium that brings together Air Force communities that play key roles in this area could be used to define and vet capabilities and develop needed training enhancements.

Centralized Management Authority

As discussed previously, the Air Force has acted to address some of these capability assessment shortfalls by creating some global ACS organizations (for example, the GACP for munitions and the AFGLSC [now part of the AFSC] for spares). In Figure 5.1, in green, we show the independent, stovepiped supply chains and functional capabilities, some of which have global managers (shown on the bottom of Figure 5.1). Efforts to establish these global resource managers are a step in the right direction—the global managers have improved visibility of ACS manpower, equipment, and other materiel—

however, they have stovepiped resource responsibilities, and there is no defined process for combining or integrating individual resource assessments.

Figure 5.1
AS-IS—No Organization Provides Integrated ACS Capability Assessments

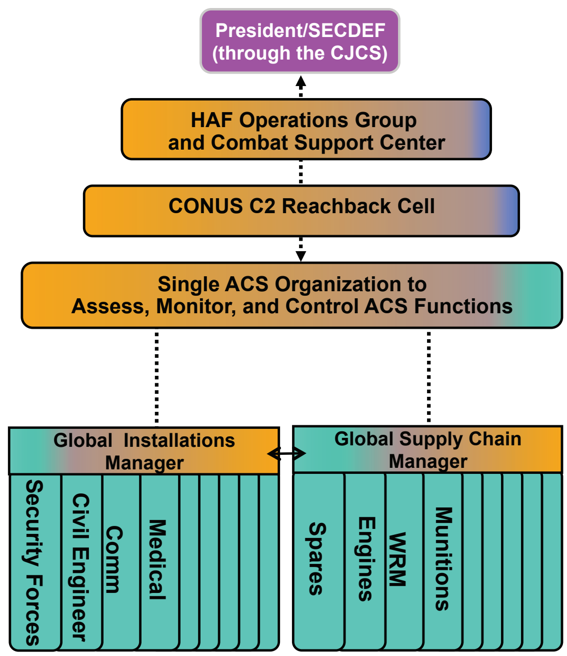


NOTE: The processes we defined in this analysis that are not currently assigned to an organization are shown in orange.

The Air Force lacks an enterprise organization with the analytic capability to identify integrated global ACS resource capabilities and constraints (for example, integrating munitions with spares and maintenance UTCs to assess sortie generation capability at a given location), including the ability to identify the most binding constraints with respect to specific COAs. Very few, if any, integrated assessments are conducted to support Air Force planning. COMAFFORs, as a result, might be presenting COAs to Joint services and COCOMs that are not supportable from an Air Force global resource point of view.

The vision presented in this analysis calls for a single ACS organization to be responsible for bringing together these assessments from independent stovepipes and/or from global managers (as shown in Figure 5.2 as a single ACS organization). Each individual resource needs to be integrated and balanced to give an overall picture of ACS capability. Currently, this function does not occur and no organization is tasked with the responsibility or has the authority to manage and control ACS resources across stovepipes. This type of integrated analysis is critical to the management and control of resources necessary to initiate and sustain operations in both contingency and training environments. Establishing an organization tasked with these responsibilities would enhance enterprise-level ACS planning, execution, monitoring, and control and thereby improve Air Force and Joint C2.

Figure 5.2
TO-BE Vision—A Single Organization to Integrate Assessments and Direct Actions to Balance Support



NOTES: Processes defined in this analysis that are not currently assigned to an organization are shown in orange. We do not show ACS functional capabilities that fall outside the installation support and supply chain grouping (such as chaplain, historian, acquisition, and test and evaluation), although they also need to be globally managed and integrated to provide a complete picture of ACS capabilities and constraints.

The single organization responsible for ACS C2 presented in the vision would include a supply chain manager and an installations support manager, as well as other ACS functions that fall outside those groupings. The supply chain manager would be responsible for conducting supply chain assessments, configuring supply chains to meet operational needs, and developing supply chain mitigation strategies. Supply chain management would include directing and monitoring the performance of the repair network. The repair network may be organized under separate management (the vertical green boxes in Figure 5.2) but it should be integrated as part of the overall supply chain (the green and orange horizontal box in Figure 5.2) to meet operational requirements. During steady-state conditions, supply chain management would oversee the day-to-day, in-garrison supply chains needed to support organize, train, and equip (OT&E) responsibilities. The installations support manager would be responsible for maintaining home-station installations support needed to meet operational OT&E needs and for developing deployable packages needed to open and sustain FOLs. This manager would also be responsible for balancing ACS installations functions.[72] Other ACS functions, such as the chaplain and acquisition, may fall outside the purview of installation support and supply chain management, but they should also be managed from an enterprise perspective and integrated with other ACS capabilities and constraints.

This ACS integrating organization could also provide reachback support to forward C-NAF and C-MAJCOM staff to evaluate the supportability of different options for combining resources to achieve specified objectives as defined by the CCDR (shown as the orange box labeled "CONUS C2 Reachback Cell" in Figure 5.2). Establishing the ability to perform risk assessments within the short decision cycles required by military leadership would require investments in modeling capabilities and staff development.

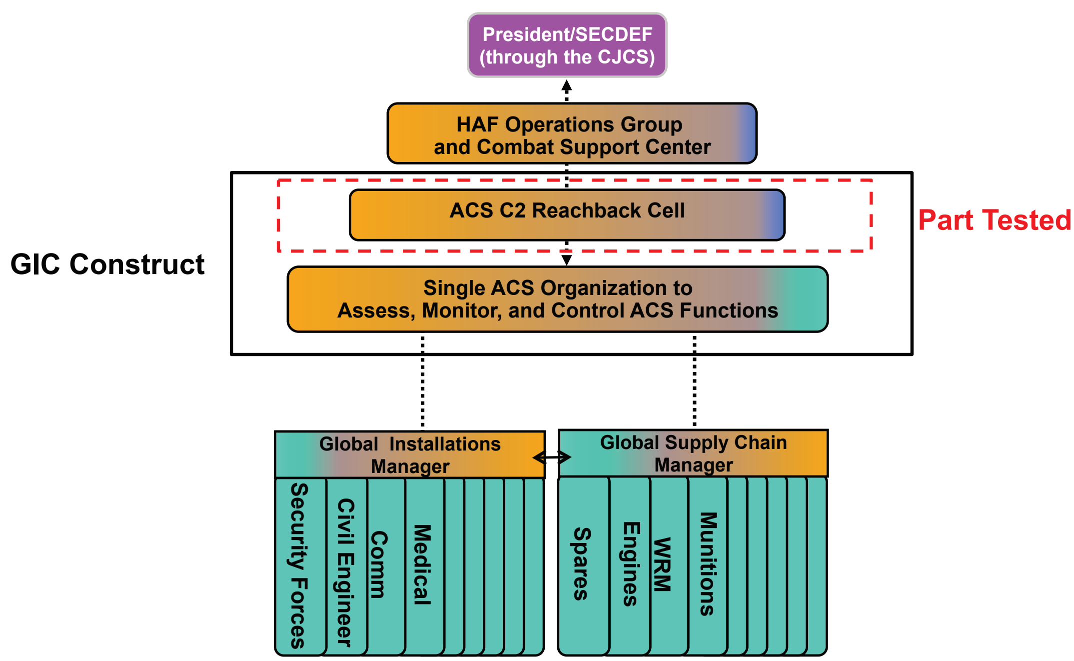
In past analyses, RAND has called the organization responsible for conducting and balancing integrated assessments, including Air Force forces (AFFOR) reachback support, a *global integration center* (GIC) (see Figure 5.3). During a recent experiment organized by the Air Force Command and Control Integration Center (AFC2IC) as part of the Joint Expeditionary Force Experiment (JEFX), a portion the GIC concept was demonstrated. The Agile Logistics EXperiment (ALEX) used the operational support facility (OSF) at the Ryan Center, Langley Air Force Base, Virginia, to bring together several stovepiped ACS resources and provide three C-NAF staffs information about the Air Force's enterprise ability to support their COAs, thus testing the AFFOR reachback piece of the GIC concept (indicated by the red box in Figure 5.3).[73] Instead of AFFOR staffs reaching back to each different ACS functional manager for stovepiped capability assessments, there was an ACS reachback cell in the Ryan Center (a C-NAF reachback organization) that provided an assessment of the ability to generate sorties, as well as the

[72] The Global Base Support (GBS) initiative at AFMC is supposed to standardize many core base operating support functions like civil engineering and communications. Although not designed as an installation support manager, perhaps GBS could play a role in this function.

[73] See Lynch, Drew, Tripp, et al. (2014).

ability to open FOLs for a select number of supply chain and functional capabilities.[74] The ACS reachback cell within the OSF provided a centralized location for C-NAFs to find out about enterprise-wide ACS capabilities and constraints.

Figure 5.3
Part of the GIC Construct Was Tested During ALEX



An ACS reachback cell within a C-NAF or C-MAJCOM reachback center may not be very costly. As demonstrated during ALEX, only a few people are needed to be on-site at the ACS reachback cell, as the majority of the analyses are conducted off-site and provided virtually.

During ALEX, the ACS Reachback Cell provided information to the C-NAFs and C-MAJCOMs for their planning processes; however, there was no organization with the authority to balance resources across competing demands or develop mitigation strategies. The TO-BE vision presented here goes further, calling for an organization to

[74] Spare parts and engines were assessed to determine sortie generation capability. Civil engineers, SF, communications, medical, and WRM were assessed to determine FOL capability.

be responsible for assessing, monitoring, and controlling ACS activities across the enterprise.[75]

A single ACS organization with the responsibility and direct management authority over all ACS functions could also ensure that each functional capability's manpower is aligned correctly during peacetime for wartime needs. In a recent RAND analysis, researchers found that some ACS manpower could be realigned to meet future OSD plans more effectively and efficiently.[76] The research team found that if manpower realignments were allowed, end strength could be reduced while still meeting OSD scenario requirements, for a net savings of several hundred million dollars per year from manpower costs. Further, steady-state deploy-to-dwell ratios and home-station workloads during deployments could be improved for many career fields.

However, having a single ACS organization with responsibility and direct management authority over all ACS functions could present span-of-control issues. There may also be some risk in having a single point of failure without backup or redundancy built into the system.

A second, less-centralized option is presented in Figure 5.4. Instead of a single ACS organization, there could be separate supply chain and installation support organizations that are brought together, integrated, and balanced at an integration cell, perhaps at the C2 operational support center (OSC). The other ACS functional capabilities, outside of installation support and supply chain management, should also be globally managed, integrated, and balanced at the integration cell. The ACS reachback organization could be part of the integration cell or it could be separate as well.

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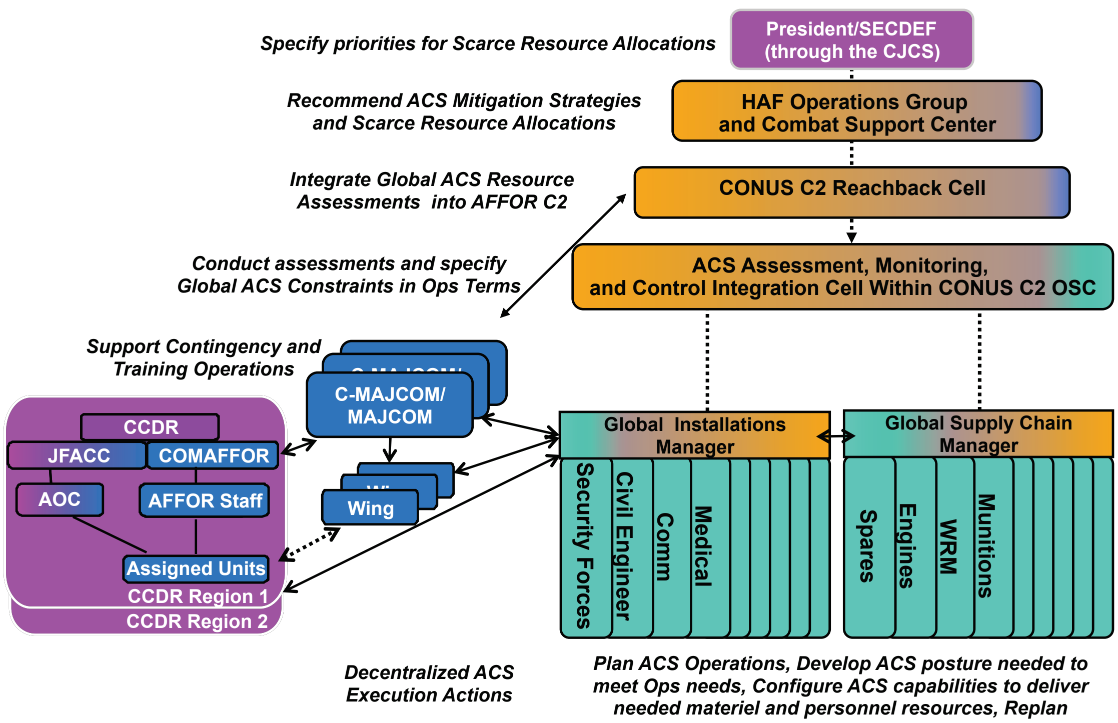
[75] Although ALEX only tested the reachback assessment portion of the vision presented here, it was considered a success. And, based on that success, organizers and participants conducted a second experiment (ALEX II) in August 2011 to further develop the concepts and implementation strategies.

[76] Most ACS career fields derive manpower requirements from home-station installation needs, not expeditionary demands. This creates inherent imbalances for ACS manpower relative to expeditionary requirements: more military manpower in some areas than the Air Force could conceivably need, and much less in other areas than the Air Force would need to execute future OSD plans. If manpower within the active duty and reserve component were realigned, these imbalances could be remedied. The realigned ACS manpower mix would better meet surge and steady-state operations at the same or reduced end strength. See Patrick Mills et al., *Balancing Agile Combat Support Manpower to Better Meet the Future Security Environment*, Santa Monica, Calif.: RAND Corporation, RR-337-AF, 2014.

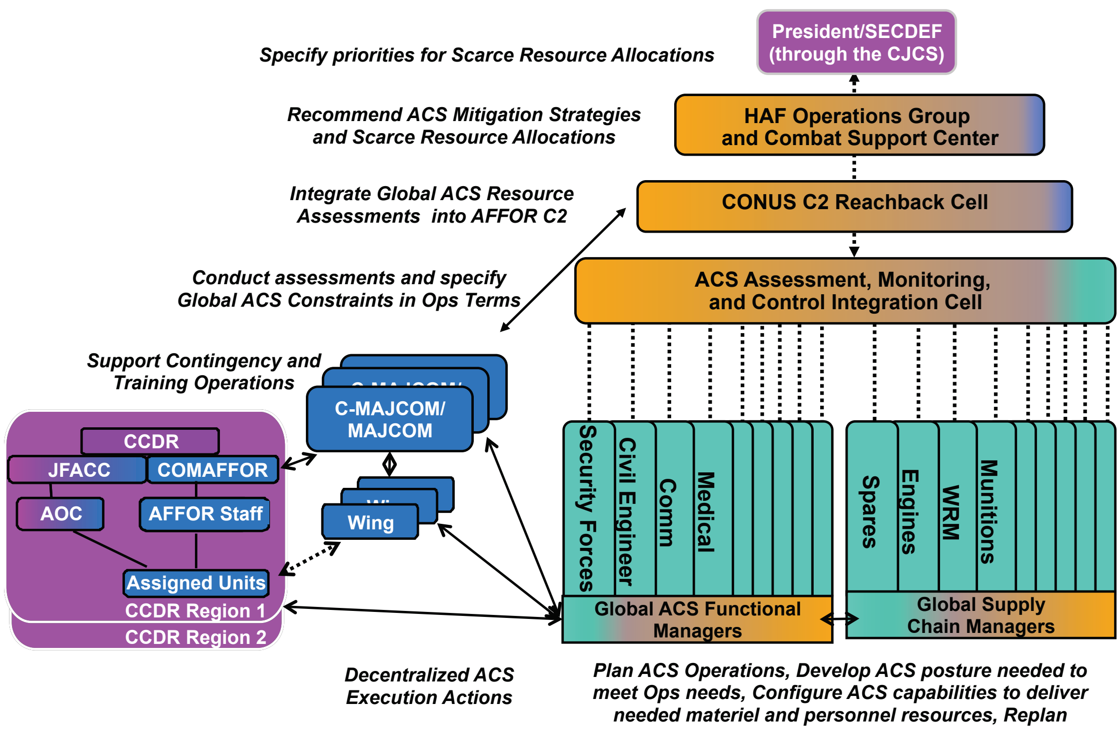
Figure 5.4
Organizational Option 2—Separate Supply Chain and Installation Support Capabilities Brought Together at an Integration Cell



This second option may have less span-of-control issues, but it introduces another level of coordination before allocation and priority decisionmaking can occur.

Another option, a decentralized approach, was the organizational option used during ALEX (shown in Figure 5.5). In this option, individual resources are managed and assessed separately. The results are fed into an integration cell that integrates the stovepiped analyses. Again, the ACS reachback cell could be part of the integration cell or it could be a separate organization. This is the organizational option that is partly in place today.

Figure 5.5
Organizational Option 3—Decentralized Approach



There were two problems experienced with Option 3 during ALEX. First, there were no standard business rules for the individual stovepiped resource analyses. Each resource analysis was completed separately with different rules and assumptions. What was considered green (or good) in one functional capability may have been considered yellow (or marginal) in another. Secondly, there was no organization with the authority to balance resources across competing demands or direct the development of mitigation strategies. In this construct, if there are competing demands, the issue must be raised to the AF/CV level for decisionmaking.

If Option 2 or 3 is implemented, the Air Force will need to determine where ACS reachback support would reside. ACC, as the force provider and the lead integrator for the C2 core capability, could serve as the assembly point for the capability assessments. The OSF at the Ryan Center, Langley Air Force Base, Virginia, is one option, as exercised during ALEX. The OSF was designed to provide C-NAF reachback support to both the AOC and AFFOR staff as outlined in PAD 10-02.[77] Another option is to locate ACS reachback support at a supporting command.

Regardless of the organizational construct, the process of bringing together, balancing, and presenting an integrated view of Air Force capabilities and constraints is vital to enhancing Air Force and joint C2 processes. Today, combat support is treated as a set of unrelated resources, making it difficult for the AFFOR staff or global resource managers to produce timely integrated capability assessments. A single organization tasked with global ACS responsibility could help C-NAF and C-MAJCOM staffs identify the most binding ACS constraints and develop mitigation strategies across resource supply chains and functional capabilities, helping the CCDRs to manage the risk associated with their CONPLANs.

Arbitrating Between and Among Competing Demands

Once binding constraints and mitigation strategies are identified, there should be a process to arbitrate across competing demands. As stated previously, there are not enough ACS assets to satisfy every operational demand as outlined in OSD planning guidance. A defined process is needed to determine which operations will have priority and which operations planners will need to replan because assets are being reallocated to another theater or because they will not have the assets they planned for. The Air Force has not formally designated an organization to seek priorities from the President and SECDEF for allocating scarce resources among AORs. Currently, planners operate under the assumption that sufficient ACS resources exist and will be allocated to them when needed. However, this will not be possible if there are simultaneous, nearly simultaneous, or increased and continued steady-state events. The confluence of scarce resources and increased demands necessitates the development of prioritization processes.

The ALEX experiment, hosted by the AFC2IC, demonstrated this significance. During ALEX, several plans were evaluated—one contingency and two OPLANs.[78] Each plan was evaluated independently; then, they were evaluated again simultaneously. The analysis showed the impacts of allocating scarce resources among AORs. As expected, there were not enough ACS resources to support all three operations simultaneously. However, the ACS reachback cell at the OSF was able to quantify the capability shortfalls and relay that information to the C-NAF and C-MAJCOM staffs. This helped the C-NAF and C-MAJCOM staffs understand the shortfalls and risks associated with

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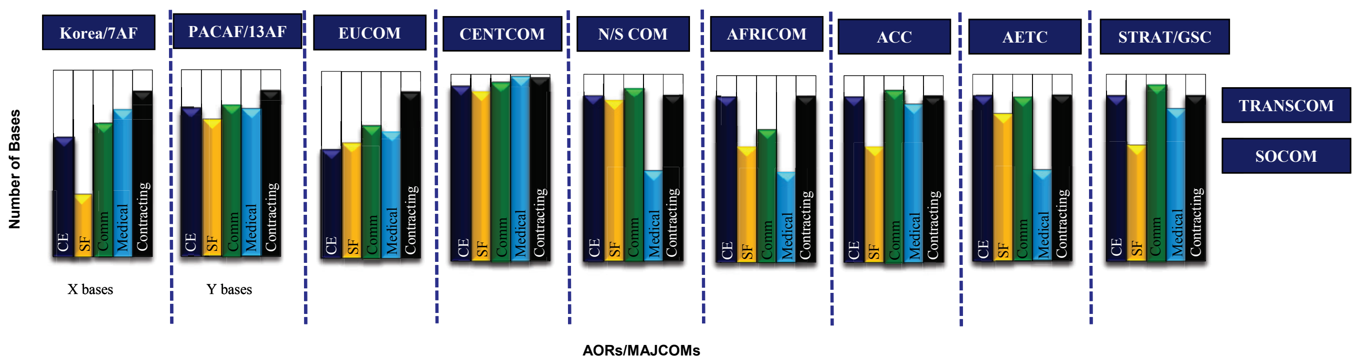
[77] United States Air Force, Program Action Directive 10-02, *Implementation of the Chief of Staff of the Air Force Direction to Restructure Command and Control of Component Numbered Air Force*, June 2, 2010c.

[78] For more information on ALEX, see Lynch, Drew, Tripp, et al. (2014).

their plans and allowed them to replan their COAs as necessary. Missing in the experiment was a process to determine which plan would have priority and how that priority would be communicated to C-NAF and C-MAJCOM staff, as well as global supply chain and functional capability managers. Since no process is currently defined, the exercise participants at the OSF explored several different prioritization scenarios. The impacts of each were relayed to the C-NAF participants.

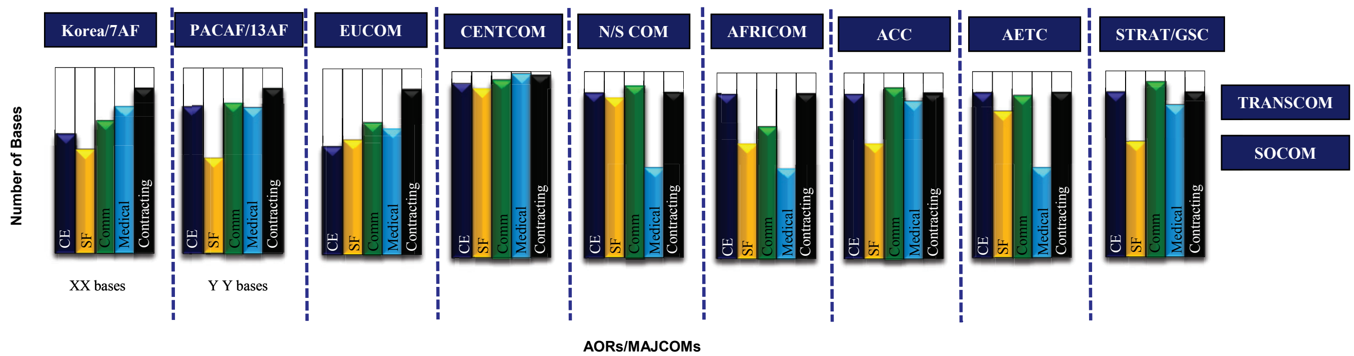
An example of the type of analysis conducted in ALEX is shown in Figures 5.6, 5.7, and 5.8. This is a notional example of how resources could be allocated and reallocated across AORs to meet designated priorities. Figure 5.6 shows notional data for five independent ACS resources—civil engineers, SF, communications, medical, and contracting—across several AORs. Integrated together, these five independent capabilities could determine the ability to establish an FOL at a given location.

Figure 5.6
Notional Assessment of the Ability to Establish FOLs



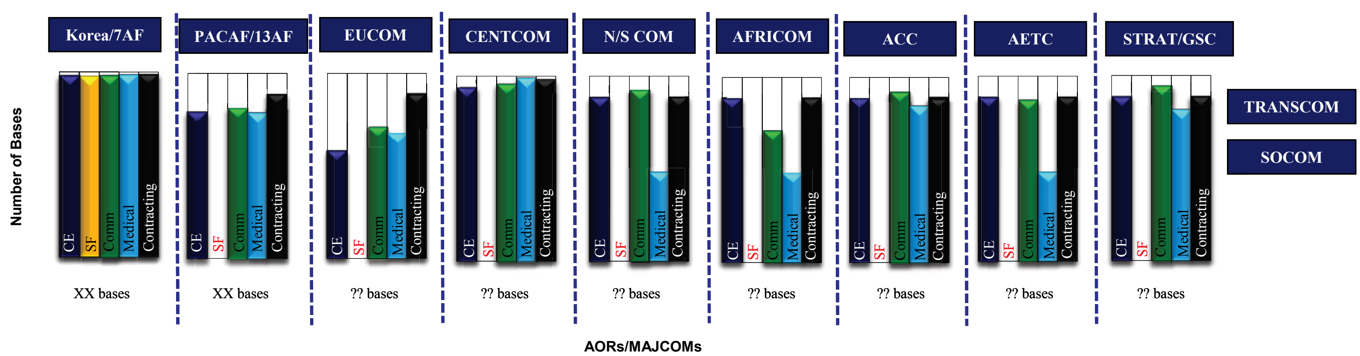
In the notional example presented in Figure 5.6, the ability to open FOLs in Korea is constrained by SF capability—the binding constraint. If Korea was given priority over other plans, SF capabilities could be reallocated from other AORs to increase FOL capability in Korea. Figure 5.7 illustrates how FOL capabilities can be increased in Korea by reallocating SF capabilities from the Pacific Air Forces (PACAF). However, there is a cost in SF capability to PACAF if capabilities are reallocated elsewhere.

Figure 5.7
Notional FOL Capability Can Be Improved by Reallocating from Another AOR



If desired, Korean FOL capability could be further increased by reallocating assets worldwide in all five resource areas (see Figure 5.8). Again, there is a capability cost to the other AORs.

Figure 5.8
Notional FOL Capability if All Resources Are Reallocated



There should be a defined process for assessing risks and allocating scarce resources according to the President's and SECDEF's priorities. Without one, each AOR is operating in isolation, assuming it will receive assets when an operation in which it is involved commences.

Process Summary

The Air Force has taken steps to address pieces of the three main process shortfalls outlined above by managing a few functional capabilities from an enterprise perspective and establishing the AFGLSC (now part of the AFSC), which could be used to bring together several classes of materiel; however there is much work still needed. The issues are larger than any one Air Force organization. They cross many lines of authority and responsibility. Without designating a single ACS organization charged with the responsibility of addressing the issues and given the authority to make changes, these process gaps may persist. A single organization and commander needs to be identified and given the authority to move the Air Force toward an integrated C2 vision. However, establishing a single ACS authority would take time. In the meantime, there are many other improvements that can be made more quickly, such as in doctrine, guidance, and instructions.

Doctrine, Guidance, and Instructions

Codifying the role of ACS in C2 in doctrine, guidance, and instructions is imperative for long-term implementation. It creates standard, repeatable processes to plan, execute, monitor, and control ACS enterprise actions to achieve specific and supportable operational needs. It also enables COMAFFOR and major command (MAJCOM) staffs to concentrate on developing supportable plans for meeting contingency and training requirements while the ACS enterprise concentrates on delivering needed resources.

While progress has been made in demonstrating how ACS planning, execution, monitoring, and control concepts enhance Air Force and Joint C2 (during the ALEX experiment), there is still much work to be done to capture the processes in doctrine, guidance, and instructions. Once Air Force-level guidance defines roles and responsibilities, MAJCOMs can create and modify their instructions. For example, AFMC Supplement 1 to Air Force Instruction 10-401 provides basic direction[79]:

> The AFMC Operational Plans Division (AFMC/A3X) is the focal point for coordinating all plans (whether produced by Headquarters AFMC or other AFMC entities) with other MAJCOMs. The AFMC Exercise Program (AFMC/A3X), in conjunction with AFMC inspector general (IG) and other OPR [office of primary responsibility] functions in direct reporting units (DRUs), will coordinate an annual process whereby all AFMC-scheduled exercises and AFMC-scheduled exercise-related activities (readiness exercises, IG inspections involving events termed exercises, experiments, wargames, demonstrations (capabilities/technology/other) termed exercises, etc.) are—to the maximum extent practical—synchronized within the Command and with the AEF battle rhythm. The overall process is detailed in Air Force Materiel Command Instruction (AFMCI) 10-204, *AFMC Exercise-Related Activities and Support*.

[79] U.S. Air Force Materiel Command, Supplement 1 to Air Force Instruction 10-401, *Air Force Operations Planning and Execution*, AFI 10-401 AFMCSUP I, July 29, 2010, Chapter 11, "Roles and Responsibilities."

> … Headquarters AFMC A-Staff/Functional Directorates develop, write, and update the annex or appendix [in AFI 10-401 AFMCSUP I] detailing their functional support to each AFMC war and crisis action plan. Each AFMC plan summary must include instructions for implementing the planned action (checklist, plans, or other procedure) and level of Command responsible for preparing the implementing document. The Headquarters AFMC Staff[80] reviews installation-level plans to ensure consistency and adequacy in supporting AFMC/Air Force plans. Headquarters AFMC/A3X provides the results of the Staff analysis to the originating installation for proper action.

AFMC established a wargaming integration office (AFMC/A8XI), as the Command's lead organization for participation in Title X wargames. The major focus areas of the office are to provide some logistics realism for the games, ensure results and feedback are integrated into AFMC ACS planning and programming cycles, and channel findings and results back to the respective agencies for their internal action. AFMC/A8XI personnel are also participating in selected exercises and experiments. All of these actions will provide an improved AFMC focus on contingency operations.

However, detailed roles and responsibilities are not included in doctrine, guidance, and instructions. Specifically, there are no AFMC instructions that address

- Headquarters AFMC's role in OPLAN and contingency planning (including LSAs), COCOM exercises, wargames, and experiments
- how each AFMC A-staff, center, and directorate supports OPLAN or other major contingency planning (including LSAs), COCOM exercises, wargames, and experiments
- the products that each organization should produce in support of one of these events
- command organizations' responsibilities and relationships with outside organizations, such as C-NAF/CCs, C-MAJOM/CCs, Air Staff, and the AFC2IC, or the relationship between each AFMC organization, such as the Air Force Sustainment Center's relationship with the Air Logistics Complexes (ALCs) within the new AFMC center construct
- the Air Force Sustainment Center's (which includes the former AFGLSC's) responsibility to conduct proactive OPLAN LSAs and strategies to compensate for spare shortages written in Surge Contingency Plan 70s and each ALC's Plan 70 accordingly and provide the results to the appropriate C-NAF
- required training curriculum for all personnel who may participate in these events

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[80] Or, under the AFMC reorganization, as part of the new AFMC Sustainment Center.

- inspection criteria and a command inspection schedule for each command organization to support these activities.[81]

Additionally, AFMCI 10-204 is in draft form, but appears to be too general in nature and does not specify AFMC C2 nodes required for assessments of global resources and process performance.[82]

AFI 10-401 also needs to be updated. One specific responsibility of Air Force supporting commands is to complete and submit LSA results to supported COMAFFORs. This instruction should be updated to include requirements for global ACS integrated capability assessments and prioritization rules for allocating scarce resources among C-NAFs and C-MAJCOMs. It should also include the Air Force Sustainment Center's role in LSAs as part of crisis action and contingency planning. Currently, there is no mention of the Air Force Sustainment Center in AFI 10-401.[83]

Additional instructions could be written mandating an ACS reachback cell within the OSF to support C-NAF and C-MAJCOM AFFOR staffs and AOC reachback operations as demonstrated in the ALEX experiment. Headquarters Air Force PAD 10-02 supports C-NAF reachback functions, including ACS global resource assessments. It directs that C-NAFs be manned day-to-day to respond to Phase 0 and Phase 1 operations and maintain readiness to support other phases. It also directs that C-NAFs will no longer man to the 72-hour surge requirement. This PAD also directs the test and development of an OSF capability, which is fundamental to the future of effective and sustainable C2 for geographic C-NAFs and C-MAJCOMs. The PAD states an OSF should include the following functions:

- C-NAFs' and C-MAJCOMs' core Continuity of Operations (COOP) for those C-NAFs conducting ongoing regional combat operations
- the primary reachback facility for AOC and AFFOR staff, potentially eliminating some of the requirements for augmentation
- a capability for training, exercise, and experimentation support for AOC and AFFOR system capability.

If the Air Force decides to use the OSF for global integrated ACS capability assessments by reachback, an instruction detailing the OSF's specific responsibilities is required. With a modest number of personnel and using virtual support from some

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[81] We have documented specific changes necessary to some instructions in the annotated bibliography in Appendix B of this publication.

[82] U.S. Air Force Materiel Command, Air Force Materiel Command Instruction 10-204, *Exercise Program*, August 31, 2010.

[83] U.S. Air Force, 2006c.

organizations (for example, ACS supply chain and functional capability managers), the OSF could perform global ACS assessments and provide feedback to C-NAFs and C-MAJCOMs. Because this is an entirely new concept, multiple MAJCOM (for example, AFMC and ACC); C-NAF and C-MAJCOM; and Air Force instructions will require additions and modifications.[84]

AFMC's role in planning, exercises, and experiments is critical for assessing how well the ACS enterprise can support near-term conflicts with existing resources. Air Force and AFMC publications should be updated to reflect changes and new processes to help institutionalize AFMC's role in ACS planning, execution, monitoring, and control.

Training and Career Development

Trained personnel are necessary to help remedy the shortfalls in the process outlined above—conducting integrated and balanced capability assessments and developing scarce resource allocation schemes. It may be necessary to develop new ACS planning, execution, monitoring, and control curriculum, which could then be incorporated into existing or new training courses. Enhanced ACS curriculum should provide training on topics such as combat support doctrine, policy, and guidance; AFFOR staff and AOC combat support processes; integrated ACS capability assessments; operationally relevant ACS metrics; and new decision support tools, as they are developed. Expanded training could include the testing of new tools, systems, and processes before they are fielded.

New and enhanced curriculum could be incorporated in training courses such as the joint services introductory course for basic AOC processes, the Contingency Warplanning Course (Maxwell Air Force Base), the C-NAF Commander's Course (Maxwell Air Force Base), courses at the Air War College and Air Command and Staff College, and courses taught at the Air Force Institute of Technology and other civilian universities that have supply chain curricula.

Career-path planning for combat support personnel might include assignment to warfighting command-level positions in supply, transportation, logistics plans, CE, or services, with the intent of creating senior combat support personnel with the skills needed to fill AFFOR staff A4 (logistics) and A7 (installations and mission support), as well as COCOM joint staff ACS positions. Those combat support officers with a strong C2 background can be groomed for leadership positions. Additional education and training might be needed for those who will occupy key ACS assignments responsible for integrating combat support into the joint system, such as in the COCOM J4 staff, the

[84] Specific inputs for PAD 10-02 can be found in Appendix B of this report.

COMAFFOR A4/7 staff, and the AOC. The number of these positions is not large, but they are key to the development of feasible operational plans.

Finally, the Air Force should ensure that operators are trained to create operational planning teams (OPTs) that include combat support planners in a timely manner (understanding their uncertain planning environment). Operators should understand what combat support planners need and when, and combat support planners should understand the limitations and uncertainties within which the operators work. Processes that define how operations and combat support planners should work together need be codified in guidance and instructions and routinely exercised so these processes become institutionalized. Only by training both groups to understand both sides of the planning equation and communicate effectively will this link between operational and combat support planning be forged and sustained.

Training and realistic exercises are critical aspects of the link between combat support and operational planning. Educating both combat support and operations personnel about their roles in the context of campaign planning will enable more-effective communication and facilitate the integrated decisionmaking process as outlined in the operational architecture.

Gap and Shortfall Summary

While progress has been made in improving ACS planning, execution, monitoring, and control processes by establishing some global managers and the C-NAFs, transforming the logistics enterprise, and designating core functions,[85] there are still improvements that need to be made. Global supply chain and functional capability managers are being established to manage and control some resources, but other resources are managed theater-by-theater, without an enterprise view of Air Force capability. No organization is charged with integrating and balancing stovepiped resource assessments to provide capability and constraint information to the warfighter. Neither has the process by which to allocate scarce resources across competing demands been defined and written into doctrine, guidance, and instructions. Tools and systems to help analyze Air Force ACS capabilities and limitations are limited. Each of these gaps underscores the need for standardized, integrated ACS processes focused on operationally relevant results codified in doctrine, guidance, and instructions and led by an organization charged with the responsibility and given the authority to manage ACS capabilities.

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[85] For more information about recent Air Force process improvements, see Chapters One and Two.

6. Conclusions and Recommendations

This document defines an operational architecture that maps C2 processes, integrating ACS planning, execution, monitoring, and control across the strategic and operational levels of operations. We document processes at C2 nodes from the President and SECDEF to the unit level and sources of supply. We also assess these nodes across the operational activities, from readiness preparation through planning, deployment, employment, sustainment, and reconstitution. The focus of this analysis is on how enhanced ACS processes can be integrated within the Air Force and joint C2 enterprise. The resulting architecture provides a vision for enhanced C2. We then use that architecture to identify and describe where shortfalls or major gaps exist between current ACS processes and the vision for integrating enhanced ACS processes into Air Force C2.

Findings and Recommendations

The vision presented in the architecture defines ways of integrating ACS assessments and resource allocation processes to better inform decisionmakers—an integral part of the C2 process. The concepts and processes we document in the architecture have been widely vetted with senior operational and ACS leaders, who agree that enhancements are needed.[86] However, ACS processes are not currently established and defined in doctrine, and guidance, tools, and systems are lacking.

While progress has been made in improving ACS planning, execution, monitoring, and control since 2002, there are still improvement actions that need to be taken. Clearly defining processes, as we have in this architecture, to specify ACS planning, execution, monitoring, and control roles and include what information flows where, should lead to better integration between combat support and operations. Parts of these processes are in place today; others do not exist or are not assigned to specific organizations. There are many options for how the processes could be implemented.[87]

While there is general agreement about the need for and value of the new processes we describe, the responsibility for developing them may span across many organizations. This architecture can be particularly important if enhanced ACS processes are developed

[86] See Table 2.1 for a list of key stakeholders who helped shape and refine the vision.

[87] The current reorganization of AFMC offers an opportunity to improve ACS processes. These enhanced processes can be incorporated as roles and responsibilities are codified for the new organizations.

separately by several organizations and the information from these processes needs to be integrated by other organizations. From an architecture perspective, it does not matter who develops the processes and associated systems.

However the Air Force chooses to proceed, those processes that are implemented need to be codified in doctrine and guidance. The roles and responsibilities of each C2 node, including logistics, operational, and installation staff; Air Force commanders; MAJCOMs; and others should be delineated in doctrine and guidance. Without clear guidance, enhanced ACS processes may not become institutionalized in how the Air Force does business. Advancements and enhancements in ACS could be lost without clear directives providing roles, responsibilities, and authorities.

Finally, in documenting the architecture, we found that the processes are larger than any one Air Force organization. They cross many lines of authority and responsibility. To implement the enhanced processes as documented in the architecture, a commander needs to be identified and given the authority to move the Air Force toward an integrated C2 vision enhanced by ACS processes. Establishing a single ACS authority would be a large cultural and organizational change for the Air Force and would take time to implement. In the meantime, there are many actions the Air Force can take to improve ACS planning, execution, monitoring, and control.

Appendix A. Operational Architecture for Mobility Air Force Maintenance

In this appendix, we present a vision of how to better integrate MAF maintenance into Air Force C2 processes. MAF maintenance includes all aircraft inspections and repairs, whether performed on the flightline or in a backshop, required to produce mission capable MAF aircraft (for example, C-17 and KC-135) to meet an established air tasking order.

We discuss all military operational activities, from readiness preparation through planning, deployment, employment, sustainment, and reconstitution. We also include all echelons of MAF maintenance involved in the C2 vision. The MAF aircraft maintenance support function is considered throughout all activities involved in a contingency operation, and the personnel and equipment required to perform MAF maintenance are primarily selected from the same base where the MAF aircraft are selected. In the sections below, we will outline, activity-by-activity, how MAF maintenance could be better integrated into Air Force and joint C2 process in the future.

Readiness Preparation

Readiness begins with a significant event, such as a review mandated by law or a real-world contingency (for example, military operations, a humanitarian relief effort, or a natural disaster) that would require a JSCP review or change in OSD guidance. In response to such an event, the CJCS reviews intelligence reports, threat assessments, national policy, and budgetary constraints and produces the current year's planning guidance for COCOMs/JTFs to review and compare to theater OPLANs to ensure they meet national objectives (see Figure 3.3, Box A01).

Prior to submitting a revised OPLAN, as required, COCOMs/JTFs will review planning guidance and military objectives and send their intent and required operational effects to the C-NAF or C-MAJCOM for input about the status of Air Force forces and support availability (for example, MAF maintenance personnel and resources) and to assess and validate each theater OPLAN's objectives, request for forces, and support requirements (see Figure 3.3, Box A11).

In this vision—for better-integrated ACS planning, execution, monitoring, and control—C-NAFs and C-MAJCOMs will rely on the GIC to provide integrated ACS capability assessments. The GIC, in turn, will rely on Air Mobility Command (AMC), as the global manager, to provide MAF maintenance capabilities analyses. During this process, these organizations will conduct an individual theater OPLAN or contingency assessment and a global assessment of all theater plans to determine MAF maintenance personnel and support capabilities.

The C-NAF or C-MAJCOM that is supporting an OPLAN or contingency operation will send validated force and supportability requirements to the GIC and a request for review to AMC as the supporting command (see Figure 3.3, Box A31A).

Once it receives the theater OPLAN, the GIC will consider the plan's objective and force and support requirements, validate the UTC and resource requirements (that is, the number of aircraft, the operational tempo, the number of sorties and duration, and the beddown location) and forward this information to the global manager (see Figure 3.3, Box A21A).

The global manager will review the information from the GIC and measure it against available MAF maintenance personnel and resources. The global manager will evaluate if the actual MAF maintenance and resource availability will impact the support plan objective. The result is a validated MAF maintenance assessment and unit sourcing information for MAF maintenance personnel and resources that are sent to the GIC to be integrated with other support functions (see Figure 3.3, Box A71A).

The GIC will integrate and balance MAF maintenance personnel and resource capabilities with other support function capabilities (for example, CAF maintenance, airfield management, and CE) to determine an optimum support plan for implementing and sustaining an OPLAN or contingency. The GIC then sends this validated support plan, identifying any MAF maintenance constraints, to the C-NAF or C-MAJCOM (see Figure 3.3, Box A21B).

The supporting command will also validate the deployment plan by evaluating unit readiness and comparing it to the OPLAN or contingency requirements. From the unit level, validated unit taskings, including any MAF maintenance shortfalls and limitations, are also sent to the C-NAF or C-MAJCOM (see Figure 3.3, Box A31B) and supporting command. Once this theater supportability plan is developed, the GIC then assesses the global enterprise requirements (that is, across all theater objectives) for MAF maintenance.

The C-NAF or C-MAJCOM from each theater provides its validated objectives, force, and support requirements to the GIC, which integrates force and support requirements from all theaters (see Figure 3.3, Box A31A). During this assessment, the GIC considers MAF maintenance personnel and resource requirements across all theaters to ensure they are operating with enough personnel and resources to meet their requirements, though the C-NAF or C-MAJCOM supporting a contingency has force and resource priority, as determined by SECDEF (see Figure 3.3, Box A21C).

This global enterprise-wide capability requirement is passed to the global manager, who reviews and optimizes MAF maintenance capability to meet all theaters' MAF missions (see Figure 3.3, Box A71B), and then sends an optimized global support plan back to the GIC.

The GIC assesses this global MAF maintenance support plan and integrates it with all other support function plans, such as CAF maintenance, munitions, SF, and CE (see Figure 3.3, Box A21D). This global integrated support plan is forwarded to the C-NAFs or C-MAJCOMs and CJCS, providing visibility on the global state of all support functions.

Once the C-NAFs or C-MAJCOMs receive the individual and global support plans, they compare the assessments to their OPLANs and suggest adjustments and mitigation strategies to account for global support function constraints, including MAF maintenance constraints (see Figure 3.3, Box A31B).

The C-NAFs or C-MAJCOMs will send a projected allocation strategy to the COCOMs/JTFs, which evaluate the support plans and compare them to the President's/SECDEF's strategy. The COCOMs/JTFs will revise OPLANs as required to achieve desired operational effects with the existing resource availability (see Figure 3.3, Box A12).

Finally, the revised OPLANs, with support plan details, are sent to the CJCS, who reviews, prioritizes, and arbitrates support resources across demands (see Figure 3.3, Box A02).

This prioritized allocation strategy ends the readiness activity and is one input for COCOMs/JTFs in the beginning stages of contingency operation activities.

Planning

In planning, the CJCS continues to review intelligence reports, threat assessments, and national policy, then provides the COCOMs/JTFs with intelligence reports and, if military action is requested, military objectives and end states (see Figure 3.3, Box B01).

The COCOMs/JTFs will review this information alongside emerging MAF maintenance support requirements from the C-NAFs or C-MAJCOMs, then develop planning guidance, including air component options, military tasks, and end states, for the C-NAFs or C-MAJCOMs (see Figure 3.3, Box B11).

The C-NAFs or C-MAJCOMs will translate the COCOM's/JTF's guidance into COAs for air component effects, listing known facts, limitations, and assumptions, as well as how the established military end state will be reached. The C-NAFs or C-MAJCOMs will produce initial force and resource UTCs and MOEs for the GIC to identify initial supportability demands for a COA (see Figure 3.3, Box B31A).

The GIC compares these initial UTC requirements against enterprise MAF maintenance requirements, identifying any major support planning factor deviations requiring replanning. Once established, the GIC provides a draft support requirement plan (that is, the operations tempo, timeline, beddown location) to the global manager (see Figure 3.3, Box B21A).

The global manager will develop a MAF maintenance supportability CONOPS to meet the established MOEs. At this time, the global manager will determine all available resources at the FOLs, such as maintenance facilities, maximum aircraft on ground limitations, fuel delivery methods, and weather conditions. The global manager will review MAF maintenance availability to meet the UTC requirements from the GIC, tailor the UTC requirements against MAF maintenance availability, and provide the GIC an assessment of the capability of MAF maintenance to meet the operational needs of the COA (see Figure 3.3, Box B71A).

Upon receipt of the MAF maintenance support plan, the GIC will integrate and balance MAF maintenance personnel and resource capabilities with all support function capabilities to meet the COA's operational needs. The GIC sends the global manager the overall support plan identifying MAF maintenance constraints and the ability to meet the COA's MOEs (see Figure 3.3, Box B21B).

The global manager will reevaluate the support plan, determine the ability to generate the mission and meet the UTC requirements, and will develop a MAF maintenance mitigation strategy, as required, for the GIC to consider when developing the global support plan (see Figure 3.3, Box B71B).

The GIC will include the MAF maintenance support plan with all other required support plans and identify the enterprise ability to meet the COA's MOEs. The global support plan, now vetted by all global managers, includes UTC requirements and suggested mitigation strategies, and is sent to the C-NAFs or C-MAJCOMs (see Figure 3.3, Box B21C).

Using the global support plan, the C-NAFs or C-MAJCOMs will develop a list of recommended and prioritized COAs to meet the established military end state for the COCOMs/JTFs to consider (see Figure 3.3, Box B31B).

The COCOMs/JTFs will examine each COA for its ability to achieve the intended military effects and stay within cost goals and then inform the C-NAFs or C-MAJCOMs which COA was selected for execution (see Figure 3.3, Box B12).

The C-NAFs or C-MAJCOMs finalize the selected COA by completing all the actions required to carry out the COA (such as essential tasks, force and resource requirements, and assumptions) and then sends the formal COA with a request for forces and a support plan to the GIC and supporting command (see Figure 3.3, Box B32).

The GIC works with all global managers to determine the actual support requirements and then sends an integrated support plan for the COA to the global manager (see Figure 3.3, Box B22).

The supporting command will identify and task units and resources to carry out the integrated support plan and develop a proposed TPFDD. Tasked units will assist in developing wing-level deployment plans and with TPFDD planning to posture MAF maintenance to meet the integrated support plan requirements.

Upon receipt of the integrated support plan from the GIC, the global manager will develop MAF maintenance support strategies, including constraints and mitigation actions, and forward a finalized MAF maintenance support plan to the C-NAFs or C-MAJCOMs, GIC, and the supporting command (see Figure 3.3, Box B72).

This ends the MAF maintenance planning process.

Deployment

Deployment begins with the President's/SECDEF's decision to deploy forces. The CJCS reviews current world events, assessments, and the COCOM/JTF COA analysis and, if warranted, issues a DEPORD to the COCOM/JTF specifying a request to position military forces (see Figure 3.3, Box C01). The COCOM/JTF reviews the military end state and selected COA and provides an OPLAN and DEPORD to the C-NAF or C-MAJCOM (see Figure 3.3, Box C11).

The C-NAF or C-MAJCOM assists with force deployment and beddown plans; validates TPFDD requirements; and performs a variety of other duties, such as liaison with host nation officials, embassy personnel, and special operations forces. The C-NAF or C-MAJCOM will issue the COCOM/JTF OPLAN, DEPORD, and MOE guidance to the global manager, supporting commands, and tasked units (see Figure 3.3, Box C31A).

Using the COCOM/JTF OPLAN, DEPORD, C-NAF or C-MAJCOM guidance, and unit capabilities, a supporting command assists tasked units in rapid UTC sourcing and tailoring, securing FOL MAF maintenance resources, and addressing unresolved shortfalls.

Tasked units will use the supporting command and wing guidance to implement the DEPORD. They will review the TPFDD to ensure MAF maintenance personnel and resources are properly scheduled to depart, build load plans, and provide FOL capabilities. The units will also monitor the reception of MAF maintenance personnel and resources, ensuring force beddown and readiness to later execute the mission.

The global manager will monitor the DEPORD execution against control parameters, as well as look out for any MAF maintenance deviations or the inability to meet the MOEs, and will forward significant MAF maintenance impacts of the deploying units' status and capabilities to the GIC and the C-NAF or C-MAJCOM (see Figure 3.3, Box C71).

The C-NAF or C-MAJCOM monitors the deployment and beddown process, coordinates capabilities with air operations center planners, and assists the global manager and units with adjustments and minor deviations.

The GIC also monitors against control parameters, assesses the deployment, and notifies the C-NAF or C-MAJCOM of any major deviations from the plan that may require replanning actions (see Figure 3.3, Box C21).

The C-NAF or C-MAJCOM will inform the COCOM/JTF of DEPORD status, capability, and any deviations requiring a DEPORD revision or replanning actions (see Figure 3.3, Box C31B).

With this information, the COCOM/JTF will adjust the DEPORD to accommodate deviation and send the revised DEPORD to the C-NAF or C-MAJCOM, the global manager, and any supporting commands (see Figure 3.3, Box C12).

The C-NAF or C-MAJCOM will adjust the support plans to the revised DEPORD and issue updated guidance to the GIC, the global manager, any support commands, and the tasked units, which adjust accordingly (see Figure 3.3, Box C31C).

This process of the GIC monitoring the DEPORD execution and forwarding deviations to the C-NAF or C-MAJCOM, which in turn forwards deviations requiring DEPORD revisions or replanning to the COCOM/JTF, which adjusts and reissues a revised DEPORD continues until all forces and resources are in place.

Employment and Sustainment

Employment begins when the CJCS issues the EXORD to take military action. After further review of current world events, assessments, and the COCOM/JTF COA analysis, the CJCS will issue an EXORD to the COCOM/JTF to take military action (see Figure 3.3, Box D01). The COCOM/JTF reviews the EXORD's request for military action and sends force employment guidance to the C-NAF or C-MAJCOM, the global manager, and tasked units (see Figure 3.3, Box D11).

With the EXORD, OPLAN, and selected COA, the C-NAF or C-MAJCOM will execute the operational plans by providing the global manager and tasked units with air tasking order (ATO) information such as sortie rates and flying schedules (see Figure 3.3, Box D31A).

Tasked MAF maintenance units will provide aircraft to meet the expected ATO sortie rates and will provide the C-NAF or C-MAJCOM and global manager with aircraft status and unit capability information.

The global manager will monitor MAF maintenance capabilities against expected performance parameters and provide the GIC and the C-NAF or C-MAJCOM with this information (see Figure 3.3, Box D71). The C-NAF or C-MAJCOM will compare actual sortie rates to the planned sortie rates and emerging MAF maintenance support requirements, then determine the impact, if any, that MAF maintenance may have on the ability to execute the mission.

The GIC also monitors against control parameters, assesses execution, and notifies the C-NAF or C-MAJCOM of any major deviations from the plan that may require replanning actions (see Figure 3.3, Box D21).

The C-NAF or C-MAJCOM will recommend any necessary OPLAN adjustments or deviations requiring replanning actions to the COCOM/JTF (see Figure 3.3, Box D31B).

The COCOM/JTF will determine whether operational effects are being achieved and the OPLAN execution is generating the desired result. If necessary, the COCOM/JTF will reissue a revised OPLAN with updated operational effects or end states to the C-NAF or C-MAJCOM (see Figure 3.3, Box D12).

The C-NAF or C-MAJCOM will execute the revised OPLAN and issue adjusted ATOs to the GIC, the global manager, and tasked units, then monitor the results of the revised OPLAN (see Figure 3.3, Box D31C).

This process—the GIC comparing actual ATO and MAF maintenance requirements to the planned requirements and forwarding deviations to the C-NAF or C-MAJCOM, which in turn forwards deviations requiring OPLAN revisions or replanning to the COCOM/JTF, which adjusts and reissues a revised OPLAN to the C-NAF or C-MAJCOM, which issues adjusted ATOs to the GIC, global manager, and tasked units—continues throughout execution activities.

Reconstitution

Reconstitution begins when the President/SECDEF sets terms to cease military action. After analyzing the world situation, national interests, and intelligence reports, the CJCS orders the COCOM/JTF to draw down military operations (see Figure 3.3, Box E01). The COCOM/JTF provides guidance and intent for the C-NAF or C-MAJCOM to develop a reconstitution plan (see Figure 3.3, Box E11).

From the COCOM/JTF guidance and intent, the C-NAF or C-MAJCOM develops suggested COAs and provides the GIC with closure requirements and drawdown options (see Figure 3.3, Box E31A).

The GIC will draft the support requirements for the suggested drawdown COAs from the C-NAF or C-MAJCOM. The GIC will identify the potential last date to generate the mission, the resources to remain in place, and a drawdown plan for the global manager (see Figure 3.3, Box E21A).

From this, the global manager will develop a MAF maintenance drawdown plan and identify its impacts, if any, on the overall drawdown plan. The global manager will identify MAF aircraft maintenance requirements to move personnel and resources and meet each COA and will send these requirements to the GIC, along with mitigation strategies in the event that there is an impact on the COA (see Figure 3.3, Box E71A).

The GIC balances the MAF maintenance drawdown plan with other support function plans and develops the theater drawdown plan for the global manager (see Figure 3.3, Box E21B). The global manager evaluates the MAF maintenance requirements to support the theater drawdown plan and sends the GIC any MAF maintenance constraints, as well as mitigation strategies (see Figure 3.3, Box E71B).

The GIC now develops a global drawdown plan identifying MAF maintenance constraints for the C-NAF or C-MAJCOM (see Figure 3.3, Box E21C). Using the drawdown plan, the C-NAF or C-MAJCOM reviews the operational requirements and develops a list of recommended and prioritized COAs for the COCOM/JTF to consider (see Figure 3.3, Box E31B).

The COCOM/JTF will examine how well each COA meets the drawdown guidance and cost goals, and then select a COA for the C-NAF or C-MAJCOM to finalize (see Figure 3.3, Box E12).

The C-NAF or C-MAJCOM will finalize essential tasks, support requirements, and assumptions, then forward a formal drawdown plan to the GIC (see Figure 3.3, Box E32).

The GIC works with the global manager to finalize MAF maintenance requirements to sustain the drawdown plan. The GIC will integrate other global manager support function plans and develop an integrated capabilities drawdown plan for the global managers (see Figure 3.3, Box E22).

The global manager will develop the specific MAF maintenance strategy to support the drawdown and forward the plan to the supporting command (see Figure 3.3, Box E72).

The supporting commands identify the personnel and resources required to support the drawdown plan and send the proposed plan to the MAF maintenance units so it can be further developed it into a wing plan and MAF maintenance personnel and resources can be supplied. This ends the reconstitution activity.

Appendix B. Annotated Bibliography

In this appendix, we list the Air Force and AFMC publications we reviewed as part of this ACS planning, execution, monitoring, and control analysis. For each publication, we provide a synopsis of the relevant guidance as it pertains to ACS processes and point out where doctrine, guidance, and instructions may require changes to achieve the integrated vision for C2 in the future.

Air Force Policy Directive 10-28, *Air Force Concept Development*, September 15, 2003

The purpose of this AFPD is to provide a common framework and practical guidelines for developing and writing Air Force concepts. It incorporates the guidance contained in the Joint Staff's Draft *Joint Operating Concept;* replaces the CONOPS, concept of employment (CONEMP), and concept of execution (CONEX) framework with the Joint Staff framework of operating, functional, and enabling concepts; focuses the concept format on effects and capabilities; and defines the concept coordination and approval process.

AFPD 10-28 defines Air Force concepts as the ways (sequenced actions) in which military means (capabilities) are employed to accomplish desired ends (effects). Air Force concepts describe how the Air Force intends to employ air and space power in support of Joint Operating Concepts and national security and national military objectives. It continues that concept principles must be articulated in sufficient detail to enable decisionmakers to compare alternative approaches and conduct meaningful experimentation. Only after a concept has been thoroughly developed and validated will it provide the basis for force planning and input into the requirements, acquisition, and resource allocation processes. If implemented, Air Force concepts will impact military DOTMLPF.

Concepts are framed in three primary ways: maturity, time applicability, and type. AFPD 10-28 indicates that a concept matures over its life cycle, and as the concept matures, so does its level of specificity. The phases of a concept development life cycle include (but are not limited to) initiation, wargaming, experimentation, validation, and implementation. Concept approval is required at least twice in the concept life cycle: prior to moving into the experimentation phase and prior to the implementation phase. A validated concept will influence DOTMLPF. Concepts also apply across the full spectrum of time. Future concepts look at the ways we expect to employ air and space power in the future (five years out and beyond), current concepts address how we expect to employ air and space power today (until five years from now), and historic concepts highlight how we once employed air and space power. Understanding where a concept fits in the time spectrum helps in understanding its influence on DOTMLPF. Finally, Air Force concepts can be categorized into four different types: institutional, operating, functional, and enabling. AFPD 10-28 provides extensive definitions of these as well.

AFPD 10-28 is important for guiding AFMC's direction as it develops ACS processes and ties them to C-NAFs for the assessment of global resource levels and process performance in support of full contingency planning for an OPLAN or other major campaign, integration in OPLANS, contingency operations, exercises, experiments, and wargames. Further, this directive is important to AFMC's development of command relationships within the MAJCOM.

United States Air Force, Program Action Directive 10-02, *Implementation of the Chief of Staff of the Air Force Direction to Restructure Command and Control of Component Numbered Air Force*, June 2, 2010

This directive formalizes and implements CORONA South (Commanders Conference) Taskers and CORONA Top Taskers. Notably, it establishes the requirement for DEPORDs for the Rapid Augmentation Team (RAT) and Air Reserve Component. The AFFOR C2 enabling concept, implemented by PAD 06-09, established a new Air Force component headquarters structure better able to support the CCDRs and provide C2 of AFFORs. Subsequently, the Chief of Staff, United States Air Force (CSAF) directed that C-NAFs be manned day-to-day to respond to Phase 0 and Phase 1 operations and maintain readiness to support other phases and directed that C-NAFs no longer man to the 72-hour surge requirement. This CSAF direction left C-NAFs with the risk of not being able to fulfill the full range of roles and responsibilities and, during a rapid transition to Phase 2 operations, could put CCDR's intent in jeopardy. To mitigate these risks, ACC led the implementation of a total force, Air National Guard (ANG) and Air Force Reserve Command (AFRC), 125-person RAT alignment plan for all phases of conflict.

Also of note, is that PAD 10-02 directs the test and development of an OSF capability. It defines an OSF as a fundamental element for the future of effective and sustainable C2 for geographic C-NAFs and explains that an OSF should provide COOP to C-NAFs conducting ongoing regional combat operations; serve as the primary reachback facility for AOC and AFFOR staff, potentially eliminating some of the requirements for augmentation; and serve as a capability for training, exercise, and experimentation support for AOC and AFFOR system capability. The OSF will include an AN/USQ-163 Falconer AOC system capability.

It is essential that this PAD be modified to include the establishment of an ACS reachback cell within the OSF to support C-NAF AFFOR staff and AOC reachback operations as demonstrated in the JEFX 11-1 (ALEX 11-1 and AC11) experiment, as well as address the manpower requirements needed to maintain interfaces with C-NAFs, the Air Force Sustainment Center, global force management (GFM) functional capability managers, ACC/A4X, and others. We recommend standing up the Ryan Center with six personnel, possibly from the 710 Combat Operations Squadron (710 COS), to staff the ACS reachback cell at the OSF. The criteria for the six positions should include an analytic ACS background. Specific inputs to this directive could include

- Section 2.3 or 2.4. In addition to describing the risk to C-NAF responsiveness and CCDR intent due to C-NAF manning, describe the need for global ACS enterprise assessments. Currently, C-NAF COA selections do not consider the ability of the ACS enterprise to support OPLANs and contingency operations. Therefore, C-NAFs are developing plans that may not be supportable from ACS perspective and are committing Air Force forces to operations with unknown and potentially serious support shortfalls. This was demonstrated in ALEX 11-1 when global ACS assessments were conducted on specific OPLANs. In this section, include language that addresses this and states that imbalances between needed global ACS resources and their availabilities require global assessments to ensure C-NAF COAs are supportable.
- Section 3.2.19.4. Expand to include testing the OSF ACS reachback cell's ability to conduct global ACS materiel and personnel assessments.
- Section 5.1.8. Include language that the OSF ACS reachback cell will be staffed by six members of 710 COS and stood up when CONPLANs or specific OPLAN assessments dictate (e.g., during LSA evaluations).
- Section 5.7.2. Add a third part to the OSF definition that describes the OSF as serving as a reachback entity to obtain global ACS assessments to determine if the global ACS enterprise has the capabilities to support C-NAF COAs.
- Section 5.9.1. Include language stating that AFFOR training includes an understanding that the OSF ACS reachback cell provides reachback capabilities to outline the types of global ACS resource assessments.
- Section 6.2.6.1.4. Indicate that, initially, six positions are required in the OSF to maintain interfaces with C-NAFs, the Air Force Sustainment Center (which includes the former AFGLSC), GFM functional capability managers, ACC/A4X, and others. These positions can come from the 710 COS and can be activated when periodic assessments are needed for OPLANs or when contingencies dictate. When activated, these personnel would be assigned to the OSF ACS reachback cell at the Ryan Center, Langley Air Force Base, Virginia. The personnel in these positions can relieve and come from the RAT as described and need to have background and knowledge in the ACS fields that is analytic in

nature (for example, a Logistics Management Enlisted-to-AFIT graduate). Further explain the duty description of the full-time positions when activated within the OSF ACS reachback cell—facilitate ACS functional assessments; balance them based on the intractable personnel or resources; and then provide balanced assessments to C-NAFs, Air Staff, and ACS resource providers (for example, the Air Force Sustainment Center, ACC/A4X, and the CE functional capability manager).

Air Force Instruction 10-204, *Participation in Joint and National Exercises*, April 21, 2010

This instruction implements AFPD 10-2, *Readiness*, and Department of Defense Instruction 3020.47, *DoD Participation in the National Exercise Program (NEP)*. It provides guidance regarding Air Force participation in the Joint Exercise Program (JEP) and the NEP and addresses the Combatant Commander Exercise and Engagement (CE2) portion of the DoD Training Transformation (T2) Program. It provides exercise guidelines and responsibilities and establishes organizations and tools for the oversight and management of Air Force support for and participation in these exercises. It establishes and provides guidance for the Air Force Joint Exercise Coordination Team (AFJECT), the Exercise Integrated Process Team (EIPT) and the Exercise General Officer Steering Group (EGOSG). It outlines major actions associated with the exercise cycle.

As the parent instruction to AFMCI 10-204, it is applicable when developing AFMCI 10-204. Listed here are some MAJCOM, Field Operating Agency (FOA), and DRU responsibilities:

- Provide oversight of headquarters and subordinate unit exercise activities.
- Provide supplemental guidance, as needed, to clarify exercise planning, controlling, executing, and evaluating functions and responsibilities.
- Ensure exercise activities help command and subordinate units achieve and maintain their designed operational capabilities, fulfill OPLAN taskings, and appropriately respond to contingencies such as natural disasters or terrorist incidents.
- Establish a headquarters-level OPR to implement the exercise program and oversee and monitor the exercise activities of subordinate units.
- Establish a command interface point of contact (POC) with AF/A3O-AT for overall exercise planning and coordination.

AFI 10-204 also identifies Lead MAJCOMs (L-MAJCOMs). To facilitate Air Force exercise planning, programming, and execution activities, the following MAJCOMs will serve as L-MAJCOMs for exercises within the indicated mission areas:

- ACC is the L-MAJCOM for CAF.

- AMC is the L-MAJCOM for MAF.
- Air Force Special Operations Command (AFSOC) is the L-MAJCOM for Special Operations Forces (SOF).
- Air Force Space Command (AFSPC) is the L-MAJCOM for Space and Cyberspace Forces.
- Air Force Global Strike Command is the L-MAJCOM for Nuclear Forces.

Although AFI 10-204 tasks AFMC as a member of the AFJECT and the Air Force focal point for national asset participation, cyberspace-related issues, materiel support, and airlift support/participation in Air Force exercise programs, it does not specify AFMC as the L-MAJCOM for ACS. This instruction should be modified to designate AFMC as the lead MAJCOM for ACS.

AFI 10-204 also specifies that all Air Force organizations will coordinate their requirements within the named mission areas with the appropriate L-MAJCOM and gives the following responsibilities to L-MAJCOMs:

- Develop a prioritized list of exercise requirements for their designated mission area. This list may be used to measure how well individual exercises address specific mission area objectives.
- Evaluate mission area exercise participation and assess its impact on Air Force capability to meet Air Force–wide mission area requirements.
- Assist Headquarters Air Force with identifying mission area exercise shortfalls and advocating for additional exercise opportunities or resources, as appropriate.

Another ACC responsibility is to program for and provide oversight of the U.S. Air Force Warfare Center. Similarly, AFI 10-204 should specify that ACC programs for and provides oversight of the Ryan Center at Langley Air Force Base, Virginia.

Air Force Materiel Command Instruction 10-204, *Exercise Program*, August 31, 2010 (Draft)

This AFMCI was in rough draft form when we reviewed it for this analysis. It will implement AFPD 10-2, *Readiness*, and AFI 10-204, *Participation in Joint and National Exercises*. It guides AFMC in its role as an Air Force MAJCOM when participating in joint and national exercises and identify AFMC exercise responsibilities; details the basic structure and objectives of the AFMC Exercise Program; establishes the AFMC After-Action and Remedial Action Reporting; and describes funding for the AFMC Exercise Program. This instruction provides a cursory level of command exercise play, normally in support of joint or national exercises, to facilitate AFMC–led exercises with a focus on C2, communications, and responsiveness to crisis events.

As one of AFMC's capstone exercise instructions, AFMCI 10-204 is too general in nature and does not specify AFMC C2 nodes that should be tied to C-NAFs for the assessment of global resource levels and process performance. It does not address the specifics of how C2 should be exercised as part of global C2 enterprise. The instruction should define in detail how each AFMC A-staff, center, and directorate will demonstrate its support of full contingency planning for OPLAN or other major contingency planning and execution and as part of LSAs, exercises, experiments, and wargames. It should further define the C2 relationships between each AFMC organization (for example, the Air Force Sustainment Center's relationship with ALCs), as well as these organizations' relationships with C-NAFs and other participants (for example, the Air Force Sustainment Center's relationships with C-NAF/A3/5/4 and an OSC). The instruction should also address all metrics used to assess materiel support and supply chain effectiveness.

Participation in contingency operations, OPLAN LSAs, COCOM-sponsored exercises, selected experiments, and wargames are important for assessing how well the ACS enterprise can support current OPLANs and other near-term conflicts with existing resources. These events can improve existing and emerging Air Force and Joint C2 concepts by enhancing ACS contingency planning, execution, monitoring, and control processes and integrating these within the C2 enterprise. The lessons learned from each event can offer more realistic inputs and results in future events, providing a continuous improvement in expanding and enhancing ACS contingency planning and execution realism and readiness within Air Force and Joint C2 enterprise. AFMCI 10-204 should thoroughly detail the roles, responsibilities, and relationships of all AFMC directorates and centers in contingency operations, OPLAN LSAs, COCOM-sponsored exercises, selected experiments, and wargames; detail specific output products of all materiel supply chain C2 activities and link them to a specific schedule of events; detail each directorate and centers' responsibilities to C-NAF/CCs, Air Staff, etc.; define the required output products that should come from each event; and establish and detail the curriculum of a training workshop.

COCOM-sponsored exercises Terminal Fury and Ulchi Freedom Guardian are tied to major OPLANs and Austere Challenge is an annual joint exercise that tests U.S. European Command (EUCOM) and supporting commands' ability to plan and execute operations as a JTF Headquarters. All these exercises offer the opportunity to employ vital portions of the ACS contingency planning, execution, monitoring, and control processes; the commands go to war with current resources and force structure, and a major part of the supporting OPLANs is the LSA that is conducted to support them. AFMC should monitor and track combat support planning, execution, and control (C-SPEC) activities and tie them to the major OPLAN LSA process, then use the LSA results to test key portions of the ACS planning and execution process in the major

COCOM-sponsored exercises. AFMCI 10-204 should document AFMC's participation in COCOM-sponsored exercises.

Participation in selected experiments tests the expansion and integration of new planning and execution capabilities, including new supply chain C2 processes and C-SPEC capabilities. AFMC participation will focus on testing ACS nodes and processes that are affected by AFMC, such as the ability to build/sustain needed FOLs given current and/or future resources; test C-SPEC, FOL Assessment Model (FAM), supply chain C2, and other expanded ACS planning and execution capabilities; and introduce and test files from other planning and execution systems. AFMC participation in these events will improve ACS realism and, when used in real-world contingencies, will offer more-accurate COA decisions to COCOMs.

AFMCI 10-204 should expand on the main focus areas of how all A-staff, directorates, and centers participate to provide C-NAFs with accurate ACS status when needed in contingency operations, OPLAN LSAs, COCOM-sponsored exercises, selected experiments, and wargames. This AFMCI should establish criteria for each A-staff, directorate, and center to meet and should direct periodic inspections to ensure compliance with this AFMCI and other AFIs. Finally, this AFMCI should direct and establish training criteria for key personnel in all A-staff, directorates, and centers.

It is essential that a single focal point be assigned, and AFMC/A3 would be a good choice. However, the instruction does not mention AFMC/A4, which should be included as an office of coordinating responsibility (OCR). Given AFMC/A4's large role with ALCs (and product centers, labs, etc.) and AFMC materiel sustainment policy issues, AFMC/A4 (logistics) is the equivalent of A3/5 (air, space, and information operations) in operational commands. Further, AFMC/A8/9 (strategic plans, programs, and analyses) should also be included as an OCR. AFMCI 10-204 should also capture AFMC/A8XI's role in selected exercises (as build-up to Title X wargame events). Because of the progress AFMC/A8X has made in establishing its wargaming office (A8XW) and its established participation in exercises, experiments, and wargames, it should work closely with AFMC/A3X in developing this rough draft into a comprehensive instruction.

Air Force Instruction 10-208, *Continuity of Operations Program*, December 1, 2005

This instruction implements portions of AFPD 10-2, *Readiness*, March 1, 1997 and AFPD 10-8, *Homeland Security*, October 1, 2003. It describes procedures for implementing portions of Presidential Decision Directive 67, *Enduring Constitutional Government (ECG) and Continuity of Government Operations*, October 21, 1998; DoD Directive 3020.26, *Defense Continuity Program (DCP)*, September 8, 2004; DoD

Directive 3020.36, *National Security Emergency Preparedness,* November 2, 1988; DoD Instruction 3020.39, *Integrated Continuity Planning for Defense Intelligence*, August 3, 2001; and guidance contained in Federal Preparedness Circular (FPC) 65, *Federal Executive Branch Continuity of Operations*, June 15, 2004.

AFI 10-208 describes the DoD Directive 3020.26, *Defense Continuity Program*, definition of *COOP* as an internal effort within each branch of government to ensure that the capability exists to continue uninterrupted essential component functions across a wide range of potential emergencies, including localized acts of nature, accidents, and technological and/or attack-related emergencies. COOP involves continuity of DoD mission essential functions (MEFs) through plans and capabilities governing the succession of office; the emergency delegation of authority; the safekeeping of vital resources, facilities, and records; and the improvisation or emergency acquisition of vital resources necessary for the performance of MEFs that must be maintained at a high level of readiness to be implemented both with and without warning.

The Air Force described COOP planning as simply a "good business practice"—part of the fundamental mission of all Air Force organizations—and stated that all levels of command within the Air Force will plan, budget, and execute their ability to support SECDEF and JCS MEFs and ensure the ability to project forces. All levels of command will ensure forces are available to the SECDEF to support civil authority requests for assistance and to prevent, protect against, and respond to threats to national security. Planning factors as contained in War and Mobilization Plan Volume 1 (WMP-1), Basic Planning and Air Force Manual 10-401, Volume 2 should be included in command COOP plans.

AFI 10-208 explains that commands should apply a deliberate risk management process to determine which risks may be mitigated, accepted, or transferred and that each command must develop guidance for subordinate organizations. The Capabilities Review and Risk Assessment (CRRA) process and CONOPS Champions provide an opportunity to evaluate the health and risk of each required capability while establishing priorities among capabilities. Commands should apply the CRRA construct to identify the capabilities and controls necessary to ensure mission continuation and decrease mission risk as identified in the deliberative risk management process.

Headquarters Air Force, MAJCOMs, AFRC, and ANG element responsibilities include: incorporating and institutionalizing COOP concepts into relevant doctrine, policies, strategies, programs, budgets, training, exercising and evaluation methods; ensuring subordinate organizations, including NAFs, DRUs, and FOAs; developing and maintaining continuity plans that support the command's COOP plans and enhance Air Force–wide mission assurance; and developing a training, testing, and exercise program to evaluate the readiness of the continuity program and plans. This program should include the personnel, equipment, systems, processes, and procedures necessary to respond in a crisis; reflect guidance contained in AFPD 10-2, *Readiness*; AFPD 10-8, *Homeland Security*; AFPD 10-25, *Full-Spectrum Threat Response*; and other mission continuation and/or assurance documents. Supporting commands ensure their COOP programs and plans are consistent with their respective Unified Combatant Command plans, and if conflicts between the Unified Combatant Command plans impact the command's COOP plan, the Unified Combatant Command plan will take precedence.

Air Force Materiel Command Instruction 10-208, *Continuity of Operations Program*, July 6, 2010

This instruction implements portions of AFPD 10-2, *Readiness*, October 30, 2006 and AFPD 10-8, *Homeland Security*, February 7, 2008 and supplements AFI 10-208. It describes the policy and requirements for implementing DoD Directive 3020.26, *DCP*, January 9, 2009; DoD Instruction 3020.39, *Integrated Continuity Planning for Defense Intelligence*, September 12, 2008; and DoD Instruction 3020.42, *Defense Continuity Plan Development*, February 17, 2006. AFMCI 10-208 is applicable to Headquarters AFMC and its subordinate organizations, requiring they establish and maintain COOP programs and publish COOP plans.

Headquarters AFMC and all major subordinate organizations (that is, centers) must develop a COOP plan. Within each center and the Headquarters, directorates/wings will each prepare a Continuity Plan that details their MEFs and the necessary staff, equipment, and means to carry them out, complementing the Center/Headquarters COOP plan. Air base wing (ABW) Continuity Plans should not duplicate existing plans. AFMCI 10-208 goes on to note that COOP plans are facility-centric: organizations with more than one facility providing identified MEFs must address each facility in their plan; geographically separated units (GSUs) must each have separate plans. It describes continuity as a primary operational capability enabler and focuses on MEFs that support command customers at all levels and under all conditions, including other Air Force MAJCOMs and COCOMs and by SECDEF request or civil and humanitarian support requests. The instruction emphasizes planning for the events that are most likely to occur and degrade operations. AFMCI 10-208 stresses that COOP planning should be focused on mission continuity, the degree of interruption that can be tolerated, and that COOP actions should be prioritized in organizational contingency and crisis planning.

Air Force Instruction 10-401, *Air Force Operations Planning and Execution*, December 7, 2006

The purpose of AFI 10-401 is to provide an overview of the joint planning process and the interrelationships of the associated national-level systems that produce national security policy, military strategy, force and sustainment requirements, and plans. The four major interrelated systems affecting the development of joint operational plans are (1) the National Security Council System (NSCS); (2) the Joint Strategic Planning System (JSPS); (3) the Planning, Programming, Budgeting, and Execution (PPBE) Process; and (4) the Joint Operation Planning and Execution System (JOPES). This instruction provides very detailed planning guidance.

The logistics supplement to WMP-1 provides guidance for directing LSA as directed by Chairman of the Joint Chiefs of Staff Memorandum (CJCSM) 3122.03B and Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3110.03C, *Logistics Supplement to the Joint Strategic Capabilities Plan*. The LSA anticipates combat support challenges and resolves them before they become showstoppers. The LSA addresses the areas of materiel, infrastructure, logistics support forces, and lift in detail. It identifies deficiencies, assesses the risk or impact on operations and any known get-well dates or alternative solutions, and assigns a level of risk associated with the deficiency.

Only significant deficiencies requiring external assistance need addressing. Other Air Force providers of combat forces, resources, and capabilities also provide their assessment of sustainability to the A4. The entire intent of the LSA is to provide a broad assessment of the key combat logistics support and enabler capabilities required to execute the CCDR's planned operation.

It is the responsibility of functional capability managers and planners at all levels to analyze and review WMP-1 guidance for their respective functional capabilities. Functional capability managers will work closely with Air Staff to ensure compliance with guidance, resolve any contentious issues, and ensure the most effective management of forces.

COMAFFOR Senior Staff Course (CSSC). CSSC is a mentored seminar for Air Force colonels exercising executive responsibilities, recommending force application and movement, maintaining situational awareness, and developing responsive COAs and adaptive plans in C2 organizations above base level. COMAFFOR Special and A-Staff Directors are specifically targeted, as are Air Force colonels supporting COCOM staffs. In a seminar setting, senior officers examine critical COMAFFOR and COCOM situations and lessons learned through case studies and mentor interaction. AF/A4RC is the Air Staff CSSC sponsor.

For sustainment planning, AFMC/A4R validates all logistics planning factors developed by Air Force and other DoD organizations. Headquarters Air Force, Deputy Chief of Staff for Logistics, Installations, and Mission Support (AF/A4/7) reviews these planning factors to ensure they are consistent with policy guidance.

AFMC responsibilities are detailed with no mention of the Air Force Sustainment Center. The Chief, Logistics Readiness Division, Director of Logistics and Sustainment is the Air Force central manager for LSA development, validation, and dissemination of wartime resupply planning factors. This office provides planners with approved wartime resupply planning factors for determining logistics support strategic lift requirements based on force structure, the length of generation, and other scenario conditions.

Specifically, AFMC/A4R does the following:

- provides functional guidance relative to the use, development, computation, validation, and management of wartime resupply planning factors
- coordinates wartime resupply planning factor policy decisions
- keeps affected agencies informed of proposed planning factor program changes
- maintains liaison with the respective Air Force collateral managers of classes and subclasses of supply and other military services, as well as DoD agencies involved in the development and use of wartime resupply planning factors
- documents lessons learned and maintains audit trails on methods, rationale, and data sources used for the development of planning factors
- functions as the lead Air Force activity for updating wartime resupply planning factors
- validates all Air Force wartime resupply planning factors prior to their inclusion in the Logistics Factors File (LFF) in JOPES
- transmits sustainment planning data for the Air Force Class IX supply (less medical peculiar repair parts)
- develops new methods and automatic data processing system capabilities to improve data collection and computation of wartime resupply planning factors
- interacts with other military services, DoD organizations, Air Force MAJCOMs, and agencies for data exchange to support existing and improved methods for sustainment planning factor development
- acts as the focal point for developing the capability to link sustainment requirements with wholesale item asset availability
- verifies consumption factor updates to the JOPES LFF.

ACS sustainment planning is a crucial element of crisis action and contingency planning. The Air Force accomplishes this planning by means of an LSA. LSA is an analytical process used to predict ACS operational capability requirements, gaps, and priorities. The process and methodology support Defense Planning Guidance (DPG) and major theater OPLAN assessments, crisis action planning, and supplemental budgeting estimates. AFMC/A4R validates all logistics planning factors developed by Air Force and other DoD organizations. AF/A4/7 reviews these planning factors to ensure they are consistent with policy guidance, ACS CONOPS objectives, and CRRA scenarios and priorities. This assessment provides a broad assessment of key ACS support and enabler capabilities required to execute the DPG and the COCOM's plans. *As a general rule, the Air Force uses the supported component headquarters' directorate of logistics, or equivalent, as its agent for analysis.*

The LSA is accomplished in accordance with JSCP, CJCSI 3110.03C, and CJCSM 3122.03B. The LSA must be submitted to the supported commander for inclusion in the theater LSA for the OPLAN. Air Force supporting commands are also required to accomplish an LSA and submit results to the supported COMAFFOR. The LSA addresses the four pillars of ACS sustainability (materiel, infrastructure, expeditionary combat support (ECS) forces, and lift). It highlights deficiencies and their associated risk to supporting the warfighting air component.

Air Force Instruction 10-401, *Air Force Operations Planning and Execution,* December 7, 2006; Air Force Materiel Command Supplement, June 7, 2006 Incorporating Through Change 2, July 29, 2009, *Air Force Operations Planning and Execution*

This instruction embeds Headquarters AFMC–unique situations and aligns the command with AFI 10-401. It has a significant amount of inclusions and incorporates AFMC Guidance Memorandum 10-01-2008 for managing and conducting AEF processes and tasks. This annotation will only add applicable AFMC-unique inputs that are not written in the AFI version of this instruction.

In support of crisis action planning, this instruction identifies Headquarters AFMC Command Center (OPSO/A3XC) as the OPR for receipt and validation of higher headquarters' Planning and Execution Orders and Headquarters AFMC/A3X (Headquarters AFMC CAT/A3-Deployment Cell) as the Command OPR for receipt and action on the Joint Chiefs of Staff (JCS)-directed execution of OPLANs, CONPLANs, DEPORDs, and OPORDs. Headquarters AFMC/A3X will prepare and maintain procedures for operation of the Headquarters AFMC/A3-Deployment Cell.

In support of crisis action planning, all Headquarters AFMC A-Staff, Functional Directorates, Installations, DRUs, and GSUs will have primary and alternate POCs trained and proficient in contingency and crisis action planning for their function. Contingency and crisis action procedures must be periodically exercised during joint and unilateral command post exercises and field training exercises to ensure the required capability is available. AFMC participation in any exercise involving crisis action planning should be consistent with real-world processes.

Headquarters AFMC/A3X is the Command OPR for unified and specified command plans and reviews all plans for impact on AFMC. Further, the Installation Commander is responsible for ensuring their plans are reviewed on a regular basis. All plans and implementing procedures will be reviewed every 12 months. Each AFMC Commander must delineate, in detail, the actions to be performed by each organization involved in supporting emergency tasks for which he or she is responsible.

The AFMC Operational Plans Division (AFMC/A3X) is the focal point for coordinating all plans (whether produced by Headquarters AFMC or another AFMC entity) with other MAJCOMs. The AFMC Exercise Program (AFMC/A3X), in conjunction with the AFMC IG and other OPR functions in the MAJCOM, including exercise POCs for AFMC installations, centers, and GSUs/DRUs, will coordinate an annual process whereby all AFMC-scheduled exercises and AFMC-scheduled exercise-related activities (for example, readiness exercises, IG inspections involving events termed exercises, experiments, wargames, demonstrations [capabilities/technology/other] termed exercises) are—to the maximum extent practical—synchronized within the command and with the AEF battle rhythm. The overall process is detailed in AFMCI 10-204, *AFMC Exercise-Related Activities and Support*.

Air Force Instruction 10-404, *Base Support and Expeditionary Site Planning*, March 9, 2004

This instruction implements AFPD 10-4, *Operations Planning* and provides for the preparation of base support plans (BSPs), expeditionary site plans (ESPs), and the accomplishment of contingency site surveys across the spectrum of Air Force operations for deliberate and crisis action planning and execution. It describes what is needed to translate and integrate operational requirements into ACS and ECS at employment sites to create and sustain operations**.** This revision integrates the In-Garrison Expeditionary Site Plan (IGESP) and the Expeditionary Site Survey Process (ESSP) into the plan.

AFI 10-404 states the objectives of IGESP and ESP as determining capabilities and applying them to contingency operations. The ESSP is a subset of the overall expeditionary site planning process, which is the foundation for Air Force expeditionary operations. It provides the detailed information required by planners at all levels—strategic, operational, and tactical. All planners, whether they are developing the air campaign, the aircraft basing plan supporting the air campaign, or preparing to deploy a unit forward to execute the plan, require similar information to begin planning. Part I of IGESP and ESP identifies the resources and capabilities of a location by functional capability and is the focus of the expeditionary site survey. For contingency requirements, Part II of the plan allocates the resources identified in Part I, assesses the ability to support the operation, and identifies limiting factors (LIMFACs). IGESPs are primarily developed for locations with a permanent Air Force presence and are fully developed by the collaborative planning efforts of many functional experts with a deliberate planning time line. ESPs are chiefly associated with locations without a permanent Air Force presence and may contain only the minimum data necessary to make initial beddown decisions (quick reaction site survey information in Part I). ESPs may be developed within short time frames to meet contingency needs without full staffing or coordination.

Planners use the Logistician's Contingency Assessment Tools (LOGCAT), a suite of standard systems tools that enables automated, employment-driven, ACS planning. LOGCAT supports the expeditionary site planning process by accurately and rapidly identifying resources and combat support requirements at potential employment locations, providing beddown capability analysis and LIMFAC identification, and facilitating force tailoring decisions to reduce the overall deployment footprint. LOGCAT consists of three components that are mandated for use when they are available at all levels of command. The baseline planning data for IGESP/ESP development is (1) COCOMs and supporting OPLANS and CONPLANS, (2) TPFDDs including all-service data, (3) wartime aircraft activity reports (WAARs), (4) WRM authorization documents, and (5) contingency-in-place requirements. Planners and surveyors must be able to take advantage of the DoD Communications Network, the Global Command and Control System (GCCS), and the Global Combat Support System (GCSS) infrastructures.

AFI 10-404 could include two products to enable the planning process: (1) the Strategic Tool for the Analysis of Required Transportation (START) model and (2) FAM. START determines early-stage manpower and equipment deployment requirements. It is a preliminary requirements TPFDD generator that COCOMs could use to generate a list of required UTCs to support a user-specified operation. The UTC requirements are a function of rules (for example, the number and type of aircraft beddown, beddown conditions, and threat conditions). A fully developed version of this tool could enable the kind of quick planning processes early in the contingency planning cycle that could prove to be useful to the Air Force in both deliberate and crisis action planning. FAM computes aggregate demands and supplies a list of required UTCs. Demands for UTCs can come from TPFDDs, if available, or from other estimates of the forces required to execute a particular operation, and the UTCs come from the AEF Reporting Tool (ART). Given an input TPFDD (or other demand list) and an input ART file, FAM first identifies if the demand file contains any faulty UTCs. In the event that faulty UTCs are identified (that is, not green), subject matter experts can review ART and the commander's comment for UTCs to determine if a UTC could become fully operational according to the ART reporting standards or if the demand needs to be changed or deleted. FAM does not address sourcing decisions.

Air Force Instruction 21-102, *Depot Maintenance Management*, July 19, 1994

AFI 21-102 implements AFPD 21-1, *Managing Aerospace Equipment Maintenance*, and DoD Directive 4151.18, *Maintenance of Military Materiel*, August 12, 1992. It provides guidance and procedures for the management of Air Force depot maintenance activities. It directs AFMC to develop and maintain a depot maintenance support programming system for depot maintenance planning during peacetime, periods of increased tension, and emergencies. This instruction charges AFMC with the responsibility to

- develop the most responsive and economical mix of depot support for items acquired by the Air Force and to ensure the development and retention of a core capability during peacetime that can respond readily to the Air Force's wartime mobilization (surge) needs by maximizing the repair and supply of serviceable assets to forces engaged in combat or contingency actions.
- develop and maintain a surge CONPLAN. This plan contains guidance and procedures for a highly responsive capability to accelerate, surge, or compress depot level maintenance or modifications accomplished on mission-essential materiel.

AFMC Guidance and Policy for Material Surge and Plan 70, January 27, 2009 (Draft)

This policy will be used in conjunction with Air Force and AFMC policy and is developed in support of AFMC Plan 70. This plan provides a mechanism to request and obtain additional depot support/resources to meet increased peacetime and/or contingency requirements. Plan 70 outlines and defines the processes used to plan and manage the transition from peacetime materiel support levels to those required to maintain both contingency and wartime support levels. Materiel support may consist of any combination of commodities, engines, and/or aircraft. It satisfies AFI 21-102 requirements for AFMC to develop and maintain a surge CONPLAN, contains guidance and procedures for the Air Force Sustainment Center and ALCs to develop surge plans, and defines the process that the Sustainment Center and ALCs will use to plan and manage the transition from peacetime to contingency support levels. Notably, the ALCs should include procedures for surging exchangeable parts, both within and outside the Execution and Prioritization of Repair Support System (EXPRESS);

accelerating/compressing aircraft in depot maintenance, as required; and coordinating surge plans with other ALCs.

However, there is an absence of command direction outlining how the ALCs, centers, and directorates will plan for OPLAN and contingency planning and execution, exercises, experiments, and wargames.

Warner Robins Air Logistics Center (WR-ALC) and 638th Supply Chain Management Group, *Surge Contingency Plan 70*, December 2009

This plan provides policy and guidelines for the surge production of exchangeables, the acceleration/compression of aircraft during contingency situations, and acquisition surge/acceleration operations in support of contingency operations and AEF steady-state requirements. During any contingency, and for the duration of steady-state requirements, the ALC will ensure the highest depot-level production possible to meet the needs of operational forces and national objectives forwarded from the AFMC Crisis Action Team (CAT), which helps estimate contingency support activity and the possible implementation of surge. The CAT forwards orders from the JCS (which serve as key milestones in the contingency execution process and provide updated information on timing, taskings, etc.). The Strategic Planning Branch (WR-ALC/XPTS) maintains the WR-ALC Staff Control Center (SCC), which functions as a unit control center and reports to the Robins Installation Control Center (ICC), and maintains the WR-ALC Materiel Control Center (MCC). During surge, the MCC will function as the WR-ALC commander’s C2 hub for Wartime Materiel Support (WMS) issues; support surge operations, as presented in Annex C; and other portions of this plan, as tasked. Surge can be directed by the AFMC/CC, WR-ALC/CC, and/or the 638th Supply Chain Management Group (638 SCMG) Director in response to increased requirements due to a steady-state or wartime contingency.

Surge of exchangeable requirements in support of steady-state and contingency operations applies to stock-fund managed exchangeable items; some processes may also apply to items managed by other systems. This policy provides repair-cycle procedures for items controlled by the Depot Repair Enhancement Program (DREP) and the Contract Repair Process (CRP) and driven by EXPRESS. It also provides specific management procedures for the 638 SCMG, 330th Aircraft Sustainment Wing, 402nd Maintenance Wing, Financial Management Directorate (WR-ALC/FM), the materiel management (MM) and item management (IM) functions, and the production management functions within the Source of Repair (SOR) Groups. Included are instructions for the WR-ALC and 638 SCMG Exchangeable Surge POC, the Group/Squadron Exchangeable Surge

POC, the Exchangeable Surge Committee, and the DREP and CRP teams outlining specific responsibilities for functional capabilities and team personnel involved in the repair process. The DREP and CRP team processes include all WR-ALC and 638 SCMG Source of Supply (SOS) Groups, as well as the SOR, contracting, supply, preservation/packaging, and material movement functions for both EXPRESS and non-EXPRESS items. Exchangeable surge procedures are generally initiated by information contained in JCS orders indicating or directly requesting a need for increased production or expedited delivery.

Aircraft production surge is in response to a formal customer request. Aircraft acceleration/compression can be directed by the AFMC/CC or WR-ALC/CC. Surge is used by AFMC to accelerate production during depot maintenance when the owning commands require increased aircraft support. A surge in aircraft depot maintenance is accomplished through the acceleration or compression modes of production. AFMC depots will surge aircraft in response to customer requests after a cost analysis has been performed and funds have been made available. It is the responsibility of the owning command to identify any increased aircraft demands necessary to successfully complete contingency activity.

Accelerated acquisition of a new program is in response to specific wartime requirements. Acquisition surge is the acceleration of an ongoing program to meet wartime requirements.

Oklahoma City ALC (OC-ALC), *Surge Contingency Plan 70*, May 2009

This plan provides policy and guidance for planning and executing depot level maintenance surge activities in support of contingency operations and Air, Space, and Cyber Space Expeditionary Force steady-state requirements. It provides a mechanism for requesting and obtaining additional depot support/resources to meet increased peacetime and/or contingency requirements. The plan outlines and defines the processes used to plan and manage the transition from peacetime materiel support levels to those required to maintain both contingency and wartime support levels. Materiel support may consist of any combination of commodities, engines, and/or aircraft. The plan provides guidance for the planning and implementation of acquisition acceleration/surge to provide materiel support to contingency operations. *Accelerated acquisition* is a new program in response to specific wartime requirements. *Acquisition surge* is the acceleration of an ongoing program to meet wartime requirements. The plan also provides exchangeable surge policy and procedures to meet both EXPRESS and non–EXPRESS-driven exchangeable requirements in support of steady-state and contingency operations. Although this policy applies to stock-fund managed exchangeable items, processes for other items are also addressed.

This plan is developed in support of AFMC Plan 70. OC-ALC and 448 SCMW must provide logistics support to ensure customers have the capability to integrate and adapt operations that achieve strategic and tactical effects in a total joint force environment. Headquarters AFMC forwards contingency information and JCS orders (from the AFMC/CAT), which will assist in estimating contingency support requirements and implementing surge. The CAT coordinates contingency support operations throughout the command and acts as the single headquarters' focal point for incoming and outgoing contingency communications with higher headquarters, lateral contingency response staffs, and the AFMC center-level contingency staffs. The CAT acquires and disseminates key information that assists single managers in supporting the contingency. The 72 ABW ICC will receive/analyze/distribute information.

Ogden ALC (OO-ALC), *Depot Level Wartime Material Support Contingency Plan 70*, June 29, 2009

This plan directs acceleration and surge operations at OO-ALC in support of the Air Force, DoD, AFMC, and JCS OPLANs, including the acceleration or compression of aircraft in OO-ALC facilities for programmed depot maintenance or modification and acquisition acceleration in response to a contingency, emergency, or exercise. This document is effective for planning and implementation directed by the OO-ALC/CC or a higher authority. It provides guidance for the OO-ALC implementation of AFI 63-114, *Rapid Response Process* and Headquarters AFMC Plan 70, *Surge Contingency Plan*. It provides the OO-ALC commander with the flexibility to accelerate the fielding of critical systems and implement aircraft surge procedures to meet theater-specific wartime needs, including support of forces in conflict or crisis situations. In the event of acquisition acceleration or surge/compression operations, OO-ALC Plan 70 delineates responsibilities, lines of communication, and the actions to be taken to ensure continued readiness to rapidly provide the highest level of depot production and materiel support possible during any contingency situation, commensurate with operational force needs and national objectives. Upon request from a supported MAJCOM and/or direction from AFMC/A4 for surge, OO-ALC/CC executes Plan 70 as required. Air Force WMP-1 war planning assumptions apply.

Operational Lead Commands (Force Providers) are responsible for identifying the aircraft needed to meet contingency taskings. Commands are required to submit surge requests for aircraft to the respective system program director (SPD) and Headquarters AFMC. Prior to a request, early indications may come from JCS Warning or Planning

Orders. Based on these indications, the SPD should begin an assessment of the ability to support a surge. OO-ALC will respond to aircraft surge requests using acceleration or compression sustainment measures. The acquisition acceleration process is initiated when the SPD is notified of a critical need that cannot be met by existing fielded systems. Initial notification of a critical need may be provided formally or informally to the SPD by a supported MAJCOM or an acquisition authority.

The OO-ALC WMS tasking process may require the activation of a C2 element, which is a process of Hill Air Force Base Plan 8. The ICC, or portions of it, may be activated to respond to a WMS request depending on the scope of the support directed by the OO-ALC/CC or higher headquarters. OO-ALC may be the lead ALC to support a surge request or it may support a lateral surge requirement. WMS response options will take priority over OO-ALC peacetime efforts.

Exchangeable surge policy and procedures apply to Defense Working Capital Fund–managed exchangeable items, including items repaired under the DREP and CRP. Tasking orders will usually include some type of military activity/buildup at specified locations. Only the OO-ALC/CC, with authorization from Headquarters AFMC or JCS orders dictated by events, or upon request of the supply chain manager or SPD, has the authority to direct a surge. With this authorization, the depots may expend additional work forces (extended shifts, weekends, second and/or third shifts), reassign personnel to shops with the highest-priority workloads, increase shop capacity, procure additional materiel, and/or spend additional funds for contractor support to meet the increased contingency demands. The intent is to provide CCs with a variety of options for responding to a contingency.

Air Force Global Logistics Support Center, *Surge Contingency Plan 70*, May 26, 2010 (Draft)

This plan supports AFMC's Plan 70. It provides a mechanism to request and obtain additional depot support/resources to meet increased peacetime and/or contingency requirements. It outlines and defines the processes used to plan and manage the transition from peacetime materiel support levels to those required to maintain both contingency and wartime support levels. Materiel support may consist of any combination of commodities, engines, and/or aircraft. This is a very important document that addresses contingency operations but does not address OPLAN support planning. Suggested inputs include:

- Define how the 591st Supply Chain Management Group will perform proactive assessments to identify potential problem items at the beginning of contingency planning and add a requirement for Weapon Systems Management Information System and PC-Aircraft Sustainability Model (PC-ASM) assessments. Describe this analysis and participation with C-NAF staff in the formulation of CONPLANs or the evaluation of OPLANs.

- State that ALC OPLAN 70s should also address official OPLAN assessments and have a draft plan ready to meet OPLANs, if executed.
- Define and specify relationships with C-NAFs, the OSC ACS reachback cell, AF/A4/7, and AF/A3/5 to get priorities to input into EXPRESS.
- Specify how the Air Force Sustainment Center assists all the ALCs and state the authority of EXPRESS data to authorize the Sustainment Center to direct repairs at all the ALCs.
- Develop procedures for the critical item programs to follow in support of OPLAN LSAs.

AFMC/A8XW, *Wargaming Integration Office Charter*, March 2011 (Draft)

This charter states that the mission of the AFMC Wargaming Integration Office (AFMC/A8XI) is to provide command-level oversight of wargames and provide a process for utilizing wargame feedback to assist AFMC planning and programming. With the most recent changes in the planning and programming cycles, wargame results can provide valuable guidance to both the Air Force Strategic Planning System and Air Force Corporate Structure processes. Specifically for AFMC, the ACS Core Function Lead Integrator (CFLI) can utilize feedback in the planning process to influence the ACS Core Function Master Plan and POM. Wargame results can also influence and provide direction for AFMC's role in the remaining 11 service core functions and provide for additional impact (funding, doctrine, etc.) to assist or emphasize a particular capability or concept.

This charter defines the proposed AFMC/A8XI roles and responsibilities and identifies the major collaborators required for successful AFMC participation in Title X wargames. In addition, this charter describes the overall AFMC wargaming process and the planned way ahead for AFMC/A8XI. Two of the major focus areas of the office will be to ensure that wargaming results and feedback are integrated into the overall AFMC ACS planning and programming cycles and that the results and feedback are channeled back to the respective agencies for their internal influence, prioritization, and action.

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