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TECHNICAL REPORT

Combat Support Execution Planning and Control

An Assessment of Initial Implementations in Air Force Exercises

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Prepared for the United States Air Force

RAND PROJECT AIR FORCE

The research described in this report was sponsored by the United States Air Force under Contract F49642-01-C-0003. Further information may be obtained from the Strategic Planning Division, Directorate of Plans, Hq USAF.

Library of Congress Cataloging-in-Publication Data

Lynch, Kristin F.
Combat support execution planning and control : an assessment of initial implementations in Air Force exercises / Kristin F. Lynch, William A. Williams.
p. cm.
Includes bibliographical references.
ISBN 978-0-8330-3996-5 (pbk. : alk. paper)
1. Command and control systems—United States. 2. United States. Air Force—Maneuvers. 3. Military planning—United States. I. Williams, William Appleman. II. Title.

UB212.L96 2009
358.4'133041—dc22

2009003509

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Published 2009 by the RAND Corporation
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Summary

In response to the CSC2 issues discovered during operations in Serbia in 1999, the Deputy Chief of Staff for Installations and Logistics (AF/IL) asked RAND PAF to study the current ("AS-IS") operational architecture and develop a future ("TO-BE") CSC2 operational architecture (Leftwich et al., 2002). PAF researchers documented current processes, identified areas in need of change, and developed processes for a well-defined, closed-loop TO-BE CSC2 operational architecture that incorporated the lessons learned during JTF Noble Anvil and Operation Enduring Freedom, which AF/IL directed for implementation.

The TO-BE operational architecture envisions enabling the ACS community to

- quickly estimate combat support requirements for force package options needed to achieve desired operational effects and assess the feasibility of operational and support plans
- quickly determine beddown capabilities, facilitate rapid time-phased force and deployment data (TPFDD) development, and configure a distribution network to meet employment time lines and resupply needs
- facilitate execution resupply planning and performance monitoring
- determine the effects of allocating scarce resources to various combatant commanders
- indicate when combat support performance deviates from the desired state and implement replanning and/or "get-well" planning analysis (Leftwich et al., 2002)
- provide decisionmakers with an Air Force–wide view of combat support resources available for joint employment operations.

The TO-BE architecture outlines changes in three key organizations: the Commander of Air Force forces' (COMAFFOR's) operations support center, commodity control points, and the Air Force Combat Support Center. It also affects operations occurring in the Falconer Air and Space Operations Center (AOC) weapon system and must work within the greater joint C2 environment.[1]

Two exercises provided opportunities to observe aspects of the TO-BE operational architecture currently in use in important CSC2 nodes in an operational environment: Terminal Fury 2004 (TF04) and Austere Challenge 2004 (AC04). A RAND team, aided by Air Force

[1] A Falconer AOC is one attached to a Combat Air Force warfighting headquarters and serves the COMAFFOR. The other type of AOC is a functional AOC, such as the Tanker Airlift Control Center, which is part of 18AF and collocated with the AMC staff. Generally, the term *AOC*, as used in this report, refers to the Falconer AOC weapon system.

personnel (see Appendix C for a list of the assessment team members), participated in TF04 and all three phases of AC04 to make these evaluations. The assessment teams used the operational environment created by TF04 and AC04 to observe CSC2 processes under stress.

The exercises offered opportunities to examine the extent to which an agile combat support–enabled (ACS-enabled) C2 structure can relate ACS actions to warfighter combat capability. Operational time lines have been collapsed to the point that the position and posture of combat support forces are key to delivery of desired combat power. As a consequence, combat support functional areas must work in an integrated fashion across C2 nodes, providing predictions of ACS needs and rapid ACS responses to dynamic operational needs.

In addition to the on-site assessment teams, PAF and Air Force participants gathered a group of strategic partners to review ACS activity daily, via teleconference. These partners represented the broader Air Force combat support community. They included personnel in theater and CONUS major commands, as well as personnel from Headquarters Air Force and support organizations. The group reviewed daily exercise activity and extrapolated off-site activity that would occur in the broader group of CSC2 nodes to support the warfighter combat force deployed within the context of the exercise. In this way, other Air Force nodes could participate in combat support activities that were not part of the overall exercise play. This capability complemented the aim of the research, which was to gain knowledge of the current ACS and operational-level C2 state-of-play and posture and to make observations regarding CSC2 resource and process strategy.

The aim of this research was to evaluate the progress the Air Force has made in implementing the TO-BE operational architecture and to identify areas that need additional improvements. Assessment team members were embedded during each exercise to observe CSC2 processes, such as the allocation of scarce resources, and to explore the integration of combat support systems and processes. Exercise limitations did not allow us to assess the closed-loop aspect of the CSC2 process, in which performance metrics and lessons learned lead to replanning of support.[2]

The exercises did point out areas where implementation of the TO-BE architecture is likely to produce major productivity gains and enhanced decisionmaking information as the Air Force continues to implement the architecture. Monitoring CSC2 processes, the assessment teams made observations in the following areas:

- implementation of proposed CSC2 organizations
  - organizational structure at various C2 nodes (between and within nodes)
  - AOC staffing and organization
- use of existing collaborative information systems and products
  - a common operating picture
  - exploiting technology
- efforts in training and education.

Table S.1 lists the assessment criteria used in each of the three areas.

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[2] The exercise did not last long enough to require replanning of support.

Table S.1
Areas of Assessment and Assessment Criteria

Assessment Area	Criteria
Organizational structure	Who communicated with whom
	Method of communication
Systems and technology	Manual or electronic
	Common system or task-specific
Training and education	Method of training
	Amount of training

Agile CSC2 requires a support system that integrates combat support stovepipes and relates how options for providing support influence operational effects. ACS activity is an enabling function that shapes the combat power available to the joint force air component commander and the joint force commander at any given time. The ACS system postures forces for employment. Therefore, combat and supporting force commanders need an integrated C2 system to extend authority over forces used to achieve desired effects.

Exercise play was mined for situations in which the AS-IS operational architecture would be stressed. This provided the opportunity for the assessment team to look across nodes and within nodes (when assessment team members were available) to understand how ACS-engaged personnel processed exercise information to overcome problems and still achieve the desired combat effects. Particular attention was paid to how information was fed into operational-level CSC2 systems and shared across nodes. Discussions were initiated among the assessment team and with the strategic partners to improve understanding of how TO-BE processes, systems, and training would affect exercise play if fielded and in effect.

Terminal Fury 2004

In TF04, a PACOM-planned operational environment, force basing, logistics readiness, and force sustainment capabilities were critical factors of the joint force commander's ability to provide timely and sufficient force capability. To fulfill the TO-BE operational architecture, the ACS deliberate planning process should be fully integrated with the operational community's effort and harmonized with joint logistics planning processes. The operational architecture could facilitate the rapid creation of alternative courses of action that reflect needed capabilities and available forces for employment. Combat support planning tools, aimed at determining alternatives, could help make the support consequences of each course of action more visible to AOC planners, warfighting staff, and the joint force commanders they serve. An analytic CSC2 capability could help place these factors in an operational context. Identifying the potential constraints (such as host-nation infrastructure, alternative basing logistics time lines, force protection, and other joint force considerations) builds knowledge over the critical factors leading to building and fielding the desired capability. This could also shift the key informa-

tion away from arrival of individual force components to the creation of actual combat capability and could help build command knowledge about what key factors are necessary to creating that capability. Enabled by the CSC2 TO-BE architecture, force arrival in theater would not be as important as when a specific capability becomes available for employment.

As a consequence of closer integration with operational planners in the A-3, A-5, and in the associated AOC, A-4, A-6, A-7, and other ACS functional elements may need to invest in the collaborative planning tools that are used in operational planning and execution.[3] Moving to a future force-planning environment means integrating ACS information systems and products. Once integrated, the information will help enable war-fighter decisions, gaining precision in force deployment and sustainment activity and helping shape the combat power available to the joint force commander.

During TF04, the limited first-generation collaborative planning tools (such as Information Workspace and Collaboration at Sea) that the operations cells forward (afloat) and in the rear used in the AOC may have helped reduce the time needed to work the problem. In moving from the AS-IS to the TO-BE CSC2 system, joint collaborative tools should be procured and widely distributed among all Air Force CSC2 nodes. CSC2 reporting systems should fully integrate with joint systems and incorporate inventory reporting systems with embedded machine-to-machine connections that will not only allow data owners to monitor and validate their data but, when tied to an information grid, will also allow increasingly accurate, commonly shared, and timely information flows to the force capability providers working directly with operational commanders. Personnel need to be trained in their use and educated about what the collaborative environment can provide. Collaborative tools and a shared data-entry system could have freed functional managers from compiling inventory reports on manual spreadsheets, improving their ability to monitor and direct the sustainment of forces flowing into the joint operating area. As base loading became critical during the second phase of operations, they would have a better knowledge base on which to project potential shortfalls and could have adjusted base force loads to sustain the needed warfighting capabilities better. The AS-IS system demands that these functional managers spend their time maintaining the data system. The TO-BE system will place a demand on their professional capabilities.

Austere Challenge 2004

In the AC04 operational environment, force basing, logistics readiness, and force sustainment capabilities were spread among AOC-like C2 and staff elements at several levels, including Combat Air Forces, Mobility Air Forces, and the deep strategic support capability vested in Air Force Materiel Command (AFMC), and among other organizations supporting the warfighting commands. However, most of this Air Force strategic support was outside the training audience. The exercise was aimed at testing the connection between the JTF air component in the forward area and the major command staff supporting and shaping the combat forces.

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[3] For example, the necessary CSC2 systems and processes should be incorporated into the Falconer AOC and listed as appropriate in weapon system documentation, such as the Falconer AOC's *Flight Manual* (Falconer AOC, 2002).

The exercise was also being used by the USAFE Commander to validate a notional warfighting headquarters structure (the Air Force component for Europe [Air Forces Europe—AFEUR]) operating within a JTF.

The roles, missions, duties, and responsibilities of each of the C2 nodes were fairly well defined. Data collection and reporting and determining which information and which nodes were authoritative at both the tactical and theater levels caused some issues. Our observations found that physical location, on-site and face-to-face interaction are valued when the situation is less defined or when communications nodes are less robust.

Theater nodes that exercise control functions quickly adapted the structure for delivering their exercise products. The structure supported the operational context and the desire to share information files across nodes. The only cost was in the intellectual capital and keyboard man-hours used to create, structure, and maintain the workspace. This was an example of what can be accomplished given the current AS-IS architecture.

An investment should be made in CSC2 education to help define the desired work process, systems, and infrastructure requirements. Increased emphasis on obtaining and using collaborative tools would increase efficiencies and effectiveness until future network-centric solutions are developed.

Summary Observations

Monitoring CSC2 processes, such as how combat support requirements for force package options needed to achieve desired operational effects were developed, the assessment teams made observations in three areas: organizational structure, systems and tools, and training and education. While the research presented here took place in 2004, a number of our findings are still relevant today. The following is a summary of the observations the assessment teams made during their 2004 exercise experiences.

Organizational Structure

Differing organizational constructs exist today. Some of these may be fine-tuned for different operational environments. As long as the roles and responsibilities are well defined, the organizational structure should not have a large effect:

- Air Force CSC2 nodes should fully understand their roles and authority when working with warfighting headquarters.
- Warfighting headquarters should learn—through common practice—the value of Air Force service-led support.
- All organizations should share information with appropriate CSC2 nodes.
- Within the theater, each organizational node should understand and execute its responsibilities within the tasked operational authority. (Theaterwide capability must work to enable CSC2 capabilities assigned to a JTC with specific joint tasks to perform.)

- We suggest that a logistics component be matrixed across AOC divisions to provide combat support expertise and eliminate a parallel C2 structure in the warfighting headquarters staff.

C2 Systems Integration and Decision-Support Tools

A common information management architecture could be defined so that each node is working from common information:

- An information management plan could be developed for managing the common system architecture so that a common operating picture can be developed.
- ACS systems and processes should be integrated to operational systems at the data level.

Technology should be exploited to allow sharing of information through Web-based tools, Really Simple Syndication (RSS)–enabled data and text streams, and automatic data builds for decisionmaker viewing (instead of building slides). Using technology to share common data should allow more time for "what if" analysis and resource allocation, and less time will be spent generating Microsoft PowerPoint slides.

Training and Education

Exercises should be designed to engage all nodes in the ACS arena:

- Provide an opportunity to work across nodes in a collaborative environment.
- Construct Blue Flag exercises to engage ACS personnel.
- Develop a strategy to involve key CONUS CSC2 nodes in theater C2 exercises.
- Continue to manage functional career areas to acquire the deep knowledge necessary to perform with the precision needed in fielding and sustaining combat forces.
  - Develop an appreciation for operational risk as it applies to providing forces.
  - Develop fluency with modeling and simulation of ACS activity to better influence operational outcomes to meet desired effects during force structure beddown and planning.
- Build the means for building knowledge of best practices across ACS for the entire Air Force.
- Teach ACS critical thinking and problem-solving in an operational environment.

Invest in the education of personnel who understand ACS functional areas, but learn how to best leverage technology and TO-BE information management processes.