
SUMMARY

The United States continues to invest in military capabilities to conduct unilateral operations if national interest so demands. At the same time, top-level national security and national military guidance and the preferences of top-level political and military decisionmakers increasingly require the U.S. military to participate in coalition operations. In some cases, coalition support is required for the United States to conduct successful military operations, and in most coalition operations the United States desires to share the burden. U.S. allies are also interested in coalitions because such operations provide them and with increased security and the opportunity to participate in military operations that the allies could not undertake unilaterally.

A key element in coalitions is interoperability. It enables allied support for coalition operations and can increase the effectiveness and efficiency of U.S. and allied forces in such operations. However, because a predominantly technical treatment of interoperability cannot cover certain strategic and operational implications, the research described in this report uses a broad definition that is common to the U.S. Department of Defense and to NATO:

Interoperability. The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces, and to use the services so exchanged to enable them to operate effectively together.¹

¹See *Joint Staff* (1999).

RESEARCH OBJECTIVE

The objective of this research is to help the U.S. Air Force identify potential interoperability problems that may arise in coalition air operations of the United States and NATO allies over the next decade, and to suggest nonmateriel and technology-based solution directions to address identified challenges. The focus of the research is on command, control, communications, intelligence, surveillance, and reconnaissance (C3ISR) systems in out-of-NATO-area operations. For purposes of this study, we use a broader definition of “out-of-NATO-area” (or “out-of-area”) operations. Our definition includes NATO Alliance operations and non-NATO coalition operations in which the United States and other NATO allies participate and that occur outside or on the periphery of Alliance members’ territory. Although the authors recognize that interoperability problems remain in joint-service operations and are worthy of research, such problems are beyond the scope of the effort documented here.

STUDY APPROACH

To better understand interoperability and its multiple dimensions, we conducted literature reviews, had discussions with subject matter experts, and surveyed 40 recent coalition operations (one of which was a NATO Alliance out-of-area operation). To identify interoperability challenges that the United States and its NATO allies’ air forces will need to address over the next decade, we examined new technology, security, and military trends as reflected in top-level DoD guidance and visions of future military operations.

Next we identified and conducted case studies of key ongoing U.S. and allied programs that have major implications for future interoperability. To better understand the military value of these programs, we examined them in the context of conducting representative military missions. In parallel, we examined the economic and political implications of interoperability for the selected programs to determine those approaches that offer the best opportunity to address interoperability issues.

Based on these findings, we developed suggested solution directions, both nonmateriel and technology-based, to address identified interoperability challenges.

OBSERVATIONS

Recent Operations

Our review of recent coalition operations indicates that interoperability has multiple and complex dimensions—political and economic as well as military—that may manifest themselves at strategic, operational, tactical, and technological levels. Further, interoperability problems are not isolated by level. Strategic-level interoperability problems can have operational and tactical implications, and technological interoperability problems may reverberate in the opposite direction. For example, the political and economic goals of individual nations to support national industries can lead to the development of air power systems (e.g., fighters, weapons, airborne surveillance and control assets) that have substantially different capabilities and that require extensive work-arounds to be employed in coalition operations. Similarly, the lack of interoperable communications and combat identification systems and procedures could result in the attrition of coalition aircraft to enemy defenses or fratricide that causes the partner to leave the coalition. Interoperability issues should be considered in the context of each of these levels.

Political support, access to allied infrastructures and airspace, landing rights, and forward basing are essential to bringing U.S. air power to bear effectively. Specifically, allied support for and actual participation in coalitions help U.S. decisionmakers garner and maintain the public support necessary to conduct military operations in regions of the world that are of national interest (e.g., Southwest Asia [SWA] and the Balkans). Moreover, as seen, for example, in Operation Allied Force, access to allied air space and the availability of infrastructure in close proximity to areas of operations can minimize flight time to air patrol stations and targets while providing flexibility to conduct attack operations from more than one approach azimuth.

These factors may be overlooked if the potential contributions of individual allies are measured solely in terms of the number of aircraft made available or sorties flown in specific operations. Although it is true that in recent SWA operations (e.g., Desert Storm, Desert Fox) the United States provided the preponderance of air

missions, in some Balkan coalition operations—particularly those not involving precision strike operations (e.g., air surveillance, air space control, and no-fly-zone enforcement)—allies provided more than half of the aircraft and missions flown. Further, it is important to recognize that providing the preponderance of air assets to coalition operations helped the United States rationalize its smaller ground force contributions in Bosnia and Kosovo operations.

Notwithstanding the above, allied contributions to recent strike operations in the Balkans have been limited because the allies lack sufficient precision-guided weapons (PGWs) that can be delivered day or night in any weather conditions. A number of U.S. allies are developing plans to expand their holdings of PGWs, including those that use the Global Positioning System (GPS). These plans need to be implemented because future crises may require the use of PGWs to minimize casualties and collateral damage as well as standoff weapons to minimize the risk of attrition of coalition aircraft to more sophisticated enemy air defenses.

Another future concern lies in the allies' limited capabilities (e.g., force readiness, airlift) to rapidly deploy forces to out-of-area operations. The allies have made great strides in their ability to deploy and support operations outside their borders to the periphery of Europe, but more improvement is needed to rapidly deploy combat forces to non-European theaters. Without improvements to existing capabilities, the combat value of allied air forces is likely to decrease.

Recognizing that these and other shortfalls exist among its members, NATO endorsed the Defence Capabilities Initiative in April 1999 to meet the challenges of the present and foreseeable security environment. The most important areas NATO identified for improvement were the deployability and mobility of Alliance forces, their sustainability and logistics, their survivability and effective engagement capability, and the necessary command and control and information systems. These improvements are needed not only for future NATO air operations but also for other likely coalition air operations.

Case Studies

The case studies examined suggest that the following areas offer the best leverage for achieving acceptable levels of interoperability in future coalition operations: (1) a common or harmonized doctrine for the planning, execution, execution monitoring, and assessment of combined joint task force operations, especially air campaigns; (2) compatible or adaptable concepts of operations and procedures for airborne surveillance and control in support of air-to-air and air-to-ground missions; (3) common information-sharing standards and compatible tactical communication systems; and (4) expert personnel who understand the capabilities of coalition partners and who hone their expertise in combined operations and exercises.

Efforts to enhance interoperability solely through common or fully interoperable systems at the technological level are likely to be limited by political, economic, and security factors, particularly the desire to support national industries, equitable burden sharing, and ensuring that the most advanced military capabilities are not compromised. From a technology and cost perspective, selected C3ISR initiatives appear to offer the best opportunities for interoperability enhancements.

SUGGESTED ACTIONS

Our suggested actions fall into two categories: those that the U.S. Air Force can take only in collaboration with other stakeholders and those for which the Air Force has purview to take direct action. Whereas the United States is developing capabilities to conduct unilateral operations if national interest demands, most NATO allies are developing their capabilities to conduct operations in the context of NATO concepts, processes, and systems. Thus, the suggested actions also consider relevant NATO-wide developments.

Collaborative Actions

In collaboration with the DoD, other U.S. services, and NATO allies, the U.S. Air Force should

- Help NATO develop the Combined Joint Task Force (CJTF) concept of operations (CONOPS), associated processes, expert personnel, systems, and information-sharing protocols for out-of-area operations. In particular, the Air Force should ensure that the key doctrinal concept of centralized control and decentralized execution, which is inherent in U.S. joint-service air CONOPS, is institutionalized in the NATO CJTF concept.
- Help NATO define the desired level of information sharing and interoperability between planned U.S. and NATO force-level planning and execution-monitoring capabilities (organizations, procedures, personnel, and systems).² At a minimum, a set of common messaging standards for information exchange should be defined for the U.S. Air Force's Theater Battle Management Core System (TBMCS) and NATO's Interim Combined Air Operations Center (CAOC) Capability as well as for TBMCS and NATO's Air Command and Control System.
- Help NATO develop a coherent space policy and information-sharing protocols that provide sufficient information to conduct key operations while protecting sensitive equities. In some cases, bilateral agreements with selected NATO allies may be appropriate.
- Continue to foster the interoperability of Airborne Warning and Control System (AWACS) assets and standard air early warning and control procedures, especially those needed in the presence of friendly and enemy stealth aircraft. The focus should be on ensuring that NATO, U.K., French, and U.S. AWACS modernization programs are synchronized.
- Develop the process and capabilities to receive and exploit ground surveillance information from the different airborne ground moving-target indication (GMTI) sensors that NATO members are developing. Support advanced concept demonstrations to determine the value of this capability and help select

²We focus on interoperability between U.S. and NATO capabilities because only a few NATO countries have extensive national air command and control capabilities: not only do most NATO allies rely on NATO-wide capabilities, they rationalize their spending by investing in such capabilities.

the most appropriate means to achieve it, including development of common GMTI data formats.³

- Ensure that the Multifunctional Information Distribution System (MIDS) engineering and manufacturing development program is successfully completed and that the functional interoperability inherent in MIDS terminals is maintained through the production phase and then applied to future fighter data links.
- Continue to share fighter and weapon systems information to ensure adequate common understanding of individual coalition partners' air capabilities (technology, personnel, operations). In parallel, continue to develop operating protocols that permit the use of allied air assets in coalition operations and expand training exercises to emphasize out-of-area operations. Be prepared to employ workarounds.
- Encourage NATO allies' acquisition of advanced precision weapons and standoff weapons. Low-cost GPS-guided weapons are particularly promising. Although they are expensive, standoff weapons ensure platform survivability in a high-threat environment, and standoff antiarmor weapons enable more effective participation in the halt phase of a campaign.
- Increase opportunities for combined experiments and advanced technology demonstrations.
- Support the above suggested actions by actively participating in NATO's Defence Capabilities Initiative.

Direct Actions

In parallel with the preceding collaborative efforts, the U.S. Air Force should consider taking the following direct actions:

- Leverage its expertise and capabilities in planning and executing air and space operations in power projection missions by manning key positions in the emerging deployable and key static CAOCs to reinforce the principle of centralized control and

³These are appropriate actions given the uncertainties of the NATO Alliance Ground Surveillance program.

decentralized execution. Further, it should develop and maintain a cadre of experts who can provide support to higher NATO headquarters (if needed) to help develop air campaign plans and assist in execution monitoring and assessment.

- Explore opportunities to gain better visibility into the Western European Union Satellite Centre to determine if and how Centre assets might help satisfy some of the information needs in future NATO operations.
- Ensure that the AWACS Radar System Improvement Program (RSIP) continues to be adequately funded and that appropriate NATO RSIP employment lessons learned are incorporated in future early warning and air control doctrine and tactics.
- Support advanced concept technology demonstration of multiple GMTI sensor data reception and exploitation capabilities in joint expeditionary force experiments.
- Strengthen Air Force visibility and management oversight in the MIDS production-phase program to ensure that MIDS terminals are delivered as needed to U.S. fighter modernization programs, within budget constraints.

IN SHORT

The United States and the U.S. Air Force can influence its NATO allies up to a point, recognizing that self-interest will remain paramount. At the strategic level, the allies do not put high-intensity conflict at the centerpiece of their planning. They do not see a superpower threat to NATO arising or any serious military threat to their well-being. Hence, their strategic focus is on peace operations and crisis response. The result is proportionately lower investment relative to the United States in developing and acquiring advanced military systems such as stealth aircraft and all-weather PGWs.

This suggests that efforts to develop nonsystem solutions are likely to be more successful in improving the interoperability of U.S. and allied air forces. Offering the most promise are the development of agreed-upon information-sharing protocols and means; force and tactical employment concepts, processes, and procedures (e.g., development, dissemination, and execution of air tasking order); and

expert personnel capable of instituting workarounds for interoperability problems that will continue to arise in operational and tactical levels of coalition operations.

Because of their much lower relative cost and greater flexibility in application, technological solutions to interoperability that are based on C3ISR elements appear more feasible than attempts to achieve interoperability through the acquisition of common major weapon systems (such as high-performance aircraft). Among the most promising are interoperable airborne surveillance and control capabilities and tactical data communications systems to support air-to-air and air-to-ground operations.