

STUDY OBJECTIVE AND SCOPE

The objective of this research is twofold: (1) to help the U.S. Air Force identify potential interoperability problems that may arise in coalition air operations of the United States and other willing NATO allies over the next decade,¹ and (2) to suggest solution directions to mitigate those problems. The research develops both nonmateriel and technology solutions to address identified shortfalls, taking into consideration force structure elements, doctrine and tactics, and interoperability workarounds.

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 territory.

¹Although the authors recognize that interoperability problems remain in joint-service operations and are worthy of research, they are beyond the scope of the effort documented here.

BACKGROUND

The United States continues to invest in military capabilities to conduct unilateral operations. 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.

Interoperability is a key element in coalitions because it enables allied support for coalition operations and offers the opportunity to increase the effectiveness and efficiency of U.S. and allied forces in such operations. Achieving these potential benefits, however, is not a trivial matter. Interoperability problems among coalition air forces may arise for a variety of reasons beyond the usual technical problems encountered, for example, in radio communications. Differences may exist in the speed at which coalition air forces can plan operations or can deploy to areas where there are mutual interests to protect. For example, the U.S. Air Force is reorganizing itself to be more expeditionary and to be able to deliver bombs on target within 48 hours of receiving the order to deploy from the continental United States (CONUS). Also, there may be differences in doctrine or employment concepts. For example, U.S. allies may not place the same emphasis that the United States places on speedy deployment, precision strike, or the halt phase of a major theater war (MTW). These doctrinal and operational differences can be compounded by technical differences among forces.

The planned modernization of the U.S. Air Force's fighter and bomber force will render that force both far more stealthy and capable of precise delivery of weapons from standoff ranges against a spectrum of targets. In parallel, the U.S. Air Force, in collaborative efforts with other services, the Department of Defense (DoD), and other government organizations, is upgrading its C3ISR capabilities to support a modernized fighter and bomber force. U.S. allies are not likely to follow suit to the same extent. This divergence in capabilities between the United States and its allies is becoming more apparent and must be properly managed to ensure that the potential benefits of coalition operations are realized.

STUDY APPROACH

We began the study by discussing the many definitions of interoperability and underscoring its inherent multiple dimensions and complex relationships. Based on literature reviews, discussions with subject matter experts, and several of the authors' direct encounters with interoperability issues in coalition operations, we highlighted its importance in the evolving context of new security, budgetary, and programmatic issues.

We continued with a review of recent coalition operations to better understand the dimensions, issues, and value of interoperability. Analyses and documented lessons learned from 40 recent operations involving U.S. and NATO allies' air forces, together with discussions with subject matter experts, form the basis for this step of our research. The results of these efforts, and our examination of new technology, security, and military trends as reflected in top-level DoD guidance and visions of future military operations, were used to identify interoperability challenges that U.S. and NATO allies' air forces will need to address over the next decade.

Next, we identified and conducted case studies of key ongoing U.S. and allied programs with important implications for future interoperability. The case studies encompass five major elements necessary to conduct air operations: (1) concepts (doctrine, processes, systems, and personnel) for force level command and control (C2), assessment, planning, and execution; (2) information-sharing practices and systems; (3) airborne surveillance and control for air-to-air and air-to-ground operations; (4) tactical digital data communications; and (5) weapon systems. The case studies included an examination of economic and political implications to determine approaches that offer the best opportunity to address interoperability issues.

To cover this broad range of elements within the resources of this study, we focused on selected programs of direct interest to the Air Force. Note that our examination addressed interoperability issues and not whether the specific program or programs examined provide the optimal solution for conducting particular functions of air operations.

To better understand their military value, we examined these selected programs in the context of conducting representative military missions. Mission-level and campaign-level analyses were used to assess the value of interoperability.

Based on these findings, we developed suggested solution directions to address identified interoperability challenges. We subdivided the solution directions into two categories: (1) those that need to be done in collaboration with other major stakeholders, and (2) those for which the U.S. Air Force can choose to take direct action.

STRUCTURE OF THE REPORT

In Chapter Two, we discuss definitions of interoperability and underscore its inherent multiple dimensions and complex relationships. In Chapter Three, we summarize our review of recent coalition operations. In Chapter Four, we identify interoperability challenges that U.S. and NATO allies' air forces will need to address over the next decade. These three chapters also provide the context for the case studies discussed in the next six chapters.

Chapters Five through Ten provide case studies and suggested actions that the U.S. Air Force can take to realize short- and medium-term improvements in the interoperability of U.S. and NATO allies' air forces. The case study in Chapter Five examines air command and control in the context of the recent NATO reorganization and its expansion from Article 5 defense of NATO territory to a more power projection-oriented C2 structure to support out-of-area operations. We focus on interoperability between U.S. and NATO capabilities because only a few NATO countries have extensive national air command and control capabilities.

The case study on space development (Chapter Six) highlights potential cooperation or competition between U.S. space programs that were vital in past coalitions and Europe's growing desire to increase its space capabilities and hence lessen its dependence on U.S. assets in future military operations.

Chapters Seven and Eight look at case studies of airborne surveillance and control platforms. Air surveillance and control capability—based on U.S., NATO, U.K., and French Airborne

Warning and Control System (AWACS) programs—is viewed as a major interoperability success. By contrast, ground surveillance and control—based on the Joint Surveillance [and] Target Radar System (JSTARS), NATO’s Alliance Ground Surveillance concept, and U.K., French, and Italian programs—remains an interoperability challenge.

Chapter Nine examines the use of tactical data links, in particular Link 16, for achieving interoperability among U.S. and NATO allies’ fighters. The case study focuses on a near-term fighter data link program, the Multifunctional Information Distribution System (MIDS), a cooperative program between five NATO nations and the United States to develop a low-cost Link 16 terminal. The MIDS case study highlights the programmatic complexities of international cooperative initiatives.

Chapter Ten examines the interoperability among U.S. and NATO allies’ fighters and weapon systems. With the development of multinational European fighter aircraft, future coalition operations will be characterized by less commonality between U.S. and NATO allies’ fighter forces, which could create interoperability challenges for force planners. Limited development and procurement of precision-guided weapons (PGWs) by U.S. NATO allies create additional challenges.

In Chapter Eleven, we illustrate the military value of interoperability. We analyze air surveillance during peacekeeping operations, force protection against conventional aircraft and cruise missiles using defensive counterair (DCA) capabilities, and interdiction of moving columns of armor during the halt phase of an MTW. For each of these missions, we describe the operational concept, identify the system capabilities of the NATO ally participants, and highlight actual and potential contributions of allied forces in coalition operations with the United States.

In Chapter Twelve, we summarize our observations and present suggested actions to improve interoperability of U.S. and NATO allies’ air forces.

Appendix A provides a brief summary of our analyses of 40 recent coalition operations involving U.S. and NATO allies’ air forces. This is background material for the discussions presented in Chapters

Three through Ten. A separate report presents in more detail our analysis of recent operations.²

Appendix B briefly describes the four new operational concepts presented in *Joint Vision 2010* as background material for Chapter Four.³

Appendix C provides details of the MIDS case study presented in Chapter Nine.

Appendix D summarizes our analysis of the deployment of additional U.S. Air Force fighter forces to theater to augment in-place fighter forces. In the scenario analyzed, the forces are being used to interdict moving armor columns as part of a halt-the-invasion operation. We consider two cases: in one the U.S. deployment is fully supported by NATO allies; in the other there is no support from NATO allies. The results are used as inputs to the halt analysis presented in Chapter Eleven.

²See Larson et al. (1999).

³See Chairman of the Joint Chiefs of Staff (1996).