Chapter Two

ANALYSIS APPROACH

The objective of our research is to develop a set of concepts and a draft CS execution planning and control operational architecture that can support the Air Force of the future. The research should provide a solid foundation for the Air Force to use in developing and refining its overarching C2 operational architecture. The approach we used is shown in Figure 2.1.

The first step was to define the expected CS execution planning and control functionality. Our starting point was the operational needs of the Aerospace Expeditionary Force and lessons from recent contingencies. To this initial set of requirements, we incorporated extensive input from discussions with subject matter experts and site visits to over 20 Air Force and joint-service organizations (see Appendix A). We also included insights from previous studies, such as U.S. Joint Forces Command's *Focused Logistics: Enabling Early Decisive Operations*.[1]

We also documented the current *AS-IS* CS operational architecture by reviewing Air Force and joint-service doctrine, manuals, instructions, and concepts of operations (CONOPs); and describing processes and organizational responsibilities derived from the expert interviews, analyses of lessons learned from the AWOS, recent

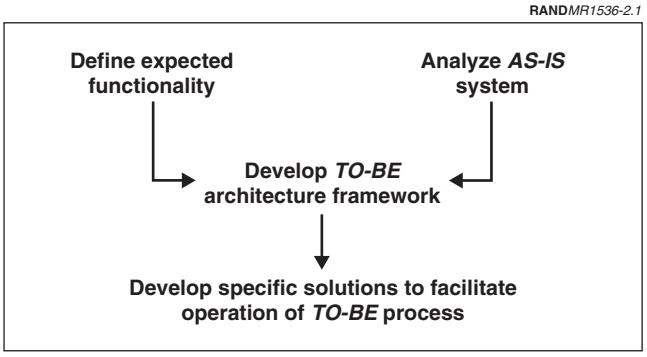

Figure 2.1—Analysis Approach

[1]U.S. Joint Forces Command, Concepts Division, *A White Paper for Focused Logistics: Enabling Early Decisive Operations,* October 1999.

contingencies, and insights from previous studies such as the base-lining effort conducted by Aerospace Command and Control, Intelligence, Surveillance, and Reconnaissance Center (AC2ISRC).[2]

Using the desired functional characteristics and analysis of the *AS-IS* architecture, we developed *TO-BE* concepts and an associated operational architecture. We present the architecture in a number of process maps, flow diagrams, and associated databases. The process maps have three levels of detail: a high level that shows the generalized concepts of CS execution planning and control that are applied across all phases of operations; a mid-level architecture that describes the concepts fairly closely; and a detailed architecture. The high- and mid-level process maps are described in Chapters Three and Four. The low-level *AS-IS* diagram, documented using flow-charting software, is contained in Appendix B. The low-level *TO-BE* diagram is shown in Appendix C. In addition to the process diagrams, the *TO-BE* operational architecture is documented in a database containing process activities and tasks in a hierarchical structure. The database includes information required to perform the tasks, the information sources, products produced by each activity and the recipients of the products. It identifies the organizational nodes responsible for the activities and tasks. The information in the database is consistent with the high-, mid-, and low-level process diagrams. The associated compact disk contains a complete set of the documentation described above.

The database that describes the information inputs for a given CS decision can be accessed by clicking on the C2 process box of interest in the HTML diagram. The *TO-BE* process diagram is hyper-linked to its more detailed database to show supporting tasks, information flows, and organizational node responsibilities. The HTML diagram also describes how one can navigate between the *TO-BE* diagram and the databases.

This framework allows one to drill down and follow how the general principles are used at lower and lower levels. This approach helps track how individual tasks align with the higher-level desired functionality, and also helps highlight redundancies and shortcomings in the *AS-IS* system.

The *AS-IS* architecture analysis was then compared to the AEF CS execution planning and control needs to identify *AS-IS* shortcomings and changes necessary for the *TO-BE* architecture. Shortcomings were broadly grouped according to the type of modification ("solution") that would address them. Solution themes are proposed to guide the development of more specific solutions. The categories of shortcomings and corresponding solution themes are shown in Table 2.1. For each category, we discuss several shortcomings and how each hinders efficient CS execution planning

[2]Aerospace Command and Control, Intelligence, Surveillance, and Reconnaissance Center, *USAF Command and Control CONOPs,* Vol. III, *Blue Order of Battle, Global Awareness for Expeditionary Aerospace Forces,* Langley Air Force Base, VA, July 7, 2000. While various CONOPs, doctrine and policy publications, and operating instructions mention CSC2, this is the first complete documentation of the operational architecture. Major sources from which this architecture was drawn are listed in the document's references.

Table 2.1

Summary of *AS-IS* Shortcoming Categories and Solution Themes

Shortcoming Category	Solution Theme
Doctrine/policy	Clarify objectives and functions
Organizations	Evolve to standing CS organizations to conduct C2 functions
Training and education	Adequately train, educate, and exercise CS personnel (e.g., train CS personnel on ops planning processes and ops personnel on CS planning processes)
Information systems/tools	Field appropriate capabilities

and control. We then propose solutions aimed at resolving the shortcomings. The solutions are designed to facilitate, enhance, and refocus the operation of the CS system to be in line with the desired functionality and *TO-BE* concepts.