

Netted Bugs and Bombs: Implications for 2010

Edited by

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Preface

To date, the Center for Strategy and Technology (CSAT) has published 39 student research papers, each as an individual document. The papers in this book, all written in 2004 and 2005, deal with a variety of related subjects, so it seemed appropriate to publish them together in a single volume. The 39 previously published papers, with the twelve in this volume, are posted the on Internet at <http://www.au.af.mil/au/awc/awcgate/awccsat.htm>. In keeping with the established numbering system, the first paper in chapter 1 is CSAT Occasional Paper No. 40 and the last one in chapter 12 is CSAT Occasional Paper No. 51.

Recent military operations in Afghanistan and Iraq have demonstrated the value of network-centric operations (NCO) and unmanned aerial vehicles (UAVs). These two topics are the subject of the first and second parts of this book; the third section is devoted to their implications for combat and non-combat operations. Just as information operations (IO) and warfare terminology have changed repeatedly in the last decade, so have the labels in the network operations and network warfare (NCW) arena shifted within the last year. Consequently, the essays in Part I, originally written in 2004 and 2005, reference both NCO and NCW. The concept known as NCW, first introduced by Vice Admiral A. K. Cebrowski and Mr. John Gartska in 1998, has now evolved to the broader concept of NCO. Network capabilities are critical not only for warfare but also for the Department of Defense's (DOD's) transformation and a wide range of day-to-day operations in the military and civilian worlds. Hence, in recent months NCO has replaced NCW as the accepted term for designating the network approach in all circumstances.

The first paper in Part I, by Lt Colonel Richard Lipsey, contains a good overview of network operations policy and doctrine and argues that the DOD and the Air Force should maximize NCO's potential for achieving effects-based operations (EBO). Lipsey uses a technology-doctrine-organization framework to contrast NCO's advantages and limitations and to provide a detailed comparison of the DOD IO roadmap and the Air Force's IO implementation plan. Next, Major Eric Silbaugh reviews *Joint Vision 2010/2020*, Office of Force Transformation guidance, and Service transformation documents to highlight the centrality of NCO to DOD transformation. More importantly, his paper identifies key capability gaps in information infrastructure and recommends what can be done to remedy them. The third essay, authored by Benjamin Koudelka,

examines how precision-guided munitions (PGMs) can be networked to the global information grid to improve kill chain efficiencies and the prosecution of mobile targets. The battlespace of the future requires a network of sensors to provide command, control, communications, intelligence, surveillance, and reconnaissance (C3ISR) on a 24/7 basis, a capability not yet available. In the last paper in Part I, Major Andrew Knoedler analyzes how this C3ISR gap can be corrected using near-space vehicles like balloons, airships, and UAVs.

Part II focuses on the role of UAVs for suppression of enemy air defenses (SEAD), electronic warfare (EW), reconnaissance, and other missions. First, Colonel James Horton offers a succinct summary of the history of UAVs and proposes that unmanned combat aerial vehicles (UCAVs) replace F-16CJs in the SEAD role and the EA-6Bs for EW missions. In the next essay, Major James Abatti examines how technological advances like miniaturization and nanotechnology and new operational concepts such as swarming will enable small and micro UAVs to perform ISR, SEAD, EW, and other missions more cost effectively than the current large-model UAVs. Chapter 7, by Lt Colonel Kirk Kloeppe, addresses the development of a fly-sized UAV for chemical and biological weapons detection. The paper concentrates on the technological challenges involved in such a project. The last essay in Part II, written by Lt Colonel Daryl Hauck, takes the micro UAV concept one step further and explores the potential and consequences of using micro UAVs to carry genetic weapons.

Despite the many benefits to be gained from NCO, UAVs, and other new technologies, war is still a human endeavor, a fact aptly brought home by Lt Colonel Eric Schnitzer in chapter 9, the first essay in Part III. The U.S. military has a history of searching for the technological “silver bullet” to make warfare less costly and less bloody. Generally, however, for new technology to yield a truly effective “six shooter” requires concomitant changes in culture, doctrine, training, organization, and strategy. For example, recent technological advances have increased the information available to the Air Force’s operational-level commanders, resulting in more centralized execution of airpower. This centralization is in opposition to the Service’s long-standing doctrinal tenet of centralized control and *decentralized* execution of airpower. In “Who Pushes the Pickle Button?” Lt Colonel John Marselus offers several thoughtful recommendations to enhance airpower’s effectiveness and efficiency while still ensuring that the advantage of decentralized execution is maximized. In Chapter 11 Major Shaun McGrath analyzes how the technological complexity of advanced fighter aircraft has created a flying

training gap, especially in the F-16 community. He proposes how simulation can be leveraged to close that gap and keep fighter pilots combat ready. Finally, in an age of asymmetric warfare, it is more important than ever to consider what actions one's adversaries might take. The last chapter by Major Colin Miller looks at an enemy attack on the U.S. military's electronic systems—the very foundation of network-centric operations—using electromagnetic pulse (EMP) weapons. The paper defines and classifies EMP threats and recommends cost effective solutions to counter them. Because this threat encompasses both military and civilian operations, this essay's proposals deserve careful consideration by government and business planners and leaders at all levels.