

# The Efficiency Paradox

## How Hyperefficiency Can Become the Enemy of Victory in War

Lt Col Geoffrey F. Weiss, USAF

*Efficiency: the ability to produce a desired effect, product, etc., with a minimum of effort, expense, or waste.*

*Effectiveness: producing a definite or desired result.*



**A**t the time of this writing, America's military is embroiled in conflicts throughout the Middle East and faces threats simmering in the Far East, Africa, South America, and even along our southern border. Simultaneously, the economic realities of a multitrillion-dollar national debt and trillion-dollar deficits, as well as the prospect of cuts in defense spending amounting to hundreds of billions of dollars, are forcing significant belt tightening. Even our services in combat must look for more savings and efficiencies. Theoretically, at some point increased efficiency cannot make up the difference, and the cuts become too deep, injuring a vital capacity or costing lives in combat due to a scarcity in training or resources. How will we know when we have

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reached that point? Perhaps more insidiously, is it possible that resorting to a culture of hyperefficiency in itself could harm our effectiveness in combat?<sup>1</sup> Can a quest for efficiency result in a loss of effectiveness?

The answer to the last two questions is yes. Seeking efficiency can harm our effectiveness, and we may not see it coming unless we first understand a phenomenon known as the efficiency paradox—the apparent contradiction that occurs when maximizing efficiency actually results in diminished effectiveness. The process of preparing and planning for war demands efficiency because of the scarcity of resources and the expense of training for war and war making; however, after fighting has begun, the war fighter must contend with uncertainty, contingency, and an adaptive enemy. In war the line between waste and reserve can blur, tipping the scales from victory to defeat; furthermore, the requirement to abandon initial assumptions that subsequently prove faulty may lead to operations that fall short of achieving strategic ends, making the endeavor far more costly. By recognizing the existence of the efficiency paradox and its characteristics, the Air Force and the other services can better balance efficiency and effectiveness in the transition from peace to war, thus increasing the chances of success. Negating this paradox involves knowing how *not* to fight like we train; knowing how and why to develop war plans based upon what we must do to win, even in the face of uncertainty and friction; and understanding how to inform policy makers about strategies and forces that do not irresponsibly promote efficiencies at the expense of effects.

This article seeks to familiarize the reader with the efficiency paradox, much as a treatise would study a potentially dangerous species. If we know where to look and what to look for, then we can avoid potential dangers. Towards that end, the article examines some historical instances of efficiencies pursued in planning and training that failed to produce desired outcomes. Moreover, after addressing how efficiency and effectiveness relate to traditional principles of war, airpower, training, and planning, it offers a practical example from recent experience. The article concludes with some recommendations for avoiding pit-

falls that arise from the efficiency paradox. By understanding this paradox, we can recognize and evade that point at which hyperefficiency becomes the enemy of victory.

## When Plans Go Awry: History and the Efficiency Paradox

*When you have resolved to fight a battle, collect your whole force. Dispense with nothing. A single battalion sometimes decides the day.*

—Napoleon Bonaparte

Placing undue faith in an ability to minimize commitment of resources while maximizing outcomes is not without historical precedent. In mid-summer 1941, while Europe fought a war and America enjoyed a precarious peace, US Army Air Corps strategists in the Air War Plans Division (AWPD) under Gen Henry “Hap” Arnold set about the task of articulating the role that airpower could play in rolling back and ultimately defeating the Germans. Leveraging the “American propensity to see war as an engineering science” (with the airplane as its foremost instrument), the AWPD, having determined that destruction of 124 targets within Germany would win the war, calculated that such an objective required exactly 6,860 bombers operating with a target accuracy in combat 2.25 times worse than that in training.<sup>2</sup> We now know that outcome required the vise grip of Allied ground forces from the east and west. By the time the dust settled from the Allied bomber offensive, the United States and Britain had lost a combined 16,462 aircraft and 76,000 personnel.<sup>3</sup>

Twenty years later, in Vietnam, we made a similar miscalculation. Secretary of Defense Robert McNamara, the “whiz kid” who used “quantitative management methods” to mold the post-World War II Air Force into “a supercompany,” employed the same model to run the Vietnam War. Drawing on exhaustive statistics involving troop supplies, kill ratios, ordnance expended, and so forth, he computed what he considered a winning formula.<sup>4</sup> As the ground situation worsened,

America devised and implemented Operation Rolling Thunder to use *just enough* force to compel the North Vietnamese to accede to its wishes. In fact, Rolling Thunder was a resounding dud, having dropped 640,000 tons of bombs with very little effect.<sup>5</sup>

More recently, we can look to Somalia and Operation Iraqi Freedom as obvious examples of planning efficiencies leading to disaster. In Somalia, American forces lacked the resources in firepower and armor to stand toe-to-toe with Mohamed Farrah Aidid. As Maj Clifford Day notes in his analysis of US operations in Somalia, “both missions were ill prepared to deal with the . . . urban guerrilla movement in Mogadishu, and the US political and military leadership was not willing to commit the warpower [sic] necessary to carry out the difficult tasks they were assigned.”<sup>6</sup> In Iraqi Freedom the brilliantly efficient campaign to topple Saddam Hussein proved far too little to secure the nation in the aftermath of his fall. According to Antulio Echevarria, “In a sense, Operation Iraqi Freedom saw an attempt to supplant mass with economy of force. That attempt succeeded well enough in the initial phases of the conflict, but it failed completely when military operations shifted from major combat operations to providing security for reconstruction efforts.”<sup>7</sup>

Perhaps less obvious are the instances of Operations Desert Storm, Allied Force, and Enduring Freedom. In Desert Storm, the coalition used overwhelming force to evict Saddam from Kuwait but called it off, based on the faulty calculus that sufficient force had stabilized the region and destabilized Saddam’s regime. Hindsight shows that a more aggressive posture might have prevented the need for Iraqi Freedom altogether, together with its \$800 billion price tag and tens of thousands of casualties.<sup>8</sup> Regarding Allied Force, despite our ultimate victory, it lasted far longer than first predicted.<sup>9</sup> Lastly, as of this writing, Enduring Freedom continues feverishly. The highly efficient coalition approach that initially expelled the Taliban has proven insufficient to maintain control of the country in the long term, regardless of the efforts of a long succession of generals and strategies.

This tendency to leverage minimum force to produce a result is not restricted to the strategic and operational levels of war. The battle for Fallujah in Iraqi Freedom serves as a particularly telling tactical example. In 2004 US Marines had the task of clearing the Iraqi city of Fallujah of dangerous terrorists and insurgents. Although 2,000 of them methodically began the operation, they were neither fast nor effective enough to complete it. The second time around, however, 15,000 Marines cleared the city, prompting Ralph Peters to observe that “it was clear that commanders and planners had learned their lessons well: numbers mattered, mass was back.”<sup>10</sup>

In preparing for and planning war, we are tempted—in a desire for efficiency—to rely upon quantitative models or overly optimistic thinking (perhaps founded upon training experiences) regarding the capability of forces available. In fact war only infrequently lends itself to modeling. This is not to say that we should embrace inefficiency or abandon all planning models. But it does indicate that we must temper faith in these tools with a healthy dose of respect for the unknown, keeping our assumptions conservative and to a minimum. We must consider variables within realistic ranges and not adjust them arbitrarily to maneuver our projections into acceptable but artificial bounds. When our initial plans become casualties of war, we must be ready with branch plans and have the capacity and will to execute them.

## Mass and Economy of Force

*Economy of force is the judicious employment and distribution of forces.*

*The purpose of mass is to concentrate the effects of combat power at the most advantageous place and time to produce decisive results.*

—Joint Publication 3.0, *Joint Operations*, 11 August 2011

As history shows, transporting our efficiency model with us into combat can be dangerous. In an efficiency-based paradigm, the operative question is, What is the minimum required to carry out the task at

hand? This inquiry works well for undertakings we can clearly define in contexts that we mostly control. It compels us to commit the least number of resources necessary, thus freeing other assets that we can obligate elsewhere. This idea is embodied in the principle of war known as “economy of force.” Unfortunately, in combat we do not control all of the variables. Both the enemy and chance have a say. What now appears to be “steady state” can and will change—most likely at a time when we least expect it.

The principle of economy of force is perfectly valid, but the nine (original) principles of joint operations exist for a reason. We cannot apply any one of them in a vacuum. We must weigh economy of force as a guiding concept against other factors such as mass, simplicity, security, and, of course, objective.

An approach that delivers the minimum resources in personnel and materiel to combat may incur significant risk in terms of flexibility to react to changing conditions. And what guidelines define “minimum”? Planners and war fighters allocate and apportion forces based upon estimates and guesswork originating from what they know at the time. Those forces are organized, trained, and equipped according to older approximations and within highly constraining budgetary parameters. To paraphrase former secretary of defense Donald Rumsfeld, you fight the war with the army you have, not the one you want. But we must consider the true question: what is the army you *need*?

Doctrinally, the Army and the Marine Corps task-organize to meet mission requirements in a way that provides some flexibility by not seeking hyperefficiency.<sup>11</sup> This approach arises partly from their Clausewitzian approach to warfare, whereby they acknowledge a large component of uncertainty and chaos in combat.<sup>12</sup> As a result, our ground component plans operations with forces that have an overwhelming advantage over the enemy, usually in terms of combined-arms firepower and tactics if not sheer numbers. Part of this force structure normally includes a reserve element. Marine Corps Doctrine Publication 1-0, *Marine Corps Operations*, 2001, observes that “the re-



serve provides the commander the flexibility to react to unforeseen developments. . . . Once committed, the reserve's actions normally become the decisive operation."<sup>13</sup> As the conditions of battle unfold, the reserve can concentrate at a decisive point to turn the tide, rout the enemy, or stave off defeat—the heart of the principle of mass. Maintaining a reserve may not seem efficient, especially if we never call upon it. Nevertheless, quantity is a quality in and of itself: winning every time in minimal time has an efficiency all its own. All services would do well to acknowledge that sacrificing mass upon the altar of economy of force could ultimately prove both inefficient and ineffective. Clearly, there is *no* efficiency in war without victory.

The Somalia debacle helps illustrate this point. Though entrusted with raising the ante from humanitarian aid to war with the Somali National Alliance, Somalia Task Force Ranger did not possess the resources to do so. Had it proven successful, using a small force to neutralize the alliance might have epitomized efficiency; however, “although [Task Force Ranger] was made up of some of the most skilled military forces in the world, . . . relying on one small force, no matter how good they were, left little tolerance for friction in battle with an enemy that was grossly underrated.”<sup>14</sup> Arguably we are feeling the cost of this failure in terms of human life and national prestige even now in the ongoing global war on terrorism.

## Airpower and Efficiency

*In the last fifteen years, airpower has achieved stunning military success, if not political victory, in the First Gulf War, Bosnia, Kosovo, Afghanistan, and Iraq.*

—Grant T. Hammond, 2005

*President Obama wants the Defense Department to cut \$400 billion in planned spending over the coming decade, and managing those cuts will be a herculean task.*

—*Air Force Times*, 2011



We may naturally think of the Air Force as the most efficient of the services since efficiency was one of the founding principles of the development of airpower. Contemporary airpower (now in full flower vis-à-vis the theories of Billy Mitchell and Giulio Douhet) alone can strike anywhere, anytime, at any level of war. A single Airman can wreak staggering damage upon an enemy force—what could be more efficient than one bomber precisely striking dozens of targets previously inaccessible to ground forces? But we have the propensity to play to our strengths, hoping that the enemy will repeat the patterns we have dealt with effectively in the past—witness the Air Force’s mind-set after Operations Desert Shield and Desert Storm.

Now the Air Force enters the second decade of the twenty-first century in a position few could have imagined just 20 years ago. A remarkable upheaval has occurred not only from the instability of international security that characterizes our post-Cold War / post-9/11 world but also from acute domestic economic woes. Amidst this turmoil, the Air Force, which has defined itself from its origins as an independent guarantor of security through strategic deterrence, is redefining itself and its relevance in a “small wars” context through space, cyberspace, surveillance, command and control, rapid mobility, and persistence via remotely piloted aircraft. Commanding such change and its attendant challenges requires extraordinary care in managing both capital and human resources. To do so successfully, we must make efficiency our operative principle because we simply have no time, money, or personnel to waste. The Air Force’s in-garrison units—in the midst of budget cuts and a significant reduction in force—scramble to meet training and flying-hour requirements established during a different era, all the while managing a dynamic personnel tempo that includes more frequent and longer deployments for many Airmen in critical positions.<sup>15</sup> To meet all these demands, commanders prioritize their responsibilities in organizing, training, and resourcing to ensure that our forces are ready to fly, fight, and win—certainly the right thing to do but possibly very dangerous if we attempt to fight like we train.

## Efficiency in Training

We must approach training with efficiency in mind because we have only so many dollars to put towards expensive combat and contingency operations. In fact, during fiscal year (FY) 2011, joint and contingency funding comprised over a quarter of the Air Force's overall budget!<sup>16</sup> A review of the service's budget plan for FY 2012 indicates that funding for operation and maintenance (readiness) will drop for the first time since 2004.<sup>17</sup> Indeed, some major commands have found inventive ways to leverage contingency funds to pay for training in light of inadequate readiness funding. For example, mission-qualification training for the E-3 Sentry, once wholly funded with operation and maintenance dollars, is now partially supported by contingency funds justified as necessary to prepare Airborne Warning and Control System crews for combat. The personnel and deployment tempo resulting from our many global commitments also takes a toll on readiness. In a typical E-3 operations squadron of some 300 Airmen, personnel cuts intended to save money have produced more one-deep positions and more Airmen with multiple duties. Extrapolated across the force, these cuts can have a systemic impact on capability. Airmen designated to fly training missions and exercises find it more difficult to balance those responsibilities with leave, individual readiness requirements, and additional ground duties. Moreover, even if funds were available, the number of missions—from peacekeeping and humanitarian to full theater war—does not allow enough time to train adequately to meet every possible scenario. The mantra “train like you fight” has often become “train the best you can.”

Given this reality, units make maximum use of simulated and computer-based training, carefully scheduling live scenarios to attain the most “bang for the buck.” Particularly in live training, fallout of one or two key players can degrade the overall benefit. We have become experts at piecing together meaningful training from the bits and pieces we have to work with to realize as much value as possible.

In combat, however, we have to be careful. Unlike training—sometimes a one-sided affair in which some is better than nothing—combat

is always two-sided. The strategic bombing campaign over Europe in World War II clearly revealed that the bomber did not always get through. Only by applying the overwhelming mass of airborne firepower and by employing long-range fighter escort did the Allies prevail. In Iraqi Freedom, the 101st Airborne Division used a deep-strike helicopter tactic developed in training, sending a wave of attack helos ahead of the forward line of battle only to meet a hailstorm of small-arms fire that destroyed two of the 31 Apaches and damaged all but one of them. In the words of one of the pilots, “There’s a very different threat out there than what we expected. . . . I guess we believe that what we’ve been training for, for a long time, is not going to work here.”<sup>18</sup>

As we transition from training to combat, we need to appreciate the areas in which we had to cut corners and could not train like we fight. We must remain wary of tactics untested against a live enemy. Our training experiences should serve as a scale model for combat, not a template. They inform our thinking about how to approach our roles and missions without all the risks but also without all the fidelity of reality. Before we employ in combat, we must identify the weak points in our tactics and organization so that when we “scale up,” we are prepared to address them. This preparation can include building in “inefficiencies” we could not afford in training. Our organizations should minimize single points of failure and one-deep positions as well as implement some organizational redundancy. We should always bring enough of the right personnel so that our warriors can focus on their specialty instead of serving as jacks-of-all-trades, masters of none. The same principles apply in terms of materiel and logistics. We must remember that flexibility is the key to combat power and that, at times, inflexibility can increase in proportion to efficiency.

## Efficiency and Planning

As noted, training demands efficiency, but in planning we should be more circumspect. Any planning process begins with a problem that the plan must solve.<sup>19</sup> For example, “How do I solve the problem of de-

feating country X if it attacks us?” (strategic). “How do I secure control of the air over country X?” (operational). “How do I neutralize target Y in country X?” (tactical). We must consider many factors in answering these questions and devising a plan. Perhaps each of a number of different plans could independently solve these problems. Also weighing heavily in this process are constraints—limitations that planners must consider, including those on funds and resources. Difficulty arises if planners affirm the possibility of creating a winning plan regardless of resource constraints, a plainly illogical stance. However, like the frog in the kettle, if the heat builds slowly enough, we may not know we are in boiling water until it’s too late.

Thus, planners have the daunting yet vital responsibility of doing their best to assess the problems before them realistically. They should beware of overly optimistic assumptions and resist the temptation to stack the deck during war gaming. Planners must understand resource limitations and articulate concerns when analysis and war gaming point towards unsatisfactory levels of risk. Most importantly, they must guard against the chimera that we can solve every problem the way we *want* to solve it in light of the resources at hand. No matter how we try, we cannot determine the values of three unknowns, given just two equations. When we reach this point, we must have the intellectual honesty to admit it and then identify the problems we *can* solve with available resources.

## A Recent Experience

In the fall of 2010, during my command of a large flying squadron engaged in combat operations over Iraq and Afghanistan, I experienced the efficiency paradox firsthand. With respect to the daily apportionment of personnel and aircraft, having our aircraft on station, on time, without fail constituted the only measure of effectiveness that mattered. To do so, we had to put aside practices effective 90 percent of the time in favor of those effective 99 percent of the time. In combat the 90 percent solution is not good enough. Though limited in planes

and personnel during training, in combat the squadron brought a sufficient number to meet minimum requirements of the steady-state fight and to cover the eventuality of several potential contingencies in the Arabian Gulf. I directed earlier show times, longer hours, redundancies in personnel and equipment, and even duplication of effort to minimize mistakes and their effect on the mission. In the air, we assumed more risk to maximize on-station time during malfunctions that did not immediately affect flight safety. We allocated dozens of Airmen and extra resources for optimal flexibility and, ultimately, effectiveness. Indeed, nine out of 10 times, we could have performed our mission with less. So why didn't we?

The answer lies in the Airman's Creed: "I will never falter, and I will not fail." In combat, lost sorties and even lost minutes can mean the difference between life and death. During our missions, at times no one would have missed us for 90 percent of the sortie duration, but for the other 10 percent, we literally became lifesavers. Sometimes we define effectiveness as a capacity to respond to the unexpected; hence, we flew with enough capacity to handle a variety of less common mission profiles (e.g., search and rescue) as well as unforeseen air threats or expanded ground-combat contingencies.

Some Airmen are not used to thinking this way because it differs from the usual noncombat situation. Furthermore, Airmen are accustomed to thinking more independently about their contributions in combat and are less comfortable in a supporting role. For example, our country always needs us in our strategic capacity and in our operational and tactical roles against a determined air force or air defense. We know exactly what to do and where to be. As supporters in a counterinsurgency setting, though, we may know the scheme of maneuver, but we don't always know how and when others will call upon us. No longer can we simply execute the air tasking order; rather, in the air we often have mini-air tasking orders to fulfill, the exact timing and details of which remain unknown at takeoff. This situation is driven by the uncertain nature of ground combat, for which the insur-

gent often sets the agenda, and by the challenge of dynamic targeting at all levels of warfare. Friendly air and ground forces must have our support, without fail. That is our measure of effectiveness.

The efficiency paradox was not lost upon Lt Gen Mike Hostage, then the commander of US Air Forces Central Command, who took the time during a visit with our expeditionary wing to explain his experience with it in terms of Army and Air Force perspectives on intratheater airlift. The Air Force, he said, measured the effectiveness of that airlift in terms of cargo capacity per sortie, which admirably fell in the range of 90–95 percent (i.e., filled nearly to capacity for each mission).<sup>20</sup> However, attaining such efficiency required some manipulation of routes, timings, and cargos designed more to maximize the efficiency metric than to meet the needs of forces needing the gear. When the Army received some aircraft to handle its own requirements, those missions flew at only about 20–25 percent capacity, but the Soldiers were thrilled because they had exactly the cargo they needed, when they needed it. As General Hostage explained, Airmen should understand that we may need to sacrifice our own measures of efficiency to meet the measures of effectiveness necessary to win this war.<sup>21</sup>

## Recommendations

Now that we have some familiarity with the efficiency paradox, how do we combat it? I recommend a multitiered approach. First, incorporate instruction and discussion regarding this phenomenon into our professional military education across the services. Whether or not one agrees with the points made in this article, a healthy discourse on the concept will help future leaders by guiding their thoughts on training, planning, and war fighting in relation to efficiency. Students of war should consider this paradox in their analyses of historical case studies as well as present and future conflict. Would awareness of this phenomenon have resulted in different outcomes? Where did we get it right, and what was the result?<sup>22</sup> The answers to these questions will help us respond to those not yet asked. With the efficiency paradox in

mind, warriors can work consciously to assess where efficiency might tread close to wishful thinking and circumvent courses of action that do not adequately account for unknowns.

Second, the paradox identifies a seam between training and war fighting, both in practice and in our mind-set. Therefore, as part of their periodic review of training plans, all military units responsible for preparing forces and providing them to combatant commanders should initiate an assessment of where training is not consistent with how we actually fight. If possible, we should improve fidelity; if not, we should tailor our spin-up academics and in-theater exercises to fill in the seam. Understanding that efficiency can drive us to train differently than we fight, our leaders need to prepare their forces to fight to win and make the case for reserve and redundancy where necessary to improve the likelihood of victory.

Third, joint planning guidance must reflect the reality of the efficiency paradox and must warn planners about the perils of ascertaining the minimum force required for mission success. Although overestimation of a threat rarely results in defeat, underestimation often does. We cannot allow ourselves to be lulled into a sense of security because our current conflict appears steady-state. Today's contingency operations could erupt in a number of unpredictable ways, and future wars are never obliged to resemble those of the past. Planning doctrine should emphasize the utility of reserve and redundancy not simply as "nice to have" but as essential elements of flexible, winning plans. Exercises should challenge planners by introducing uncertainty, rewarding flexibility, and punishing rigidity.

Finally, senior military officers must remain wary of marching in lockstep with civilian leaders well schooled in business and/or political concepts but not as familiar with the particulars of war. Business theories and quantitative modeling that work well in classrooms or on Wall Street may fall short in combat. Deterministic models can give us confidence in our projections of an uncertain future and can offer useful support to predictions regarding military force and materiel. However,



uncritical reliance on them or the manipulation of variables to create agreeable outcomes is tempting and dangerous. Armed with an understanding of the efficiency paradox, our leaders can make a compelling case for strategies and force levels that have the best chance for successfully realizing our national military objectives. Granted, outcomes might still fall short of expectations—but not because we failed to grasp the pitfalls of valuing efficiency at the expense of victory.

## Conclusion

*The logic has been simply baffling to me: Expand our military commitments while cutting our armed forces.*

—Rep. Buck McKeon (R-CA)  
Chairman, House Armed Services Committee

Whether on the battlefields of Afghanistan today or in the skies over an unnamed future foe, our forces must depend upon coordinated, precise, effective action to defeat the enemy and achieve our military objectives. Such action demands employment of the right blend of capabilities in sufficient measure, at the appropriate time, every time. These forces are not concerned with efficiencies, only effectiveness. Understanding the efficiency paradox helps us get this right from the outset by concentrating our training, planning, and execution on effectiveness first, relegating efficiency to a supporting role. The weapons that will help circumvent this paradox include making sound intelligence estimates, using a reserve, employing selective redundancy in areas of vulnerability, and viewing our planning models and assumptions with a healthy dose of skepticism (i.e., considering them guides, not directives, to our thinking).

We can embrace training efficiencies, but at the same time we must recognize the point at which efficiency becomes weakness in the transition to combat. Airmen in particular should realize that effectiveness is the starting point. We must wisely choose the efficiencies we em-

ploy to reach that destination, understanding that what might seem a good idea in peacetime or in the short term could in fact lead to a far more costly outcome or perhaps even defeat.

Perhaps the most difficult and unpalatable aspect of dealing with the efficiency paradox involves presenting advice not in concert with fiscal constraints or political pressures. Sometimes our “can-do” attitude runs head-on into reality. In those cases, we either find a way to make it appear that the shape of any hole will match the peg we have (e.g., the Battle of Fallujah), or we take the more difficult path and risk political backlash (to wit, Gen Eric Shinseki and Iraqi Freedom).<sup>23</sup> These choices are not easy, but as leaders and professionals we have the solemn duty to make them, even when they are unpleasant or unpopular.

The greatest dangers are those we never see coming. Time and again, history has shown that the idea of “just enough” in war can become “not enough” very rapidly. But if we recognize the dangers of a blind drive towards hyperefficiency, we can guard against that tendency to see efficiency as the end for which we strive. In that case, we will have successfully negated the efficiency paradox and—by balancing efficiency and effectiveness—greatly increased our chances for victory. ✪

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## Notes

1. I define “hyperefficiency” as a condition whereby maximizing efficiency becomes the central aim of an endeavor.

2. Stephen Budiansky, *Air Power: The Men, Machines, and Ideas That Revolutionized War, from Kitty Hawk to Iraq* (New York: Penguin Books, 2004), 287.

3. *Ibid.*, 330.

4. *Ibid.*, 377.

5. *Ibid.*, 378.

6. Maj Clifford E. Day, “Critical Analysis on the Defeat of Task Force Ranger,” Research Paper AU/ACSC/0363/97-03 (Maxwell AFB, AL: Air Command and Staff College, 1997), 36, <http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB63/doc10.pdf>.

7. Dr. Antulio J. Echevarria II, “Principles of War or Principles of Battle?,” in *Rethinking the Principles of War*, ed. Anthony D. McIvor (Annapolis, MD: Naval Institute Press, 2005), 66.

8. Amy Belasco, *The Cost of Iraq, Afghanistan, and Other Global War on Terror Operations since 9/11*, CRS Report for Congress RL33110 (Washington, DC: Congressional Research Service, 29 March 2011), 1, <http://www.fas.org/sgp/crs/natsec/RL33110.pdf>.
9. John E. Peters et al., *Operation Allied Force: Lessons for Future Coalition Operations*, Research Brief RB-72-AF (Santa Monica, CA: RAND Corporation, 2001), 1, [http://www.rand.org/pubs/research\\_briefs/RB72/index1.html](http://www.rand.org/pubs/research_briefs/RB72/index1.html).
10. Lt Col Ralph Peters, USA, Retired, "Speed the Kill: Updating the American Way of War," in McIvor, *Rethinking*, 99.
11. Field Manual (FM) 3-0, *Operations*, June 2001, 3-7, [http://www.dtic.mil/doctrine/jel/service\\_pubs/fm3\\_0a.pdf](http://www.dtic.mil/doctrine/jel/service_pubs/fm3_0a.pdf).
12. It is easy to find numerous references to the famous Prussian war theorist Carl von Clausewitz in Army and Marine Corps doctrine. On the nature of war and uncertainty (fog) and friction, see FM 6-0, *Mission Command: Command and Control of Army Forces*, August 2003, 1-10, <http://www.dtic.mil/dticasd/sbir/sbir043/a30a.pdf>; and Marine Corps Doctrine Publication (MCDP) 1, *Warfighting*, 1997, 3-8, [http://www.dtic.mil/doctrine/jel/service\\_pubs/mcdp1.pdf](http://www.dtic.mil/doctrine/jel/service_pubs/mcdp1.pdf).
13. MCDP 1-0, *Marine Corps Operations*, 2001, 6-27 through 6-28, [http://www.dtic.mil/doctrine/jel/service\\_pubs/mcdp10.pdf](http://www.dtic.mil/doctrine/jel/service_pubs/mcdp10.pdf).
14. Day, "Critical Analysis," 36.
15. Timothy Barela, "STRESSED OUT—with Frequent and Longer Combat Deployments, along with More Work and Fewer People, the Military Workforce Faces Increasing Anxieties at Home and Abroad," *Torch Magazine*, 1 November 2007, <http://www.torch.aetc.af.mil/news/story.asp?id=123079305>.
16. *United States Air Force: FY 2012 Budget Overview* (Washington, DC: SAF/FMB, February 2011), "The Air Force Budget, FY11 PB Request—FY12 PB Request," slide 6, <http://www.saffm.hq.af.mil/shared/media/document/AFD-110214-041.pdf>. Note the following figures for the FY 2011 President's Budget: \$20.8B (overseas contingency operations) + \$30.4B (non-blue [joint]) = \$51.2B (30 percent of the \$170.8B budget).
17. *Ibid.* Note that funding for operation and maintenance decreased from \$45.8B to \$45.3B from FY 2011 to FY 2012, the first drop from one fiscal year to the next since 2004 (when readiness spending decreased from \$25.7B [2003] to \$25.4B [2004]). For comparisons, see "Previous Year's Budget Materials," Air Force Financial Management and Comptroller, <http://www.saffm.hq.af.mil/budget/>.
18. Rick Atkinson, *In the Company of Soldiers: A Chronicle of Combat* (New York: Henry Holt, 2005), 152-53.
19. For specific details on joint planning, refer to Joint Publication 5-0, *Joint Operation Planning*, 11 August 2011, [http://www.dtic.mil/doctrine/new\\_pubs/jp5\\_0.pdf](http://www.dtic.mil/doctrine/new_pubs/jp5_0.pdf).
20. Lt Gen Gilmery Michael Hostage III, commander, US Air Forces Central Command (address to the 380th Air Expeditionary Wing, Al Dhafra Air Base, United Arab Emirates, fall 2010).
21. *Ibid.*
22. For example, one could argue that the Powell Doctrine, which called for overwhelming force (a hard lesson that Gen Colin Powell learned from the Vietnam War), illustrates why Operation Desert Storm was so effective militarily against the Iraqi forces despite the later political decision to end offensive operations. Michael A. Cohen, "The Powell Doctrine's

Enduring Relevance," *World Politics Review*, 22 July 2009, 1, <http://www.worldpoliticsreview.com/articles/4100/the-powell-doctrines-enduring-relevance>.

23. Army general Eric Shinseki famously disagreed with Secretary of Defense Donald Rumsfeld on the size of the ground force necessary to secure victory in Operation Iraqi Freedom. Shinseki advocated a force of several hundred thousand to topple Saddam's regime and secure the peace afterwards. Rumsfeld, who wanted faster action and a smaller force, won the day and eventually hastened the general into retirement. Robert Schlesinger, "Nancy Pelosi, the Shinseki Myth and Things That Really Piss Me Off," *Huffington Post*, 1 December 2005, [http://www.huffingtonpost.com/robert-schlesinger/nancy-pelosi-the-shinseki\\_b\\_11532.html](http://www.huffingtonpost.com/robert-schlesinger/nancy-pelosi-the-shinseki_b_11532.html).



### Lt Col Geoffrey F. Weiss, USAF

Lieutenant Colonel Weiss (BS, University of Virginia; MAS [Master of Aeronautical Science], Embry-Riddle Aeronautical University; MMS [Master of Military Studies], Marine Corps Command and Staff College; MOS [Master of Operational Studies], Marine Corps School of Advanced Warfighting) is commander of the 964th Airborne Air Control Squadron, Tinker AFB, Oklahoma, where he commands 300 personnel in execution of command and control and battle management operations around the world. In 2010 he commanded the 964th Expeditionary Airborne Air Control Squadron in combat for Operations Enduring Freedom and New Dawn. Prior to his command tour, he served as an operations officer for the 552nd Operations Support Squadron and served on the Air Staff in the Influence Operations Division and in the Executive Review Secretariat as an executive assistant to the assistant vice-chief of staff. A graduate of Officer Training School, Squadron Officer School, Marine Corps Command and Staff College, the School of Advanced Warfighting, and Air War College, Lieutenant Colonel Weiss is a senior air battle manager with more than 2,300 hours in the E-3 Sentry (Airborne Warning and Control System), including 330 combat and combat-support hours in Southwest Asia. He will attend the National War College in the summer of 2012.

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