TECHNOLOGICAL FUNDAMENTALISM? THE USE OF UNMANNED AERIAL VEHICLES IN THE CONDUCT OF WAR

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ABSTRACT

There is an on-going battle in the Department of Defense between reason and the faith in technology. Those ascribing to technological fundamentalism are blind to the empirical evidence that their faith in technology is obscuring the technological limitations that are evident. The desire for information dominance to reach the state of total transparency of the opponent in order to win the war is untenable. The reasoning voiced by skeptics should be heeded but the technological fundamentalists are deaf to their views. The use of UAVs have provided for limited visibility of the opponent and not the perfect Panopticon as envisioned.

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The views expressed in this academic research paper are those of the author and do not reflect the official policy or position of the U.S. government or the Department of Defense.

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> Now it is clear the military does not have enough unmanned vehicles. We're entering an era in which unmanned vehicles of all kinds will take on greater importance - in space, on land, in the air, and at sea. (President George W. Bush, Citadel speech, December 11, 2001)

In Joint Vision 2010, the Chairman of the Joint Chiefs of Staff recognizes information dominance as the critical enabler for the operational concepts of dominant maneuver, precision engagement, full dimensional protection, and focused logistics. Operation Desert Storm (Iraq: January 16-March 3, 1991) provided a preview of the possibility of information dominance with the technology of Unmanned Aerial Vehicles (UAVs). Technological fundamentalists believe that information dominance with technology is the key to the military strategy in the way the U.S. will fight its wars. The dream of transparency of the opponent on the battlefield which the U.S. Department of Defense (DoD) is basing its network centric warfare concept on via information dominance demonstrates the belief in technological fundamentalism, one that places faith in technology above reason. Specifically, with the use of UAVs serving as the 'eyes for gathering information' to relay to the battle commanders and soldiers on the field, the military's increased push for the use of UAVs in the Intelligence, Surveillance, and Reconnaissance (ISR) role indicates a belief in the viability of the dream of transparency through perfect seeing. This dream, I argue, is in actuality an irrationality because it is insufficiently skeptical of the technology it places its faith in and as the skeptics point out, makes the wrong assumptions of the actions the opponent may take on the battlefield. The empirical record of the use of UAVs in current and prior conflicts clearly demonstrates and refutes the operating perfection of technology. Indeed, the faith in technological fundamentalism that the DoD proponents espouse has become a threat to the soldier's survival. The proponents of technological superiority on the battlefield hold a different faith than that of the skeptics. What is technological fundamentalism,

you ask, and how does it differ from enlightened skepticism?

The intellectual movement known as the Enlightenment arose in Europe in the eighteenth-century and championed the principles of rationalism and logic, while the Scientific Revolution worked to demystify the natural world. The Enlightenment idea of faith in the power of human reason made religion a prime target for Enlightenment thinkers. The skepticism was toward beliefs that could not be proven by science or clear logic. Thus reason over faith prevailed for enlightened skeptics.

The Enlightenment idea of faith in the power of human reason held by skeptics was not the only version. One version of reason smuggled back in "faith' through their reliance on disciplinary methods and technological capabilities: they became, in short, technologically fundamentalist. The technological fundamentalists believe that the apocalypse is imminent and that through technological accomplishments men can redeem man's fall from grace by Adam thus once again redeeming his place in God's kingdom. In other words, displaying and "fostering an almost fetishistic faith in technological destiny and fueling their own desperate dreams of technological transcendence." (Noble 1999: 111) Thus the difference between the enlightened skeptics who believe in reason versus the technological fundamentalists who believe in the faith of technology. Clearly, these technological fundamentalists turn a deaf ear to those who reason that the technology upon which the faith is placed in does not deliver the promised results.

In order to convey the tension between reason and faith, I argue that through the use of

technological arrangements and tools such as the design of a prison and the use of photos, that there exists an expression of reason but can contain within it a certain irrationality which pervades and which the technological fundamentalist will undermines and brings to bear. The use of UAVs are an example of this. We will begin with the concept of Bentham's Panopticon, representative of technological arrangements and its relationship to the issue of discipline in society, and how this concept might be extrapolated to an adversary. Thereafter will follow a synopsis of the use of technological tools such as photos and cinematography, like UAVs, which mimic the relaying of information to tell a story, and touch on how war simulations remove the human from the realities of war. Next will follow highlighting the proponents, and then skeptics, of the use of technology. Finally, a section of empirical evidence of UAVs in practice and the persistent problems with their use will be presented and followed by overall concluding remarks.

Bentham's Panopticon: The Disciplined Society

It is fitting to draw a parallel of the DoD's vision of information dominance over future opponents and that of Michel Foucault's rendering of Jeremy Bentham's Plan of the Panopticon which leads to societal discipline. Foucault begins with describing the utopia of a perfectly governed city via a 17th century case of measures taken in a city when the plague came to town. He relates how the city magistrates ordered the observation of the citizens' actions to maintain order and control over them via disciplinary mechanism by an "organization in depth of surveillance and control, an intensification and a ramification of power." (Foucault 1995: 198) Foucault relates Bentham's Panopticon based on the design of a prison that allows for full visibility of the prison tower guard, the guardian, to see, monitor, and observe the prisoners whereas the prisoners cannot see the guardian. The prisoners constantly have in their view the

tall outline of the central tower from which they are spied upon yet are unsure as to whether they are being looked at but sure that they may always be so. The automatic functioning of power is assured via the inmate's induction of a state of conscious and permanent visibility which is the major effect of the Panopticon.

> Bentham laid down the principle that power should be visible and unverifiable…. The Panopticon is a machine for dissociating the see/being seen dyad: in the peripheric ring, one is totally seen, without ever seeing; in the central tower, one sees everything without ever being seen. (Foucault 1995: 201-2)

This Panopticon is the type envisioned by the DoD's vision of information dominance and the use of UAVs in the role of the guardian to see but not be seen. By seeing the opponent and yet not be seen gives the power of information to the seer while leaving the opponent in the position of that of the inmate in not knowing when and where they are being spied upon but knowing that they may be spied upon at will.

This all-seeing mechanism, the Panopticon, automatizes and disindividualizes power. "The Panopticon is a marvelous machine which, whatever use one may wish to put it to, produces homogenous effects of power." (Foucault 1995: 202) Just as the Panopticon of the guard tower may be accessed by anyone who comes to the tower, thereby gaining an understanding of the way in which the surveillance is practiced, so too may other nation-states, not just the U.S. DoD, have access to the use of UAVs and gain an understanding of the technology's abilities and uses. Thus, like the guard tower (the "seeing machine") that "has become a transparent building in which the exercise of power may be supervised by society as a whole," (Foucault 1995: 207) so too is the available technology of the use of UAVs to society as a whole and indeed the existence of over 250 models (with multiple variants of capabilities

which increases this number exponentially) of different UAVs indicate that not just the U.S. is taking advantage of the inherent technological capabilities that UAVs offer in gathering ISR information on other nation-states as a complimenting effect of globalization. As a result of the Plan of the Panopticon, discipline is instilled not only just among the prisoners but also for the deviant outside the prison who could wind up among them, and also for society as a whole who gain an understanding of the ramifications of not conforming to societal norms. Discipline results then in two forms -- the enclosed institution on one extreme that turns inward, the enclosed institution like a prison where communication is broken and time is suspended, and

> at the other extreme, with panopticism, the discipline-mechanism: a functional mechanism that must improve the exercise of power by coercion for a society to come. The movement from one project to the other, from a schema of exceptional discipline to one of a generalized surveillance, rests on a historical transformation: the gradual extension of the mechanisms of discipline throughout the seventeenth and eighteenth centuries, the spread throughout the whole social body, the formation of what might be called in general the disciplinary society. (Foucault 1995: 209)

Foucault may be exaggerating his point here to make clear that the discipline of societal norms and a disciplined society have been instilled through the ages by laws enacted and implemented in order to tame society to an acceptable norm of behavior. The deviants of such a norm would be those who are imprisoned and who must learn to obey the laws of society in order to allow for a functioning society.

"The Panopticon, on the other hand, must be understood as a generalizable model of functioning; a way of defining power relations in terms of the everyday life of men." (Foucault 1995: 205) The function of the Panopticon is to normalize the behavior of those under its watch: "…the major effect of the Panopticon: to induce in the inmate a state of conscious and permanent visibility that assures the automatic functioning of power." (Foucault 1995: 201)

The technological arrangement of the geometric design of the guard tower which provides for sight of the prisoners without revealing the sight of the tower guard to the prisoners demonstrates reason in providing the power of the guard to keep watch over the inmates. That such an arrangement can produce discipline in the prisoners is reasonable too since the prisoners have demonstrated that they act outside the societal norms and need to be disciplined. However, the society at large that does adhere to law and order instilled via the discipline of the norm, should not be irrationally subjected to constant surveillance until such time as they prove that they do not adhere to the norm of law and order. People do not like to be watched and resist such surveillance over their movements (inherent in the concept of innocent until proven guilty).

The same type of seeing, the Panopticon, is envisioned by the DoD with the use of UAVs that surveill at an altitude range of 100 feet to 60,000 feet from the actual target. What then would be the normalized action of an opponent who knows that he is being observed via the technology of a UAV? The skeptics respond that the opponent, like society who does not like to have their freedom of movement surveilled, would adapt his behavior in order to destroy or evade a UAV or to camouflage themselves and their equipment from the detection of a UAV. We can assume then that technological fundamentalists would presume the opponent would wave the white flag in surrender to the technological superiority of the U.S. Empirical evidence, however, demonstrates that the former is the actual result, thus undermining the Plan of the Panopticon for discipline through seeing since transparency is not achieved as a result of the behavior of the opponent. Also likely is that the UAV may go unnoticed by the opponent thus altering the behavior norm sought via the Plan of the Panopticon.

Virilio: Military Technology to See All

Let us now turn to the topic of technological tools to provide this dream of total transparency through seeing from the viewpoint of the French city planner and architect, and warfare historian, Paul Virilio and his vision of pure war and how seeing (via photographic capability) compliments one another. Virilio relates how the use of aerial photography during wars captures the space and geography in real time and how speed and light in the presentation of what is photographed impacts the translation of the images taken. Virilio describes how the use of cinematography was used by leaders to rally the troops and the public in their perception of how the war effort was proceeding by showing the images of events of war that were captured on film. Just as capturing the still photographs of the surveilled geography and movements of enemy forces provides the warrior a picture of his opponent's stance, cinematography and film likewise reveal to the audience the stage that is set for the telling of a story.

Virilio makes the leap from aerial photography and cinematography, the setting of the stage, to the computer-generated fantasies of warriors on the battleground and how simulations are being used by the military today in preparation for, and the conduct of, war. He also hypothesizes what is to come in looking at how the transplantation of technology will play a role in future warfare, that is, a cybergenetic concept where, for example, wounds are treated and repaired by nanotechnology (microscopic, artificially intelligent chips - implanted just under the skin), that are directed by the body's awareness of injury to direct the technology to repair the injury.

More and more the military is relying on computer technology with visual screens to play out the battles of war, much like computer games of war. These computer simulations effectively remove the human element, the representation of the life of an opponent, by substituting an icon in its place and thus removing the human component from the end result of death on the battlefield. Consequently, the soldier identifies the simulation of war as a game with the human element removed. Thus the link between the military industrial complex with its network-centric warfare concept and the entertainment complex of computer simulations and cinematography is made. The soldier is like the movie-goer who is transfixed into a scenario that is created for him where fantasy and reality for a time become one.

Virilio sees the war machine as the "radical super-articulation of the structures which ensure the domination of the Politico-Military-Entertainment complex." (Couples 1997: 13) Linking the Plan of the Panopticon and Virilio's use of cinematography in the conduct of war, he notes that,

> Alongside the 'war machine', there has always existed an ocular (and later optical) 'watching machine' capable of providing soldiers, and particularly commanders, with a visual perspective on the military action under way. From the original watch-tower through the anchored balloon to the reconnaissance aircraft and remote-sensing satellites, one and the same function has been indefinitely repeated, the eye's function being the function of a weapon. (Virilio 1989: 3)

The use of the ocular 'watching machine' serves as the Panopticon's prison guard tower from where the prisoners are watched. The power gained from seeing the enemy and the battlefield translates into action of the warrior in destroying his target. Indeed, such power is what the military seeks:

> 'If I had to sum up current thinking on precision missiles and saturation weaponry in a single sentence,' said William J. Perry, a former U.S. Undersecretary of State for

> Defense, 'I'd put it like this: once you can see the target, you can expect to destroy it.' (Virilio 1989: 4)

Today's concept of military transformation with the use of networked computers that provide information dominance and the use of simulated battles on computer screens is in keeping with Virilio's stance on the new form of warfare:

> This makes the decisive new importance of the 'logistics of perception' clearer, as well as accounting for the secrecy that continues to surround it. It is a war of images and sounds, rather than objects and things, in which winning is simply a matter of not losing sight of the opposition. The will to see all, to know all, at every moment, everywhere, the will to universalized illumination: a scientific permutation on the eye of God which would forever rule out the surprise, the accident, the irruption of the unforeseen. (Virilio 1994: 70)

Virilio's 'logistics of perception' plays well on the Plan of the Panopticon and reinforces the desire for the all-seeing capability that influences behavior via discipline. Virilio takes the concept of "logistics of perception" even a step further "where images war with one another, becoming a substitute for reality itself." (Der Derian 2001: 66) Virilio discusses the high-tech advances and how they translate into an ever-increasing escalation of arms build-up with speed and automation of the new weapons which should deter opposition but which actually leave little room for politics and human decision. He sees the weapons one day becoming so automated and self-sufficient that politics will not be needed as the war machine will direct its own deterrence: "the 'apolitics of the worst,' which necessarily leads to the war machine one day becoming the very decision for war - thus accomplishing the perfection of its self-sufficiency, the automation of deterrence." (Virilio 1998: 55)

Virilio seems to be voicing a cautionary note about the path that the U.S. military is headed down in its concept of using the Plan of the Panopticon merged with the technological

tool of cinematography in the conduct of war:

> He seeks to reclaim the medium with a serious message: obsessive media vigilance of behavior combined with political correctness transforms democracy from an open participatory form of government into a software program for the entertainment and control of all spectators. Speed enhances this phenomenon through a global 'shrinking effect': 'With acceleration there is no more here and there, only the mental confusion of near and far, present and future, real and unreal - a mix of history, stories, and the hallucinatory utopia of communication technologies.' The coeval emergence of a mass media and an industrial army was the signifying moment of modernity, of a capability to war without war, producing 'a parallel information market' of propaganda, illusion, and dissimulation. However, technological accelerants like satellite linkups, real-time feeds, and high-resolution video augment the power of television to dissimulate in time as well as space. With the appearance of a global view comes the disappearance of the viewer-subject: in the immediacy of perception, our eyes become indistinguishable from the camera's optics, and critical consciousness, along with the body, goes missing. (Der Derian 2001: 215)

However, the power and advantage obtained via an all-seeing capability such as information dominance that the DoD seeks to obtain does not necessarily translate into success on the battlefield. Contrasting views of technological fundamentalists and the skeptics highlight their differing views, most especially on the issue of the art of war. Let us delve into the two sides – those who seek the battlefield advantage to be led by technology and those who are skeptical of the faith in technology.

Proponents of UAVs

A high-profile advocate for UAVs is U.S. Secretary of Defense Donald H. Rumsfeld who espouses the vision of Transformation which involves a mindset change that allows for harnessing technological advances of the information age in order to gain a qualitative advantage over the opponent. The network-centric warfare doctrine entails taking advantage of information technology that radically enhances the effectiveness of command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR). Transformation focuses on a

new way of war that relies on speed, maneuver, flexibility, and surprise. Secretary Rumsfeld laid out his vision of Transformation in the May/June 2002 Foreign Affairs article, "Transforming the Military," by highlighting "the ability of forces to communicate and operate efficiently on the battlefield will be critical to success." (Rumsfeld 2002: 20)

Rumsfeld notes that Transformation, "… is also about new ways of thinking and new ways of fighting" (Rumsfeld 2002: 21) and provides the example of the German blitzkrieg that revolutionized warfare by "the unprecedented ways in which they mixed new and existing technology." (Rumsfeld 2002: 21) The Secretary illustrates transformation of the military with adding "low density/high demand" assets: "For example, the experience in Afghanistan showed how effective unmanned aircraft could be -- but it also revealed their weaknesses and how few of them we have. The DoD has known for some time that it does not have enough unmanned aircraft for reconnaissance and surveillance or command and control, …" (Rumsfeld 2002: 24)

A key concept that Army Aviation is realizing today was laid out by Secretary Rumsfeld concerning military capabilities:

> As we change investment priorities, we must begin shifting the balance in our arsenal between manned and unmanned capabilities, between short-and long-range systems, between stealthy and non-stealthy systems, between shooters and sensors, and between vulnerable and hardened systems. And we must make the leap into the information age, which is the critical foundation of our transformation efforts. (Rumsfeld 2002: 24)

Technological fundamentalists are thus making the case for unmanned versus manned capabilities for the future of warfare, thereby relying on the technology used to employ these craft over the skills and abilities of man in craft.

Another proponent of the military transformation and the doctrine of network-centric warfare is Admiral Arthur Cebrowski, Director of Force Transformation at DoD. Cebrowski speaks of leveraging new capabilities of the information domain in order to develop knowledge and notes that, "The force operating in the networked condition can reach for tactics that an enemy which is not networked simply cannot reach for." (Cebrowski 2004) Cebrowski says that the battles are won in the cognitive domain, that is, in the minds of the commanders and admits that with the information dominance network that the information domain is informing the cognitive domain. However, Cebrowski believes that the information domain informing the cognitive domain is allowing for commanders to create new tactics and operating procedures that help to gain the advantage over an opponent. Cebrowski notes that warfare is more than combat and that national security via the DoD is not enough, that ultimately conflict is resolved in the complex political domain. He reveals that in the networked environment the behavior of soldiers differs due to the shared awareness and shared understanding via the broad access of information available through the network. He says that soldiers can better maintain their situational awareness and unit cohesiveness via the networked environment. Cebrowski admits that "the enemy can and does adapt to our technological and physical advantage" (Cebrowski 2004) as recent events in Iraq show and that transformation does not mean we will win with certainty. Cebrowski maintains that transformation provides for a broad and sustained competitive advantage, one that preserves options.

Not only intellectuals are voicing their belief in technology and its capabilities but institutions such as the U.S. Congress have bought into the faith of technology espoused by the technological fundamentalists.

The Congress has shown growing support of the use of UAVs and has provided strong encouragement for continued advancements in the field of UAV technology but tempers its encouragement with concern for commonality between the services' UAV programs by directing the formation of joint program offices and the submission of a UAV roadmap for the DoD. (Congress 2003) Citing the expendable nature of the UAV in comparison to the risk of loss of human life and noting the lower acquisition costs of employing UAVs, the Congress has demonstrated its agreement with the technological fundamentalists leading the course of replacing manned aircraft capabilities with that of UAVs.

As to funding, the Congress has demonstrated its agreement with technological fundamentalists in approving increased funding levels for the procurement of UAVS. DoD has been spending about $600 million a year on UAV programs and, "If the upward trend in UAV funding continues, according to the DoD roadmap UAV Annual Funding Profile, DoD is projected to invest over $10 billion in UAVs in the first decade of the new century. This is triple what it did in the previous decade." (Bone 2003: 14) The FY04 Presidential budget for UAV Programs outlines spending profiles for 12 UAV programs for the DoD with fiscal year sums of $1.4 billion in FY03 steadily rising to reach $3.2 billion by FY09 for RDT&E, procurement and O&S sums. The inventory of UAVs is expected to quadruple from 80 (in 2002) to over 300 UAVs by 2010, excluding the micro and mini-UAVs. (OSD 2002)

Let us now turn to look at the viewpoint of the skeptics and consider some of the criticisms that have become evident from empirical evidence from prior and on-going conflicts.

The Skeptics

The arguments posed by the skeptics in the military field, those who put reason ahead of faith, include the timeless unpredictability of war and the art of war, in addition to lessons learned that highlight technological immaturity, command and control conflicts, and the counter-opposition of the opponent.

One vocal skeptic of the reliance of information dominance in the network-centric warfare strategy is Lieutenant General Paul Van Riper, former president of the Marine Corps University, who voices appreciation for technology such as precision-guided munitions and overhead surveillance systems. However, he cautions that "If you lead with the technology, I think you're bound to make mistakes." (Van Riper 2003) In other words, the technology should not drive the character and form of war but should influence that character and form. Van Riper refers to the Prussian general and theorist Carl von Clauswitz who wrote the classic *On War* wherein Clauswitz discusses the fundamentally uncertain nature of war. He maintains that, "In reality, the fundamental nature of war hasn't changed, won't change, and, in fact, can't change. … There is no way to predict how any war will turn out … it has its own dynamics as it unfolds." (Van Riper 2003) Van Riper calls the terms "information dominance," and "network-centric warfare" slogans that are masquerading as ideas that make war more antiseptic. "They make it more like a machine. They don't understand it's a terrible, uncertain, chaotic, bloody business." (Van Riper 2003) Van Riper says that "once you understand how you're going to fight, then you bring the technology to it." (Van Riper 2003) He speaks of the art of war and the science of war not being equal, that the art is the thinking and understanding the theory and the

nature of war, how you want to bring combat to bear, and what the operating concepts are while the science is represented by the weapons, the technology.

Van Riper also speaks of how important it is to adapt in the face of the enemy, that is, how to use the technology in the adaptation. He believes that the war in Afghanistan would have gone much worse had our Special Operations Forces not understood the culture of the people in the region in order to relate to them and adapt to it. Van Riper notes "war is about adapting." (Van Riper 2003) Even for our enemies who may not fear the overwhelming forces of the U.S. because they think of ways to adapt and avoid the U.S. force and do as much damage as they can think of. He notes that in the later stages of the war in Iraq, just as in Vietnam, the enemy is using techniques to do damage to the U.S. even though they were defeated in a conventional battle.

To counter the U.S. conventional warfare, Van Riper notes that if he were the enemy, he would spread out to avoid being a target in one location, and take advantage of places where American technology will not work such as in the cellars of buildings or in caves. He asserts, "I would focus on how to reduce my signature and take away the Americans' ability to surveil and have reconnaissance on my positions." (Van Riper 2003) Van Riper clearly understands that to adapt strategies to counter the overwhelming and technological force of the U.S. is part of the strategy of the art of warfare. Lieutenant General Van Riper, the skeptic, has highlighted areas where the enemy of America has adapted and dragged out the war. Van Riper is not alone in sharing a cautionary note about the over reliance on technology.

Another skeptic is retired Army Colonel Douglas McGregor, a military strategist known for his unconventional thinking. Though initially viewed as an advocate for transformation and asked by Secretary of Defense Rumsfeld to consult with military officials on the formulation of the Pentagon's Iraq war plan, he warned DoD of becoming overly dependent on technology with the caveat, "technological advances cannot eliminate ambiguity, uncertainty, chance, and the forces of chaos from the field of conflict." (McGregor 1977) Colonel McGregor also cautioned that, "close-up ground fighting would continue to be a critical factor in the outcome of the war." (McGregor 1977) Like the skeptic Van Riper, McGregor also raised the issue of the unpredictability of war and of not underestimating the opponent: "War, in common with sport, has the characteristic that what worked well yesterday may not work well tomorrow, precisely because it worked yesterday. History shows that the making of false assumptions about the enemy is a perennial problem." (McGregor 1977)

Not only intellectuals are voicing their skepticism of technology and its capabilities but highly-regarded institutions such as the Congressional Budget Office have pointed out concerns of the faith in technology.

The Congressional Budget Office voiced its concerns in a September 1998 report, "Options for Enhancing the DoD's UAV Programs" that loss of manned aircraft capabilities will mean loss of needed capabilities that UAVs cannot provide. Included are the ability of pilots to spot friend or foe and react quicker for shoot down orders as compared to a UAV as well as the quick reaction time of human pilots as compared to a programmed vehicle or one that reacts slowly to the pilot controls. Some have predicted a forthcoming movement of funds from

manned aircraft to unmanned craft and the Army's cancellation on February 23, 2004, of the 21-year effort on the Comanche Reconnaissance and Attack Helicopter program enacted such a movement. The reallocation of funds from the cancelled Comanche program to other Army Aviation programs and UAVs, in addition to transitioning in 2004 doctrinal proponency for UAVs to fall under the Aviation umbrella and away from that of intelligence, certainly indicate a movement from manned to unmanned craft.

Other areas of concern noted by skeptics include technological immaturity of UAVs, command and control conflicts when UAVs are employed, and counter-opposition from the opponent to the use of UAVs. Let us look at the technological issues that plaque UAVs and that hinder the strategy of information dominance in the war.

UAVs in Practice: Achievements and Limitations

The empirical evidence on the use of UAVs by the U.S. demonstrates that since their use in Desert Storm to the present day in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), the technology has not been perfected to provide continuous transparency of the opponent to all levels of the military. This is a fourteen-year time span in which the technological improvements should have been perfected to allow for effective operation of UAVs with other military technology to provide the capability that was promised. Yet, the technology has not kept pace with the ideas of the technological fundamentalists who still, even after the evidence of its shortcomings has been demonstrated, believe that the technology is the saving grace of the U.S. warfare strategy. Skeptics point out that the irrationality of their faith is evident by the empirical evidence that shows that the technology has not reached the level that

was promised and envisioned.

In the recently published Technology Review article by David Talbot, November 2004, "How Technology Failed in Iraq," Talbot reports that U.S. technology fell far short of expectations. Even though "U.S. commanders in Qatar and Kuwait enjoyed 42 times the bandwidth available to their counterparts in the first Gulf War" the same verdict delivered after the first Gulf War's ground battle was delivered.

> What we uncovered in general in Iraq is, there appeared to be something I refer to as a 'digital-divide,' says Walter Perry, a senior researcher at Rand's Arlington, VA, office and a former army signals officer in Vietnam. 'At the division level or above, the view of the battle space was adequate to their needs. They were getting good feeds from the sensors,' Perry says. But among front-line army commanders … 'Everybody said the same thing. It was a universal comment: 'We had terrible situational awareness.' (Talbot 2004)

One success throughout all levels was that of the Blue Force Tracker, the vehicle-tracking system of friendly units, but the more important communication relaying situational awareness of the opponent was broken for the front-line. "Some units outran the range of high-bandwidth communications relays. Downloads took hours. Software locked up. And the enemy was sometimes difficult to see in the first place." (Talbot 2004) Breakdowns of the information technologies resulted in a network that didn't network all the forces.

> Once the invasion began, breakdowns quickly became the norm. For the movement of lots of data - such as satellite or spy-plane images - between high-level commanders and units in the field, the military employed a microwave-based communications system originally envisioned for war in Europe. This system relied on antenna relays carried by certain units in the advancing convey. Critically, these relays … needed to be stationary to function. Units had to be within a line of sight to pass information to one another. But in practice, the convoys were moving too fast, and too far, for the system to work. Perversely, in three cases, U.S. vehicles were actually attacked while they stopped to receive intelligence data on enemy positions. (Talbot 2004)

Virilio's concerns about the increasing speed of warfare and communications hit home with the technology in OIF where the technology couldn't keep pace with the speed of the advancing U.S. troops.

> One Third Infantry Division brigade intelligence officer reported to Rand that when his unit moved, its communications links would fail, except for the GPS [Global Positioning System] tracking system. The unit would travel for a few hours, stop, hoist up the antenna, log back onto the intelligence network, and attempt to download whatever information it could. But bandwidth and software problems caused its computer system to lock up for ten to 12 hours at a time, rendering it useless. (Talbot 2004)

The problem of information overload also came to pass but this occurred at higher echelons.

> Meanwhile, commanders in Qatar and Kuwait had their own problems. Their connectivity was good - too good. They received so much data from some of their airborne sensors that they couldn't process it all; at some points, they had to stop accepting feeds. When they tried to send information to the front, of course, they found the line-of-sight microwave-relay system virtually disabled. … 'The network we had built to pass imagery, et cetera, didn't support us. It just didn't work,' says Col. Peter Bayer, then the division's operations officer … 'The link for V Corps [the Army command] to the division, the majority of time, didn't work, to pass a digital image of something.' (Talbot 2004)

Soldiers turned to the e-mail system which turned out to be a primary method of control instead of the supplement it was intended to be -- in some instances to issue basic orders to units not receiving network communications. In particular to the use of UAVs:

> The network wasn't much better for the marines pushing forward on a separate front. Indeed, the marines' lessons-learned report says that First Marine Division commanders were unable to download crucial new aerial photographs as they approached cities and towns. High-level commanders had them, but the system for moving them into the field broke down. This created 'a critical vulnerability during combat operations,' the report says. 'There were issues with bandwidth exploitation, and processes that caused this state of affairs, but the bottom line was no [access to fresh spy photographs] during the entire war.' (Talbot 2004)

As to the reaction of an opponent when UAVs are used for surveillance purposes, such as

during the crisis in Kosovo, the expected norm of surrender to NATO forces and adherence to the Serbs' agreed-to ceasing of hostile actions did not result. Instead, Serb forces reacted to surveillance by NATO forces by shooting down as many UAVs as possible. Though NATO has no reported published numbers of UAV shoot-downs, an unofficial count of NATO UAV losses during the Kosovo conflict that was made available to Tim Ripley of the Defence Data Web reflects a total of twenty-six UAV losses: eleven U.S. UAVs shot down and six U.S. UAVs as non-combat losses; the remaining 10 combat losses were evenly split between German and French UAVs. Clearly, the panoptic results of discipline of the NATO opponent (in this case in Kosovo to be the Serbs, the aggressor of hostilities) through seeing (via the use of UAVs) were not in keeping with expectations.

Persistent Fantasies

What is so alarming about the results of the empirical record is that supporters of transformation like retired Vice Admiral Art Cebrowski, former Director of the Pentagon's Office of Force Transformation, refuse to believe that the breakdowns in the network were any more than the normal course of trying out new information technology. "'Combat was moving too fast; opportunities were too fleeting. You had to be in the networked environment' for it to work, says Cebrowski." (Talbot 2004) However, this is the point -- that the soldiers on the ground in harm's way were supposed to be in the networked environment but the technology was not there for them -- it didn't work like it was envisioned or proclaimed to work. Had the U.S. been up against a more adversarial and prepared opponent, combat losses could have been enormous. Clearly, the technology, the network-centric warfare concept, is not progressing at the same speed that U.S. demands require it to. These technology failures in Iraq are not entirely

new and a highlight of the main technological issues makes the case in point one that demonstrates a continued lack of advancement in the linking of network technologies to allow for information dominance to be achieved.

Technological immaturity on several fronts persist that impede maximization of the capabilities of UAVs and indeed the fantasy of information dominance via network-centric warfare. The transmission of data from UAVs is the first link in providing the all-seeing picture of the opponent and the battlefield. The transmission of data has been hindered technologically by a lack of bandwidth.

Bandwidth has been an issue for the transmission of data from multiple UAVS in the air by the various services and is an area that will continue to be important to the transmission of video surveillance. From lessons learned during the second Gulf War and to continue with transformation, more surveillance platforms (UAVs and the Joint Surveillance and Target Attack Radar Systems which use ground-mapping radar to monitor the battlefield) are needed, as well as more bandwidth to allow all these systems to communicate with one another. Indeed, 30 times more bandwidth was used in OIF than in Desert Storm and the need for speed will only keep growing. (Boot 2003: 9)

UAVs also provide the opponent with indications of the enemy being nearby by revealing itself to the opponent. For example,

> The UAV's problem is supporting real-time communications without revealing itself. Even with real-time communications, turning lidar (light detection and ranging) on, which cuts through most stealth, can reveal its location to a sufficiently sophisticated enemy. Active radar-based sensors can cut through foliage and under the right soil

> conditions can see into the ground. They do so, however, at greater cost, somewhat lower resolution, and being active, at the expense of platform stealth. Passive sensors can also detect radio emitters and thus geolocate their source. A technologically competent foe can nullify such information by using focused transmissions (e.g., line of sight or at least microwave), generating electro-magnetic clutter, operating in a dense environment (one that produces echoes), or designing systems such that emitters are separated from more valuable targets (e.g., bistatic radars and relays to higher-power transmitters). Sooner rather than later the use of public-key encryption and digital signatures will limit our ability to exploit (other than detect) such radio-frequency or any other communications. (Libicki 1995: 6-7)

Use of sensors also has the capability to reveal more to the opponent than we would like thus constraining the use of key technology:

> AWACS [Airborne Warning and Control System] and JSTARS [Joint Surveillance Target Attack Radar System] are wonderful tools, but they radiate like Christmas trees and will be at increased risk as the consequences of their visibility are made actionable. How visibility is sought also matters. If we have the cooperation of those who occupy the battlespace, we can use infrastructure sensors. If we lack cooperation but our engagement is overt, we can dispense sensors into the environment. If our engagement is covert (e.g., we are not yet at war, or we wish to hide our fingerprints while helping one side of a conflict), U.S. forces cannot easily use sensors that can be captured and traced back to us. (Libicki 1995: 8)

Command and Control issues primarily rest on air space integration and deconfliction, and mission planning conflicts and also limit the maximum contribution that UAVs can provide. Recognized but not yet implemented is that area space integration needs to be addressed to integrate UAVs into the military airspace and the civil airspace. The DoD is working with industry and government partners but is far from reaching regulatory consensus. (Weatherington 2003) An Aviation Week article of March 24, 2003, noted that the U.S. had as many as 90 UAVs operating right now. For OEF (Afghanistan), the DoD has in excess of 10 different types of UAV systems supporting operations. The DoD numbers exclude the use of UAVs for homeland security purposes. For example, from lessons from Kosovo: "Hunter was flown out of Skopje, Macedonia international airport. This had an unintended OPSEC [operational

security] consequence in that the Hunter takeoffs and landings had to be operationally coordinated with the Macedonia civil air traffic control." (Wentz 2002: 458)

The operational characteristics of UAVs are much like the guard tower in Bentham's Plan of the Panopticon and the cinematography noted by Virilio -- they blend characteristics from both concepts together. Operating at altitude ranges of 100 to 60,000 feet above an opponent, a UAV can provide the guardian's view in the guard tower of the opponent (equivalent to the prisoner that the guardian monitors). Though the possibility exists of being seen by the opponent, the possibility of not being detected also exists due to either its small size (if a micro-UAV) or if operating at high altitudes that evade the sight of the opponent. Though the UAVs have endurance and fuel limits of flight, the use of more than one UAV could ensure continuous coverage of sight of the opponent. Also, the UAV employs the technical capability of recording, in digital imagery, the opponent's geographic cartography, equipment, and movements which is relayed and viewed by the Commanders on the ground, just as cinematography displays the captured images and movements recorded to tell a story.

The normative behavior that results from being spied upon does not always result in the expected manner – it can be one of rebellion instead of agreement to the wishes of the all-seeing (be it the guardian, the state, the society, or the adversary in the case of war). The technological fundamentalists failed to imagine that the opponent would actually resist in a manner that would distort the transparency of the opponent and the battlefield. The opponent has not only resisted the normative behavior sought by the U.S. but has turned the table to ensure a more level playing field in their strategy of war -- that is, they use tactics that result in the U.S. having to fight an

urban war for which they are not prepared for.

The skeptics point out that the behavior of an opponent is a consideration that should not be underestimated with the use of UAVs as a surveillance instrument. The DoD has not adequately factored in the will of its opponent and this has been most evident in OIF where counter insurgents continue to fight the U.S. Highlighted in the October 1995 article by Dr. Martin C. Libicki, "DBK [Dominant Battlespace Knowledge] and Its Consequences, "Institute for National Strategic Studies, Washington, D.C., published by the National Defense University Press Book, "Dominant Battlespace Knowledge," is the serious point that opponents, however small, do fight back as witnessed in the war in Vietnam. The caution was, "The conflicts we face will remain competitions among thinking, learning, and adaptive human beings, so we need to recognize that any future opponent could diligently and intelligently try to counter capabilities the system-of-systems gives us." The reference to system-of-systems is the same concept of network-centric warfare where military systems are networked together to provide the information link of all available data to the commander and the war fighter.

Also noted in the article by Dr. Libicki, "DBK and Its Consequences," is the concern about what others can see.

> Most middle-and upper-income countries should be able to pick up navigational signals from multiple signals (and map them into fine-grain digital cartographic data-bases), obtain satellite imagery at the 4- to 20-meter resolution level (from third-party purveyors or even their own small satellites), send signals on communications satellites (in low, geosynchronous, and even middle earth orbits), acquire sophisticated turn-key traffic management systems, operate UAVs with digital sensors and downlinks, and own police networks armed with networked mincemeats. They could do this through buying or renting capacity from commercial markets or friendly governments. (Libicki 1995: 10)

Dr. Libicki does not hesitate to point out that "the military-technical revolution taking place

within U.S. could also take place among those overseas."(Libicki 1995)

Yet another consideration highlighted by the skeptics and not factored into the war strategy is that opponents adapt countermeasures to the use of UAVs. For example, in the war in Afghanistan, the opposition learned fast to adapt measures to ensure survival.

> Within days of the first Special Operation Forces (SOF)-directed air strikes, American commandos were already reporting that Taliban vehicles in their sector had been smeared with mud to camouflage them. In the fighting north of Kandahar and along Highway 4 south of the city in December, al Qaeda defenses were well camouflaged, dispersed, and making use of natural terrain for expedient cover. (Biddle 2003: 3)

Use of cover and concealment, camouflage discipline, and exploitation of dummy fighting positions to draw fire and attention from their real positions was implemented by al Qaeda forces through Operation Anaconda (March 2-17, 2002). Al Qaeda forces also concealed their defenses among a series of culverts in burned-out vehicles along the roadside, which remained wholly undetected until their fire drove back an allied advance as well as launching a counter-attack against U.S. forces using a system of wadis, or dry valleys for cover. Camouflage also came in the guise of Al Qaeda fighters dressed in the flowing robes of local herdsmen who tend goats or travel through such areas routinely. These disguised fighters traveled in small parties in the mountains, rendering them virtually impossible to distinguish as noncombatants. Natural, like overhanging rock, and manmade cover kept the reconnaissance drones, airborne radars, satellite surveillance, and thermal imaging equipment from detecting those combatants who exploited the complex environment of the earth's surface. Indeed, "military exploitable cover is commonplace in any theater of war. … foliage degrades all existing sensor technologies; urban areas provide overhead cover, create background clutter, and make it difficult to distinguish military targets from innocent civilians." (Biddle 2003: 4) History has shown that defenders can survive

modern firepower in sufficient numbers to mount serious resistance via a combination of cover and concealment.

Rebutting the lauded "Afghan model" as the future of warfare which referred to the combination of special operations forces, precision weapons, and indigenous allies during OEF, Stephen Biddle, Associate Research Professor of National Security Studies at the U.S. Army War College in his March/April 2003 Foreign Affairs article, "Afghanistan and the Future of Warfare," noted, "Although they were initially taken by surprise, Taliban fighters quickly adapted to American methods and adopted countermeasures that allowed many of them to elude American surveillance and survive U.S. air strikes. These surviving, actively resisting Taliban had to be overcome by surprisingly traditional close-quarters fighting." (Biddle 2003: 1)

UAV shoot-downs were also a technique adopted by the opponent to counter the use of UAVs in surveillance and reconnaissance missions. From lessons learned in Kosovo, the level of losses of UAVs was a shock to some NATO officers. The Serbs were employing special developed tactics to counter the UAV threat as they had learned many lessons from the alliance's use of UAVs over Bosnia from 1994 onwards.

> The majority of NATO UAV units were based in Macedonia and could only be launched from a handful of sites which were well known to Serb intelligence. It was therefore easy to position guns and hand-held heat seeking missiles under likely UAV flight paths. The German UAV unit also fell into a very predictable pattern of operation and launched their drones at the same time every day for several weeks. The Serb air defence forces could expect targets to appear at this time and had their gun and missile crews ready for action. The most innovative Serb anti-UAV tactic was the use of helicopters. It appears that the first Hunter of the campaign was lost after the Serbs launched a Mi-8 HIP helicopter to fly alongside the UAV and then a door gunner blasted the air vehicle with a 7.62mm machine gun. This then became a favorite tactic until allied fighters made it rather dangerous. (Ripley 1999)

As to the exact number of UAV losses, the Yugoslav's claim they shot down 25 over Kosovo

alone and others over Serbia and Montenegro.

Conclusion

The technological developments and improvements that should radically enhance the effectiveness of U.S. military C4ISR capabilities to provide a qualitative advantage over opponents have not materialized. Proponents, those deemed technological fundamentalists, espousing the doctrine of transformation via a network-centric warfare that relies on information dominance should admit that the technology has not been effectively demonstrated to validate the fantasy of the irrational dream of transparency through perfect seeing. The technological fundamentalists should therefore heed the cautionary note of skeptics who point out that the timeless unpredictability of war, the art of war, and the empirical evidence from recent conflicts demonstrate that the technology is not deserving of the faith being placed in it. Granted, were the technology to eventually work as envisioned, the force would be more aware of the movements of the opponent and the terrain to be navigated via the networked communications and should respond quicker to developments. Regardless, the force should not underestimate the will of the opponent. Even though the opponent may be aware of the presence of UAVs and that he is being spied upon and tracked, the empirical evidence shows that the norm that entails as a result of this Panoptic plan via UAVs is the opponent adapting his actions for survival instead of surrendering with a white flag. The opponent adapts his skills in order to stay alive and will use various measures such as camouflage, dispersing its forces, using decoys, and taking the fight to an urban area to blend in with the civilian population in order to wage urban warfare which boils down to soldier-against-soldier in hand-to-hand combat.

The DoD is relying too much on technology such as that of the seeing eye of the UAV to carry out the Plan of the Panopticon over its opponents in the conduct of war. With the proliferation of the UAV technology that exists around the globe, even opponents can buy into and attempt to institute the Plan of the Panopticon on another nation-state, perhaps even the U.S. Given the technological limitations noted in the most recent conflicts the U.S. has been involved in, the DoD is not anywhere close to the point that Paul Virilio believes the U.S. is aiming for, the automation of deterrence with "logistics of perception." Indeed, in the quest for the all-seeing and control of the enemy, the U.S. seems to have lost sight of the true goals of democracy – freedom of speech and movement for all law-abiding citizens – through observation via technology that actually enslave all to the sight of an overseer, be they friend or foe. The DoD is reaching for too much control via invasion by sight that even technology is having trouble keeping up with by its ever-increasing desire for more information, more insight into the opponent's movements, resources, and territorial terrain. From empirical evidence gained in the U.S. efforts of Desert Storm (Iraq), Operation Allied Force (Kosovo), Operation Anaconda (Afghanistan), and on-going Operation Enduring Freedom (Afghanistan) and Operation Iraqi Freedom (Iraq), it is clear that technology is far from the goals the DoD is aiming for in order to achieve the dream of transparency through perfect seeing and panoptic power to defeat its enemies. The DoD's quest of this vision of the perfect Panopticon via the use of UAVs as a link in information dominance demonstrates the difference between the enlightened skeptics who believe in reason versus the technological fundamentalists who believe in the faith of technology. Clearly, these technological fundamentalists turn a deaf ear to those who reason that the technology upon which the faith is placed in does not deliver the promised results. However, as the empirical evidence demonstrates that the use of UAVs have provided for limited visibility of

the opponent and not the perfect Panopticon as envisioned, the reasoning voiced by skeptics should be heeded.

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