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14. ABSTRACT

Technology is advancing at an ever increasing rate in the 21st century. Many of these advances have been incorporated into the military. The latest gadgets are often bought from commercial vendors; the so called, "off the shelf" solution. Although this often provides a short term benefit, often too little analysis is conducted on to best integrate the technology into the way we fight. This paper uses a case study of how Britain and Germany reacted to the introduction of the tank in World War I and their later development of their armor doctrine. It concludes that the operational commander is critical in the needed analysis and integration of new technology. He is the one ideally situated to persuade leaders at the strategic level of the importance of providing the resources necessary to acquire the most advanced technology. He also has the authority to make adjustments to force structure to maximize the capabilities of the technology and implement training requirements to make sure the technology is utilized in a standardized manner. New technology can have a detrimental effect at the tactical level if implemented incorrectly or only grudgingly adopted by subordinate commanders. The operational leader must use his authority and leadership skills to get by in from all concerned to maximize technological advances.

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Operational Leadership and Advancing Technology

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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Contents

Abstract

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INTRODUCTION

They've taken human error out of war, Heine.

- Curt Jurgens as U-boat Captain Von Stolberg[1]

Technology has advanced rapidly in the 21st century. This exponential growth has been described in a number of ways; from "Moore's law," which determined the number of transistors on a microchip was doubling approximately every two years,[2] or "The Law of Accelerating Returns," to refer to the fact that the Patent Office has determined the number of important discoveries has doubled every twenty years since 1750.[3] The way war is fought has, like the rest of modern world, been touched by the wave of technological advances.

Much has been written on how these technological advances have had an effect on modern warfare. However, much less has been written on what effect these advances have had on military leadership. This paper will focus on how operational leaders have, in some instances, used technological advances in their ability to acquire real-time battlefield data to micromanage their subordinates. This has occurred because there has been little critical analysis done necessary for the development of solid doctrine for the utilization of the technology. This analysis must determine how best to integrate the technology into the way that a specific military conducts its operations. What is best for Germany may not be the best implementation for the United States.

A case study of the introduction of tanks during World War I and the development of armor doctrine by England and Germany during the Interwar Period between the end of World War I and the beginning of World War II will be used to examine how a similar

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[1] Powell, Dick, dir., *The Enemy Below*, Century City: Twentieth Century-Fox Film Corporation, 1957).
[2] Singer, P.W., *Wired for War*, (New York: Penguin Press, 2009), 97.
[3] Singer, 99.

capability can be integrated into a military's doctrine in vastly different ways; leading to varying degrees of success.

If this analysis is not done, there is a potential that the technology will detract from the military's capability rather than increase it. The dramatic increase in the amount of data generated by multiple intelligence sources is an example of this. This situation, where an operational commander can watch a tactical operation in real time and communicate directly with the commander on the ground, has the potential of being the inverse of the "strategic corporal;" instead, the Joint Task Force (JTF) commander can become the "big squad leader."[4]

TECHNOLOGY AND WARFARE

Technology has long had an impact on the conduct of war. The operational factors space, time and force have all been affected. The ability of a commander to adopt, adapt to, and implement new technology and then incorporate it into his plan, has often meant the difference between victory and defeat.

Technology changed the relationship among factors space, time and force. Although a mile was 1760 yards long in 1865, just as it is today, mechanization has changed its implication for the warrior. A commander can now move troops distances via ground or air transportation that were inconceivable less than a century ago. This provides commanders with added capabilities but also creates additional threats against which he must defend. As the French learned in 1940, developing a doctrine which called for an enormous investment

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[4] The "strategic corporal" is a phrase for the premise that even the actions of soldiers at the lowest levels can have strategic ramifications. The reference to the premise that a senior officer can, through the use of technology, become essentially a squad leader, one of the lowest level of leadership in an infantry unit, who leads a 9-11 man squad.

in a static, defensive war against a mobile attacking enemy is usually unsuccessful when the space to be defended exceeds the capabilities of the force allocated for the defense.[5]

While technology has made operational planning more rapid and efficient, it has also reduced the amount of reaction time available to commanders. Technology has also increased the amount of data available to commanders at all levels. This is a double-edged sword in that the commander may go into a battle with increased knowledge of the enemy situation but must allocate adequate time for his staff to synthesis the raw data into usable information. Failure to know when an operational picture is "good enough" can result in a commander constantly delaying action in an attempt to achieve "perfect intelligence."

Technology has played a critical role in determining factor force. Advances in weaponry, mass production, and industrialization has provided nations with armies with a greater number of more lethal weapons manned by a better educated fighting force and is more easily assessed than intangibles which effect the fighting force. These intangibles include morale, unit cohesion and discipline.[6] Although these factors are undoubtedly affected by technology, this effect is less able of being measured than the number or caliber of guns a force has.

<div align="center">LEADERSHIP</div>

Leadership itself is not easily defined. President Harry Truman described it as "the ability to get men to do what they don't want to do and like it."[7] Generic definitions include: the office or position of a leader; capacity to lead; and the act or an instance of leading.[8]

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[5] Macksey, Kenneth, *Tank Warfare: A History of Tanks in Battle*, (New York: Stein and Day, 1972), 75.
[6] Vego, Milan N., *Joint Operational Warfare: Theory and Practice*, (Newport, U.S. Naval War College, 2007), III-41-42.
[7] Singer, 353.
[8] "leadership." Merriam-Webster Online Dictionary. 2009. Merriam-Webster Online. 4 April 2009 http://www.merriam-webster.com/dictionary/leadership.

Although everyone may not agree on an exact definition of leadership, most agree that leadership, especially military leadership, is not synonymous with "management."[9] Managers often focus solely on numbers and formulas for accomplishing an assigned task, hence the derogatory sobriquet of "bean counter," and fail to include those aspects of leadership which involve art and intuition.[10]

The managerial approach can reduce warfare to a mere mathematical equation; "They have 1,000 troops in the defense. Attackers require a three-to-one advantage when conducting breaching operations on an enemy in the defense. Our attack requires a force of 3,000."[11] This fails to take into account those intangibles which military leaders must constantly evaluate, such as morale and training of their units and the capabilities of subordinate leaders. The main character in C.S. Forester's novel, *The General*,[12] exemplifies the type of commander who is technically proficient and personally courageous but totally devoid of imagination. The novel, which was written on the eve of World War II in 1936, was widely viewed as a thinly veiled criticism of the performance of English commanders during World War I.[13] The American military is often accused of being overly managerial and businesslike during the Vietnam War.[14]

As technology makes communications easier, the operational commander must resist the temptation to only pass information. He must continue to get out and see his troops; look his commanders in the eye; and assess conditions on the battlefield for himself. Otherwise,

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[9] Author advocates the Army must readjust its management-science culture. Vandergriff, Don, "The Culture Wars," In *Digital War*, ed. Robert L. Bateman III, (Novato, CA: Presidio Press, 1999), 240.

[10] Vego, X-3.

[11] 3:1 ratio is U.S. Army doctrine. Field Manual No. 3-34.2, *Combined-Arms Breaching Operations,* Headquarters Department of the Army, Washington, DC, 31 August 2000.

[12] Forester, C.S., *The General*, (Mt. Pleasant, SC: The Nautical and Aviation Publishing Co. of America, 1982).

[13] Ibid., x.

[14] Vego, X-3.

he risks becoming just a manager; moving nameless, faceless formations of men around the battlefield.

OPERATIONAL LEADERSHIP

Just as there are three basic levels of war: strategic, operational, and tactical;[15] there are levels of command or leadership at each of the levels. Operational leadership refers to the leader at the operational level of war; who is responsible for the accomplishment of strategic objectives dictated by those exercising strategic command over the operational leader.[16]

Leadership has different aspects at each level of warfare. The successful tactical leader must be technically and tactically competent and must demonstrate physical courage to his troops. Because he is closer to the combat, the leader at the tactical level must deal with the emotional burden of knowing personally the individuals he sends on missions which could result in their deaths.[17] Leaders at the tactical level often have no voice in the type of equipment they and their troops use and must rely on their services to select, purchase, and field the "right" new equipment.

By contrast, the strategic leader may have little or no military experience. Leaders at the strategic level of warfare are often a country's non-military, political leaders.[18] They must, or should, rely on their military advisors for advice on military matters. Military advisors at the strategic level must understand the national or strategic objectives in order to provide accurate advice to their civilian masters. They must also provide the clear guidance needed by their military subordinates for mission accomplishment. Leaders at the strategic

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[15] Vego, II-17.
[16] Ibid., X-5.
[17] Grossman, Dave, *On Killing*, (Boston: Little, Brown and Company, 1995), 90-91.
[18] Vego, II-17.

level often choose the types of equipment their militaries will employ, either directly by ordering the acquisition or disuse of a particular piece of equipment or indirectly by the manner in which they provide funding to the services.

There are numerous examples of national leaders who interfered in military affairs, to the detriment of their countries. Adolf Hitler made military decisions based on intuition and discounted the advice of his military commanders.[19] President Lyndon Johnson and Secretary of Defense Robert McNamara conducted target selection at a Tuesday luncheon; a meeting that for more than two years was conducted without any military representation.[20]

President Abraham Lincoln is an example of a national leader who, although he had no military experience, had an understanding of the military strategy needed to defeat the Confederacy.[21] Lincoln went through a number of unsuccessful commanders prior to appointing General Ulysses S. Grant as the General in Chief of the Union armies in 1864.[22]

Operational commanders must bridge the gap between development of national policy and accomplishment of tactical objectives. Leadership traits which are critical at the tactical level, such as physical courage and personal presence, are less important for the operational leader. Some operational commanders attempt to purposely distance themselves from the battle, if only as a means to cope with the tremendous stress of their responsibility. British General Harold Alexander and American General Dwight Eisenhower are examples of operational commanders who "led" in this manner.[23] This has become even truer as technology has allowed commanders at the operational level to command from greater and greater distances removed from the battlefield where their soldiers are fighting.

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[19] Ibid., X-9.
[20] Ibid., X-25.
[21] Ibid., II-29.
[22] Ibid., VIII-14.
[23] Keegan, John, *The Face of Battle*, (New York: Barnes and Noble Books, 1976), 331.

However, the operational commander must have personality traits which are not necessary for tactical leaders. Because of the complexity of the issues with which he is confronted, the operational commander must be of high intellect.[24] He must also, unlike the tactical commander, be able to interact with diplomats, heads of state, and non-governmental agencies on matters of international economics, religious and cultural issues, and accurately reflect his country's national and strategic policies.[25]

Operational commanders must also be able to convince strategic leaders to fund the acquisition of the correct equipment for their forces. They must then convince their subordinate commanders that the equipment is the best available. The introduction of wireless communications is an example of a failure of operational leaders to convince units at the tactical level of the importance of a new technology.

The American army resisted the implementation of radio systems throughout the period between the First and Second World Wars.[26] Strategic leaders felt the technology was critical and the U.S. War Department General Order No. 29, dated 18 May 1920 directed, "Infantry troops will install, maintain, and operate all lines of communications within the infantry brigade."[27] Many infantry officers, though, felt using infantry soldiers for radio duty was a waste while there was more important infantry training to be conducted.[28] This was illustrated by the opinion of an Army officer evaluating a field exercise in the *Infantry Journal* in 1927 that "Radio within the infantry brigade was, as usual, of no value."[29] As a result of the failure of the Army to embrace the new technology and the failure of operational

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[24] Vego, X-7.
[25] Ibid., X-11.
[26] Bateman, Robert L. III, "Pandora's Box," In *Digital War*, 6.
[27] Ibid.
[28] Ibid., 7.
[29] Ibid.

leaders to force the integration of the technology, the Army's ability to communicate at the

tactical level was degraded. An example of the result of this failure is the fact that radios

were taken from Rhode Island State Police cars for use in tanks bound for fighting in North

Africa in 1942.[30]

OPERATIONAL LEADERSHIP AND TECHNOLOGY IN THE PAST

Operational leaders have long been forced to adapt to changes in technology or suffer

the consequences. Those who more quickly, and correctly, adapted to the new technology

were usually the ones who were more successful in the next battle or next war. Armored

vehicles (tanks) are an example of a technology that emerged during World War I. The

armor doctrine for their employment was developed, to varying degrees, in the period

between the First and Second World Wars.[31]

Armored motor cars appeared on the European battlefield soon after the start of

World War I.[32] These early models, which were essentially just civilian vehicles with armor

plating for protection, were determined to be unsuitable for the terrain and obstacles found on

the battlefield. This led to a search for a true cross-country fighting vehicle, with, oddly

enough, Winston Churchill, the First Lord of the Admiralty, championing the cause.[33]

Eventually, all the major powers employed some type of tank during World War I, with

Britain and France leading the way, especially after the Battle of Cambria in November

1917.[34] Each country took lessons learned from tank warfare during World War I and began

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[30] Singer, 208.
[31] Vego, I-21; I-26.
[32] Fletcher, D.J., *Armoured Warfare*, eds. J.P. Harris and F.H. Toase, (New York: St. Martin's Press, 1990), 6.
[33] Massey, 26.
[34] Power, Richard Carver Michael, *The Apostles of Mobility: The Theory and Practice of Armoured Warfare*, (New York: Holmes and Meier Publishers, 1979), 30.

to develop their own doctrine for the employment of armor forces.[35] Below is a discussion of how two countries, Britain and Germany, developed armor doctrine during the Interwar Period.

<div align="center">BRITISH ARMOR DOCTRINE</div>

British military theorists General John F.C. Fuller and Captain B.H. Liddell Hart were early advocates of the capabilities of mobile warfare and the use of the tank.[36] Fuller, during the last year of World War I, proposed a tactic, which became known as Plan 1919, of fast tanks striking quickly beyond the enemy trenches and attacking German command posts far to the rear.[37] This tactic required a level of performance which tanks had not yet reached and Plan 1919 was not executed prior to the signing of the Armistice.[38]

The British Army had created the Tank Corps solely to fight during World War I.[39] It became a permanent part of the British Army on 18 October 1923,[40] although not all in the British Army supported the continued use of the tank. After the end of World War I, General Sir Louis Jackson told an audience at the Royal United Service Institute that "The tank proper is a freak. The circumstances which called it into existence were exceptional and not likely to recur. If they do they can be dealt with by other means."[41]

The Tank Corps, thanks in large part to the advocacy of Fuller, was able to survive in the face of the opposition to it and the first written doctrine appeared in 1929, entitled "Mechanized and Armoured Formations," which became known as the Purple Primer

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[35] Massey, 72.
[36] Vego, I-21.
[37] Fletcher, 26-27,
[38] Ibid.
[39] Harris, J.P., *Armoured Warfare*, eds. J.P. Harris and F.H. Toase, (New York: St. Martin's Press, 1990), 31.
[40] Ibid.
[41] Ibid.

because of the color of the binding.[42] The doctrine envisioned light armor, used similar to cavalry for screening and reconnaissance, and medium armor, used to conduct armor raids.[43] The doctrine failed to adequately address tank on tank engagements and how infantry formations would keep pace with the armor forces.[44] Many commanders also spread tanks throughout their formations, violating the principle of war of mass.[45]

The British Army continued to improve tank design during the 1930s, although the military budget was severely underfunded, especially after Neville Chamberlin became prime minister in May, 1937.[46] However, their doctrine made little advancement toward a combined arms effort. B.H. Liddell Hart recommended, in 1938, that the number of infantry battalions assigned to a Mobile Division be reduced from two to one.[47] The British failure to develop a combined arms doctrine for the employment of tanks as part of a team including infantry and artillery would result in numerous defeats when confronted with German armor formations.[48]

GERMAN ARMOR DOCTRINE

By contrast, the German army began to work on a combined arms warfare concept, which integrated tanks into their maneuver doctrine.[49] They not only began to build tanks after World War I, although this was a violation of the Treaty of Versailles,[50] they also developed doctrine for the use of the tanks. The Germans used the tank in a manner that complemented the German characteristics of war: boldness, speed, shock action and fire

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[42] Ibid, 37.
[43] Ibid, 38.
[44] Ibid.
[45] Macksey, 172.
[46] Harris, 45.
[47] Ibid, 48.
[48] Ibid.
[49] Vego, I-22.
[50] Habeck, Mary R., *Storm of Steel*, (Ithaca: Cornell University Press, 2003), ix.

power.[51] The German tanks were built to support the Army's overall doctrine; they were fast (twice as fast as other tanks of the time), reliable and could communicate with each other by radio.[52] The Germans realized that the tank was only another weapons system and that "the ability to use available technology was more important than the technology itself."[53]

It is probably not a coincidence that, Heinz Guderian, arguably the creator of German tank doctrine, had experience as a commander of a communication station during World War I and worked on the development of a motor transportation battalion after the war.[54] He understood that moving and communicating were critical for the successful employment of virtually any weapon system. He also understood how to integrate the two into the development of the tank.

Guderian was an early follower of Fuller and Liddell Hart's writings. However, in 1929, Guderian came to the conclusion that tanks, either in formations made solely of tanks or formations of tank units combined with dismounted infantry, "could never achieve decisive importance."[55] Guderian envisioned "armoured divisions which would include all the supporting arms needed to allow the tanks to fight with full effect."[56] He realized that a tank's ability to maneuver gave it an opportunity to exploit factors space and time, but only if the necessary supporting arms were as mobile as the tank formations. This extended to air-ground cooperation, based on lessons learned during the Spanish Civil War.[57]

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[51] Antal, John A. "The End of Maneuver," In *Digital War,* 158.
[52] Singer, 209.
[53] Antal, 159.
[54] Heinemann, W. *Armoured Warfare*, eds. J.P. Harris and F.H. Toase, (New York: St. Martin's Press, 1990), 53.
[55] Guderian, General Heinz. *Panzer Leader*, (New York: E.P. Dutton & Co., 1952), 24.
[56] Ibid.
[57] Gat, Azar. "British Influence and the Evolution of the Panzer Arm: Myth or Reality? Part II." *War in History*, Vol. 4, No. 3, (July 1997): 317.

Guderian was able to convince Adolph Hitler of the importance of the tank. After watching a tank demonstration in 1934, Hitler declared, "That's what I need. That's what I want to have."[58] This endorsement by the German strategic leadership enabled Guderian to acquire the resources needed to develop the combined arms formations which blazed across Europe at the beginning of World War II.

EVALUATING NEW TECHNOLOGY

When an operational commander is considering incorporating a new technology into his organization, he should evaluate the technology's ability to contribute to his organization's operational functions. Although what constitutes an operational function is not universally agreed upon, they are generally those supporting structures and activities which must be integrated and organized in order to effectively employ a combat force.[59] Examples of operational functions include: command, control, communications, computers (C4) systems; operational intelligence; and operational fires.[60]

The operational commander should adopt only those technologies that complement his style of warfare. For instance, an operational commander who, during major combat operations, insists on maintaining his headquarters relatively near the combat zone and is constantly moving his headquarters to follow the action should be wary of relying on a method of communications which requires extensive preparation time.

Similarly, an operational commander must not allow a new capability based on technological advances convince him that older methods are obsolete and no longer necessary. An example is the unmanned aerial vehicle (UAV). Although the UAV has recently proven to be an incredible asset on the battlefield, for a number of reasons it does

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[58] Heinemann, 57.
[59] Vego, VIII-3.
[60] Ibid.

not mean that there is no longer a need for a trained ground force that specializes in long range reconnaissance and surveillance. As with many new technologies, there are fewer available than requested; referred to in the military as "high demand, low density" items. Thus, a commander may find that he does not have sufficient UAVs to cover all his named areas of interest (NAI). There are also environmental factors, such as heat, clouds and adverse wind conditions which can limit or preclude the use of UAVs.

When the UAV cannot be utilized, there must be another capability for the necessary observation. This capability cannot be created on the spot; it must be trained for and this requires a commitment of personnel and resources. This is a fundamental difference between the military and business world. The business world abhors spending money on something which it may never utilize. Military leaders realize, and there are numerous examples, of the "startup costs" incurred when you are unprepared during a time of war. The operational commander has sufficient rank and influence to ensure his service continues to maintain that capability.

Technology can also have negative results. There is anecdotal evidence that the skills of Army infantry soldiers to navigate with a map and compass have deteriorated since the Army began using global positioning systems (GPS) for navigation. It is only reasonable that a soldier who has a gadget which constantly and accurately tells him his position will, over time, cease to use his map and compass to perform the same task. Eventually, his ability to navigate with map and compass, which is a perishable skill, will be compromised. An enemy could exploit this weakness by destroying or interfering with satellites which provide GPS information.

Similarly, some have complained of commanders who "lead by email" instead of interacting with his or her staff, subordinate commanders, and those whom they lead. It is quicker and more efficient to send an email to ten people than it is to get up from your desk and visit each of them individually or to even conduct a quick, five-minute meeting with all ten attending. However, much can be lost in an email. The use of all caps, which is supposed to represent anger, may not necessarily explain the anger or convey the expected response. The email response to the leader may also fail to allow the leader to evaluate the demeanor of the sender.

This does not mean that a GPS or using email is bad or not productive. Both have been very beneficial. However, to make the most of the technology, any potential negative effects, to include exploitation by the enemy, must be identified and mitigated.

CONCLUSION

Technology will continue to affect the military and probably at an ever increasing pace. Because of the structure of military organizations at the operational level of war, technologies which promise an increased efficiency over existing methods will be experimented with. The operational commanders must be able to identify and implement those aspects of technology which are beneficial to his method of warfare, while at the same time identifying and mitigating those aspects of the same technology which are detrimental or counter-productive.

The operational commander must also be cognizant of the fact that his subordinate commanders may be less able to utilize the same technology, either because of organizational differences, personal preferences, or even intellectual capabilities. Only careful analysis of

all aspects of new technology will ensure adoption of its benefits and prevent any harm associated with it.

As demonstrated by the armor case study, a capability is only as good as the manner in which it is integrated into the method of war fought by the force using it. British armor formations were much less effective than German armor formations. This is a result more of the doctrine used to employ the formations than any technological superiority of the German tanks. As a historian stated, "The real strength of armour in fact lay not in battle but in the pre-emption of battle."[61]

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[61] Griffith, P., *Forward into* Battle, (Bird, 1981), 89. Quoted in Heinemann, 68.

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