Baltic Security and Defence Review

Volume 17, Issue 2
2014

Baltic Security and Defence Review is the bi-annual publication of the Baltic Defence College

ISSN 1736-3772 (print)
1736-3780 (online)

Cover and print: www.ecoprint.ee
Electronic version of the Baltic Security and Defence Review can be accessed on the website of the Baltic Defence College at www.baltdefcol.org
All articles of the Baltic Security and Defence Review are also available through the International Relations and Security Network (ISN) at www.isn.ethz.ch
All inquiries should be made to the Baltic Defence College, Riia 12, 51013 Tartu, Estonia, ph: +372 717 6000, e-mail: info@baltdefcol.org

Contents

Call for Articles for the Baltic Security and Defence Review

The Baltic Security and Defence Review will cease publication with this issue. Baltic Defence College remains committed to futhering discussion and debate in the wider Baltic. We will release the first issue of our new publication the *Journal of Baltic Security* in June 2015. All inquiries and submissions should be made to the Baltic Defence College, Riia 12, 51013 Tartu, Estonia, ph: +372 717 6000, fax: +372 717 6050, e-mail: info@baltdefcol.org.

The COG strikes back: Why a 200 Year Old Analogy Still Has a Central Place in the Theory and Practice of Strategy

By Major Jacob Barfoed

If an early death should terminate my work, what I have written so far would, of course only deserve to be called a shapeless mass of ideas … [b]eing liable to endless misinterpretation …
– Carl von Clausewitz: Note of 10 July 1827

The Clausewitzian Center of Gravity (COG) concept is central in western military strategic thinking and serves as a core concept in military planning. However, several interpretations of the concept exist, which contributes to theoretical as well as practical confusion. Moreover, the concept receives critique such as "it is so abstract to be meaningless," "it fails to provide convincing evidence for its use at the strategic level of war," "there is a lack of interdisciplinary awareness," it is an analogy tailored to Prussian military challenges in the early 19th Century, etc.[1] This article contributes to the discussion by combining the COG concept with strategic theory, hereby addressing many of the raised critique points. The article presents three COG-Strategy schools, centered on different/competing interpretations of the Clausewitzian Center of Gravity (CoG) concept as well as different approaches to strategy. Each CoG-strategy school is rooted in the experiences as well as the historical roles of the individual U.S. military services and expresses a distinct, ideal-type way of fighting and winning wars.[2] The article finishes with a discussion of how the COG concept can connect a grand strategy to the military strategy. For this purpose, it introduces the Will and Ability COG concept, which belongs to COG-Strategy school three (see below). The Will and Ability COG concept provides strategists a method for designing war winning strategies that focus on inducing a policy change by the adversary leadership and on defeating the adversary's strategy, starting at the grand strategic level of war and with the lower levels providing increasingly more details to various elements of the grand strategy.

The COG concept has two distinct different schools of thought: 1) the enemy COG is a strength and must be defeated in order to win; 2) the enemy COG is a weakness that can be exploited to defeat the enemy. The COG concept is closely linked to military strategy, and in military strategy, there are also two distinct different schools of thought: A) The direct approach and B) the indirect approach, where direct approach means focusing directly on the opponents main battle forces. As shall be discussed now, these COG and strategy schools of thought are interconnected and combine to form three COG-Strategy schools of thought, all inspired by Clausewitz:

1) COGs are Strengths: the Direct Approach
2) COGs are Weaknesses: the Indirect Approach
3) COGs are Strengths with inherent weaknesses: the Flexible Approach

COGs are Strengths: the Direct Approach

As a centre of gravity is always situated where the greatest mass of matter is collected, and as a shock against the centre of gravity of a body always produces the greatest effect, and further, as the most effective blow is struck with the centre of gravity of the power used, so it is also in War.
– Carl von Clausewitz: On War

In the 19th Century, the Prussian Carl Von Clausewitz first framed the COG concept, using the German word "Schwerpunkt."[3] Clausewitz was a scholar and military strategist drawing upon personal and observed experience of the Napoleon Wars and much of his writings must be seen in this context, i.e. state vs. state (or alliance of states) conflict with massive armies clashing on the battlefield to decide the outcome of the war.[4] Thus, for Clausewitz, "a major battle in a theater of operations is a collision between two centers of gravity; the more forces we can concentrate in our center of gravity, the more certain and massive the effect will be" [*against* the enemy center of gravity].[5]

From this quote and the quote above, it appears that Clausewitz was using his Schwerpunkt analogy to talk about a strength, which strikes effective blows. Moreover, the quotes have also led Clausewitz to be

interpreted as an advocate of (always) pitting strength vs. strength, also called *the direct approach*. This combination constitutes COG-Strategy School One – the enemy COG as a strength, which must be destroyed using one's own COG.

This also represents the U.S. Army's traditional view on war; in the historical tradition of the U.S. Army, wars are won by destroying the enemy army.[6] It does not need to be a head on clash, a classic envelopment and attack in the flank or rear is often preferable; it is the end result, which characterizes School One: the destruction of the army, understood as "put in such a condition that [it] can no longer carry on the fight."[7]

However, critics of Clausewitz hold his ideas of pitting strength against strength responsible for the strategies of WWI leading to stalemate and the death of millions of soldiers.[8] In response, proponents of Clausewitz claim that he was misunderstood; he died before finishing his book "On War" and his posthumous work has several contradictions and a complex writing style, which invites to several interpretations and disputes over his conclusions.[9] He even recognized this himself in several notes found upon his death together with sealed copies of his writings.[10] In the English-speaking world, this is complicated further by the challenge of translating his 19th Century German.

The different discussions of COGs in Clausewitz' "Book Six" and "Book Eight" are often the source of confusion regarding the use of the COG concept. In Book Six, the COG is physical and to be found where the mass is concentrated most densely in the enemy's army. In Book Eight, Clausewitz moves his discussion up to the political-strategic level and talks about more intangible COGs: "In countries subject to domestic strife, the center of gravity is generally the capital. In small countries that rely on large ones, it is usually the army of their protector. Among alliances, it lies in the community of interest, and in popular uprisings it is the personalities of the leaders and public opinion."[11] In addition, the following phrase has caused much confusion: "[O]ne must keep the dominant characteristics of both belligerents in mind. Out of these characteristics a certain center of gravity develops, the hub of all

power and movement, on which everything depends. That is the point against which all our energies should be directed."[12] The wording in these particular quotes has been criticized for being an imprecise translation of Clausewitz' German, and thus, since it is the most commonly used English translation, the source of much of the confusion existing around the COG definition.[13]

The contrast between the relatively clear COG discussion in Book Six and the more ambiguous discussion in Book Eight opens up for various understandings of the COG concept, here presented as the three COG-Strategy schools of thought. In conclusion, the COG concept in COG-Strategy School One is inspired by Clausewitz' Book Six. The next COG-Strategy school of thought is a reaction *against* School One, but still finds inspiration from Clausewitz – in this case from the COG concept in Book Eight

COGs are Weaknesses: the Indirect Approach

The perfection of strategy would be, therefore, to produce a decision without any serious fighting
– Liddell Hart: Strategy

In the aftermath of WWI, a new generation of strategists sought to overcome the horrific waste of human life in a war of attrition in the trenches. Douhet is a prominent example of such a strategist.[14] He formulated as the first a strategic bombing theory and advocated bombing the enemy's cities, using gas, incendiary bombs, etc. Douhet saw this strategy as a more humane way of war than the stalemate slaughter of WWI. While Douhet's theory was politically unacceptable for the western great powers in the interwar period, his theory was eventually validated with the use of the atomic bomb in Japan in 1945.
B. Liddell Hart[15] and J.F.C Fuller[16] are other prominent examples of such strategists, both advocating (with some variation) an indirect approach, avoiding a frontal collision with the enemy forces. Fuller advocated a narrow penetration of the frontlines using armor and focusing on weaknesses in the enemy's rear, such as headquarters, supply lines, fuel depots, etc. Liddell Hart took this further, inspired by

Douhet, and focused not only on the battlefield rear areas, but also on the strategic rear of the enemy's territory. For Liddell Hart, the indirect approach was more than a military strategy; it was a (grand strategic) mind-set. In this he was inspired by Sun Tzu and he gave an introduction to the acclaimed Griffith 1963 translation of Sun Tzu's "The Art of War."[17]

None of these western interwar strategists combined their theories with Clausewitz's COG concept; in fact their primary motivation was to present an *alternative* to what they perceived as Clausewitz's theory of direct approach. Liddell Hart went as far as to characterize Clausewitz as the "Mahdi of mass and mutual massacre."[18] However, Liddell Hart and Douhet's theories clearly focus on the non-military COGs described in Clausewitz' Book Eight. It was another air power theorist, Col John Warden, who on the eve of the cold war brought the COG concept back as an integrated part of strategy and the concept of the indirect approach.

Warden's Five Rings

But there is another way. It is possible to increase the likelihood of success without defeating the enemy's forces. I refer to operations that have direct political repercussions
– Carl von Clausewitz: On War

Around the end of the Cold War, the American scholar and strategist Col. John A. Warden III combined the indirect approach with Clausewitz' COG concept, albeit with an altered definition of COG that he found more fit for his theory.[19] Warden's use of the COG concept defines COG-Strategy School Two; in addition, School Two, with its focus on subduing the enemy leadership, represents classical U.S. Air Force strategic thinking, which goes all the way back to the U.S. Army Air Corps spiritual father, Billy Mitchell, and his inspiration from the post-WWI era European air strategy thinkers like Douhet and Trenchard.[20]

Warden's theory comes out of his air force background and from a time-period dominated by state vs. state conflicts. Warden claims that a state or any other entity can be seen as a system of five interconnected strategic rings, where affecting one ring will influence the others. For Warden, the center circle (leadership) is the most important, as it is the leadership who decide the course of the enemy. The longer away from the center, the less importance the ring has. The outer ring, the military, has the function of protecting the inner, more important rings (see figure below). Warden claims that you should put direct pressure on the innermost circle, if possible. If not, you should put pressure indirectly on the innermost ring, to make the leadership conclude that continued resistance is futile, or that the chosen course cannot be continued. This is done by putting pressure on the surrounding rings. If the enemy leadership does not respond rationally, strategic paralysis can be imposed on the enemy by destroying one or more of the outer strategic rings, making it impossible for him to resist our will.

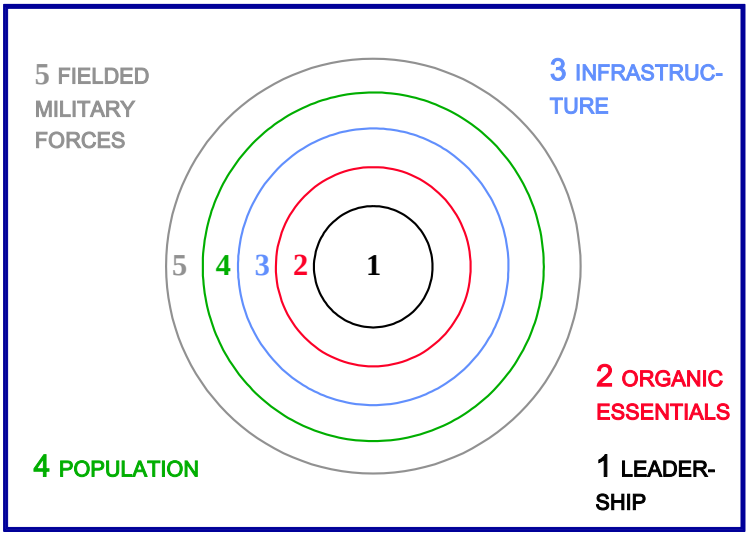


Figure 1. Warden's 5 Ring Model.

Warden defines COGs as *"that point where the enemy is most vulnerable and the point where an attack will have the best chance of being decisive."*[21] According to Warden, strategic COGs are found by analyzing the enemy as a system of five interconnected rings. Individual rings can be further analyzed by using the five-ring model on the individual ring; COGs found this way are operational level COGs, i.e. lower level COGs.[22]

Due to the development of computers, stealth, and precision weapons, Warden recommends a strategy that uses air power to carry out parallel attacks on all identified strategic COGs. Warden claims this will achieve a chock-effect, since the enemy cannot react in a timely manner, but is overwhelmed by the parallel attacks. This is where the understanding of the enemy as a system becomes relevant. Consequently, it is not the attacks of individual targets, but cascading effects on the whole system that creates the chock-effect and eventually the strategic paralysis. It follows from the theory that engaging the enemy's fielded forces is not an end in itself; rather, it is a way to enforce our will on the enemy leadership. Whether this psychological breaking point can be reached depends on whether the enemy views his goals as worth dying for. If his home territory is at stake, it will normally be necessary to engage his military forces. You might also have to engage his military forces if they threaten *your* COGs.

Warden's ideas inspired the air campaign of the Gulf War in 1991, including the use of COGs as campaign focal points. Some of Warden's supporters subsequently developed his ideas into the concepts of systems of system analysis (SoSa), effect-based planning, and effect-based operations (EBO).[23] These concepts dominated the planning of the Iraq war started in 2003, and have since inspired the development of Effect-based Approach to Operations (EBAO) in NATO.

The success of the air campaign in the Gulf War contributed to a surge in the use of the COG concept in western military theory and military planning. Unfortunately, Warden's altered COG definition also contributed to confusion about the concept. It follows from above that Warden's use of the COG concept only reflects half of Clausewitz' concept, i.e. Warden's definition focuses on striking effective blows *at*

CoGs but not necessarily at striking effective blows *with* COGs. This alteration, combined with a general adaption of the indirect approach in western doctrine, has led to some confusion in the military planning community. In the mid-1990s, Dr. Joseph Strange sought to negate this confusion, by constructing a COG concept that combined School One's "COG as a strength" interpretation of Clausewitz with the possibility of using the indirect approach; this leads to the third COG-Strategy school.[24]

COGs are Strengths with Inherent Weaknesses: the Flexible Approach

If you want to overcome your enemy you must match your effort against his power of resistance, which can be expressed as the product of two inseparable factors, viz. the total means at his disposal and the strength of his will.
– Carl von Clausewitz: *On War*

Joseph Strange, a now retired professor from the U.S. Marine Corps War College, represents an interpretation of Clausewitz' COG concept which remains true to Clausewitz' concept of the COG as a strength, while incorporating a way to employ the indirect approach, if desired. It can be argued that COG-Strategy School Three really is a variant of School One – a neo-Clausewitzian school. However, it can also be argued that School Three stands out by having less of a "destroy the enemy" mindset and more of a comprehensive approach to strategy. Thus, for School Three, circumventing, isolating, ignoring, etc. the enemy strength, i.e. the COG, can be appropriate, while School One always wants to destroy the enemy COG ultimately. School Three's historical roots reflect classic U.S. Marine Corps strategic thinking of being too small to seek out the enemy strength and destroy it. Moreover, it reflects the Marine Corps' maneuver warfare doctrine developed in the 1980s.[25] Thus, while starting out as a Marine Corps doctrinal concept, it made its way into U.S. (and NATO) joint doctrine by being a unifying COG-Strategy concept that incorporates the two other schools, in principle allowing each service to focus on the aspects of the concept that reflect either School One or School 2 thinking. Thus, the U.S. Army and Marine Corps tend to focus on Strange's physical COG and primarily at the

operational level of war, while the U.S. Air Force tend to be the only service that wholeheartedly embraces the moral aspect of Strange's COG aspect.[26]

According to Strange, "COGs are physical or moral entities that are the primary components of physical or moral strength, power and resistance. They don't just contribute to strength; they ARE the strength. They offer resistance. They strike effective (or heavy) blows."[27] Strange argues that his definition is more faithful to Clausewitz's COG concept than current US and NATO definitions, and, more importantly, a lot easier to understand and use in the subsequent COG analysis.[28]

As discussed earlier, Clausewitz told us to direct all our energies at the COG (strength against strength),[29] while strategists like Fuller and Liddell Hart advocated an indirect approach (strength against weakness). Strange suggests that even strengths have critical vulnerabilities that can be exploited to defeat them and he offers a model that permits insightful analysis of COGs.[30] He introduces three concepts for that purpose: Critical Capabilities (CC) are what the COG can "do to you that puts fear (or concern) into your heart in the context of your mission and level of war [or: the mission statement of the COG]; Critical Requirements (CR) are conditions, resources and means that are essential for a COG to achieve its CC; Critical Vulnerabilities (CV) are those CRs, or components thereof, that are deficient, or vulnerable to neutralization or defeat in a way that will contribute to a COG failing to achieve its critical capability. The lesser the risk and cost, the better."[31]

Strange's COG concept then matches one's available national/alliance/coalition Instruments of Power (IOPs)[32] with the adversary's Critical Requirements in order to find the most critical vulnerabilities in a cost/risk/effect based analysis. Some critical vulnerabilities might be vulnerable to one IOP at one specific time while other critical vulnerabilities require the use of all IOPs in a timely and integrated fashion to be vulnerable. Similar, there might be Critical Requirements that are potentially vulnerable, but the available or allocated means/resources might not be sufficient to exploit the weakness or there might not be political willingness to do so for various

reasons. Likewise, friendly COGs must be analyzed and the identified CRs and CVs protected from enemy exploitation. As an example, in Afghanistan, the friendly COGs include not just NATO COG(s) but also the Afghan government's COG(s), and all must be protected in order to succeed. The result is a logical and stringent concept for bridging available *means* (national/alliance IOPs) with political *ends*, in other words, a concept for developing grand strategy.[33]

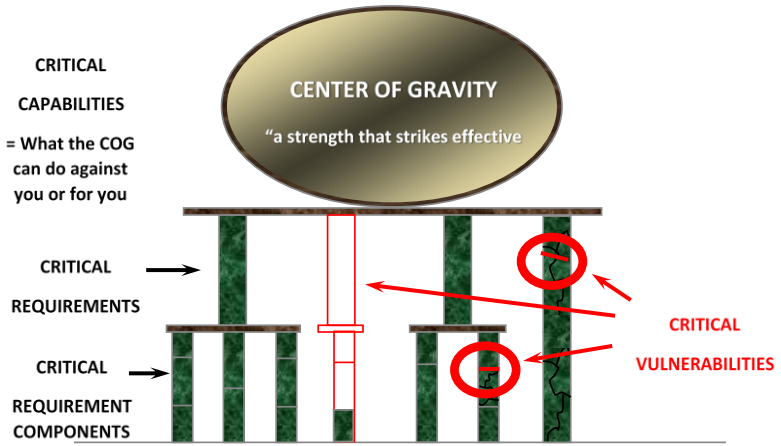


Figure 2. CoG – CC – CR – CV relationships.

It follows from the discussion above that Warden's COGs equate to Strange's Critical Vulnerabilities (CV), or rather, the most crucial CVs. As such, Warden's five-ring model can be used when looking for a Strange COG's Critical Vulnerabilities. In addition, School Two's emphasis on the enemy leadership is captured in Strange's concept of moral COGs – the primary components of moral strength, power, and resistance. Moral COGs control the physical COGs; they provide purpose, direction, and cohesion for the enemy system as a whole.[34] In other words, Strange's COG concept is a hybrid between Clausewitz' COG as a strength that strike effective blows and Warden's vulnerabilities that should be struck.

The Will & Ability COG Concept

Strange's COG model has been refined in a recent study, by establishing a conceptual linkage to the coercion concepts of punishment and denial, as well as a direct relationship between COGs and objectives at the different levels of war (grand strategic – military strategic – operational – tactical).[35] In short, the Will and Ability COG concept establishes that at the grand strategic level, there is usually a Will COG that decides on policy and strategy and provides cohesion and moral strength for carrying out the strategy, and at least one strategic Ability COG that is the agency/entity tasked by the Will COG with the main grand strategic effort. When making grand strategy for war, the use of the Will COG concept helps one to focus on the fact that a war is not over until the adversary's central decision-makers decide it is. Consequently, a grand strategy, which does not consider the desired and undesired conditions in a war's primary strategic actors' Will COGs (friends and foes alike), as well as consider ways to accomplish this, cannot be considered a well-integrated grand strategy. Examples of desired conditions could be regime change, humiliation of the enemy leader, a way for the enemy leader to save face, strengthening an allied leader, strengthening an ally's governmental structures (e.g. by strengthening the civilian institutions that form the backbone of the government).

By establishing a conceptual linkage to punishment and denial *coercion strategies*, the will and ability COG concept further enhances its usefulness:

- Punishment strategies belong to the indirect approach (Sun Tzu, Liddell Hart, and Warden) and *try to affect the adversary's will and resolve by targeting or threatening to target whatever the adversary's decision-making entity (the Will COG) values the most.*

- Denial strategies can be both direct (Clausewitz) or indirect (Fuller) and *try to thwart or threaten to thwart the adversary's grand strategy for achieving its objectives by affecting the primary means of the strategy (the Ability COG).*

- Punishment and denial are sub-strategies of coercion and can be used both in a deterrence strategy and in a compellence strategy.[36]

In addition, the Will and Ability COG concept establishes a direct relationship between COGs and objectives at the different levels of war (grand strategic – strategic – operational – tactical).[37] At each level, COGs exist, representing the entity carrying out *the main effort* of the strategy at that level (for both belligerents); the grand strategic level differs in having a Will COG as well (some might call it the political COG). As a strategy is detailed into phases or parallel sub-efforts, these detailed sub-strategies will have corresponding COGs (again, the entity carrying out the main effort in the sub-strategy), which often will be strategies and COGs at the next, lower level. This also means that the number of COGs normally will increase, the lower the level of war. The relationship is illustrated (simplified) below in Table 1:

Grand Strategic Objectives		
↑	↖↘	
Criteria for Success (CFS)	↔	Desired conditions in **Will+Ability COGs**
↑		↑
DIME strategic objectives	↔	Desired conditions in W**ill+Ability CVs**
↑	↖↘	
Criteria for Success (CFS)	↔	Desired conditions in **mil strategic COGs**
↑		↑
Operational objectives	↔	Desired conditions in **mil strategic CVs**
↑	↖↘	
Criteria for Success (CFS)	↔	Desired conditions in **operational COGs**
↑		
Tactical actions	↔	Desired conditions in **operational CVs**

Table 1. Objective – COG – CV relationships.

The left column is not identical to the right column, i.e. not all Criteria for Success (CFS)[38] describe desired conditions in COGs, and not all objectives describe desired conditions in Critical Vulnerabilities (CVs). However, the COG analyses in the right column contribute to the CFS and objectives development. The table shows that when military strategic objectives (the M in DIME) describe desired conditions in strategic critical vulnerabilities (CVs), it establishes a logical linkage to the political objectives. If the military strategic objectives do not relate to the strategic CVs, the military strategy is likely not reconciled with the political purpose, i.e. the grand strategy is disintegrated (unless another, non-COG related, logical linkage has been established).

A Brief discussion of Levels of War

The table above operates with four theoretical levels of war; however, the concept of an operational level of war is contested and the grand strategic level is often neglected. This section discusses the implications for the use of the Will and Ability COG concept in strategy; it concludes that each command level with assigned objectives should develop a strategy that considers COGs at that level of war.

In fact, critics argue that the concept of an operational level was meant for continental sized theaters (e.g. Europe in the 20th Century), where military strategy was required at several levels: a *theater level*, where the effort of multiple armies across several fronts was prioritized and coordinated with the theater wide air and maritime effort; and a "*front level*," where the effort of multiple army corps was coordinated and integrated with the air effort.[39] Today, such a scenario does not represent the most likely western military engagement. However, for all practical purposes, since the concept of an operational level of war was introduced in U.S. doctrine in the 1980s and later in NATO doctrine in the 1990s, the responsibility of military strategy and the military campaign has been moved from the strategic level to the new operational level, leaving the military strategic level as the coordinator and translator between the operational level and the political-strategic level. In theory, this reserves grand strategy for the politicians and military strategy for the operational level commander. Best case, it allows each profession to

do what they do best; worst case, because there is no direct interaction between the military strategists and the political leaders/grand strategists, the political objectives and the grand strategy does not properly reflect what the military is able to do and the military strategy is made without sufficient considerations of the non-military instruments of power or without proper considerations of what is politically possible (domestically as well as internationally).

The Gulf War in 1990-1991 was the first test of this new doctrinal concept of an operational level; however, in this case the military-strategic level merged with the operational level, as the military strategic commander (CINC CENTCOM, General Schwarzkopf) became the Joint Force Commander and the one responsible for the military strategy and the military campaign. However, one could argue that Schwarzkopf in fact was commander at the operational level, with Colin Powell (Chairman of the Joint Chiefs of Staff) representing the military-strategic level (back in Washington DC). Yet, there were no distinct military strategic objectives and no strategy at Powell's level; it went from the national objectives to the military objectives (no use of the terms military strategic objectives or operational objectives). Rather, Powell acted as the coordinator and communication link between the military-strategic commander, Gen. Schwarzkopf, and the political leadership, influencing both levels, for better and for worse.[40] See the table below:

National Objectives* (Pres. H.W. Bush)		
↑	↖↘	
(CFS were not explicit)	↔	Desired conditions in **Will+Ability COGs** (COGs**: *Saddam Hussein* + Army + *WMD*)
↑		↑
Military objectives* (Gen. Schwarzkopf)	↔	Desired conditions in **will+ability CVs**
↑	↖↘	
(CFS were not explicit)	↔	Desired conditions in **mil strategic COGs** (COGs: *Republican Guard* + regular army + mobile SCUDs)
↑		↑
Air objectives* (Gen. Horner)	↔	Desired conditions in **mil strategic CVs**
↑	↖↘	
(CFS were not explicit)	↔	Desired conditions in **operational COGs** (COGs: air sector opr. centers, radar sites, offensive air bases)
↑		
Tactical actions	↔	Desired conditions in **operational CVs**
* These were the terms used in the Gulf War. Besides air, there were also land and maritime objectives		** The only official COGs were Hussein, RG, and WMD; there was no distinction between grand strategic and strategic COGs. The additional listed COGs are added COG candidates.

Table 2. Gulf War 1990-91 Objective – COG – CV relationships.

In the Iraq War in 2003, the practical use of the levels of war repeated itself from 1990-1991. Gen. Franks, the commander of CENTCOM, a military strategic command, became the Joint Force Commander, and the objectives he strived to achieve were military strategic objectives, not operational objectives. Moreover, this time, the military commander responsible for the military strategy interacted directly with the political leadership (the Secretary of Defense, Donald Rumsfeld) rather than through the Chairman of the Joint Chiefs of Staff and a potential military strategic level of war in Washington.[41] After the invasion was complete, CENTCOM established an operational level command in Iraq, Combined Joint Task Force 7, in addition and parallel to the existing Joint Task Forces in Afghanistan and the Horn of Africa; Gen. Franks then resumed his role as the region-wide commander at the military strategic level, with the three operational level commands answering to him.

In contrast, during the NATO-led wars in Kosovo in 1999 and in Libya in 2011, practical sense did not overcome rigid doctrine. Thus, NATO established a C2 structure representing all the theoretical levels of war, but managed to produce no grand strategy considering Will and Ability COGs of relevant actors, and managed to establish a military command level at the military strategic level with corresponding objectives, but no military strategy to achieve them. Instead, the military strategic objectives were (somehow) developed into operational objectives (with no strategic design to accompany them), and the military strategy was left to the operational level commander, who in contemporary U.S. and NATO doctrine is equivalent to the Joint Force Commander. In other words, the grand strategic (i.e. political-strategic) level produced objectives, but no corresponding strategy, and the military strategic level did likewise. In both cases, the C2 structure and the responsibilities of each level would likely have benefitted from merging the military-strategic and the operational levels,[42] like in Iraq in 1990-1991 and 2003, perhaps with SACEUR acting like Powell in 1990-1991 as the coordinator and communication link between the Joint Force Commander and the political leadership in the North Atlantic Council (NAC), the Military Committee (MC), and the national governments. With 16 and 27 members of the alliance (in 1999 and 2011, respectively)

and an alliance based on consensus, that role would be difficult to manage for the Joint Force Commander in parallel with his responsibility for making and executing the military strategy.[43]

In conclusion, each command level with assigned objectives should develop a strategy that considers COGs at that level of war; it is this strategy development that generates the objectives to be assigned to the next command level. Consequently, if the military strategic level does not develop a military strategy that considers COGs at that level of war, but only functions as a coordinating link between the military field commander and the political leadership, the military strategic command should not assign operational objectives to the Joint Force Commander that differ from the military strategic objectives, but simply pass on the latter unaltered.

A COG-Focused Strategy

Leaving the confusion of rigid doctrinal levels of war behind and returning to the Will and Ability COG concept, the *COG-focused strategy* figure below (Figure 3) is used to illustrate the relationship between Political Ends, grand (i.e. comprehensive) strategies, grand strategic COGs, and desired effects in grand strategic Critical Vulnerabilities (CVs). The Blue grand strategy is *decided* by the Blue Will CoG; it *uses* the Blue ability COG to carry out the main effort of the grand strategy and which *leads* to the achievement of the Blue National Strategic Objectives (NSOs) comprising the Blue Political End State. The Blue grand strategy affects Red's (the adversary) Ability and/or Will COGs, which are therefore depicted as standing between the Blue COGs and the achievement of the Blue End State. The blue triangles illustrate desired effects in grand strategic Critical Vulnerabilities derived from the COG analyses, as the keys to affect the grand strategic COGs – protecting Blue's own and "defeating" Red's. The figure illustrate the intertwined nature of the opposing parties' grand strategies, as changes in the opposing Will COG and/or grand strategy (and the strategy's related Ability COG) could force or invite a change in one's grand strategy.

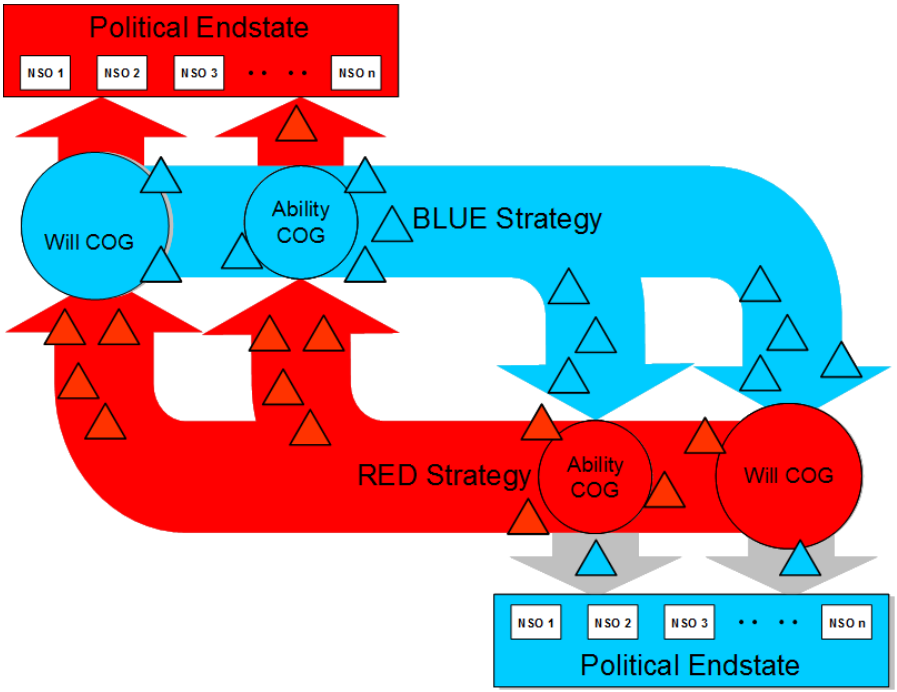


Figure 3. Intertwining COG-focused Strategies

Summary: the Three COG-Strategy Schools

The Will and Ability COG concept can be used to sum up the three COG-Strategy schools: The direct approach (School One) focuses on defeating and destroying the Ability COG(s), while the indirect approach (School Two) focuses on the Will COG's most critical vulnerabilities. For the flexible approach (School Three), ultimately defeating the Will COG is the key to success in all grand strategies and all actions must consider this. Sometimes, this is possible without defeating the enemy's fighting forces, but it requires a well-integrated grand strategy (i.e. a comprehensive approach). See Table 3 below:

COG-Strategy Schools	Main claims / strategy recommendations	
	On Ability COGs:	**On Will COGs**
1: COGs are Strengths: The Direct Approach *(Clausewitz Book Six)*	The defeat and destruction of the enemy's main fighting force is the key to success.	The enemy's will to fight is defeated by destroying his main fighting force.
2: COGs are Weaknesses: The Indirect Approach *(Clausewitz Book Eight; Douhet, Liddell Hart, Fuller, Warden)*	Fighting the enemy's armed forces should be avoided unless they threaten our COGs. In this case, An indirect approach at the operational level (Fuller) is often appropriate.	Enemy strategic weaknesses (in the strategic rear area) should be exploited in order to avoid fighting his military forces. Enemy leadership is normally a lucrative target.
3: COGs are Strengths with Inherent Weaknesses: The Flexible Approach *(Strange, Barfoed)*	Often the enemy's main effort (which normally is his main fighting force) needs to be defeated, but not necessarily destroyed. An indirect approach at the operational level (Fuller) is often appropriate.	Ultimately defeating the Will COG is the key to success in all grand strategies and all actions must consider this. Sometimes, this is possible without defeating the enemy's fighting forces, but it requires a comprehensive approach.

Table 3. COG-Strategy Schools of Thought.

While the COG concept repeatedly gets critique for being too abstract, useless in irregular warfare like counterinsurgency, and unconnected to other strategic concepts and theories, this article has argued that although several COG Schools exist (which arguably adds confusion to the concept), the Joseph Strange inspired Will and Ability COG concept counters the mentioned critique. The Will and Ability COG concept aids strategy practitioners in developing a strategy that considers both the will and the ability of the strategic actors involved in the conflict (regular or irregular), it provides a logical connection between the levels of war, and it provides clear and simple definitions, which aid in identifying the COGs in the first place. Finally, the Will and Ability COG concept connects to a rich amount of strategic theory literature: to the indirect approach theories of Douhet, Fuller, Liddell Hart, and Sun Tzu; to Clausewitz' theory that although defeating the enemy's physical strength often is the shortest road to victory, it does not equal victory as "the war cannot be considered to have ended so long as the enemy's will has not been broken;"[44] and, finally, to Thomas Schelling's coercion theories and the sub-theories of punishment (which targets the enemy's will) and denial (which targets the enemy's ability to carry out his strategy). Citing Clausewitz's introduction of the Center of Gravity concept, "we do not mean in any way to have invented a new method, but have just considered what the commanders of all times have done, from viewpoints that will serve to make their actions' connection with the nature of things clearer.[45] Strategists have always known that by defeating the enemy's strategy, one was well on the way to victory; the Ability COG concept provides that focus. Yet, successful strategists have also always known that wars do not end before enemy is willing to stop fighting; the Will COG concept provides that focus. Strategists do not have to use the Will and Ability COG concept in name, but they have better pay attention to the strategic theories behind it.

Bibliography

Avant, Deborah D. *Political institutions and military change: lessons from peripheral wars*. Cornell studies in security affairs. Ithaca, N.Y.: Cornell University Press, 1994.

Barfoed, Jacob. "Center of Gravity Analysis and Operational Design: Ensuring a logical Linkage among National Strategic Objectives; Diplomatic, Informational, Military, and Economic Instruments of Power; and the Military Campaign." In, *The Wright Flyer Papers* no. 38 (2009). http://aupress.au.af.mil/bookinfo.asp?bid=370.

Biddle, Tami Davis. *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914-1945*. Princeton Studies in International History and Politics. edited by G. John Ikenberry and Marc Trachtenberg Princeton, NJ: Princeton University Press, 2002.

Clausewitz, Carl von, Michael Eliot Howard, Peter Paret, and Beatrice Heuser. *On war*. Oxford world's classics. New York: Oxford University Press, [1976], 1989.

Coram, Robert. *Boyd: The Fighter Pilot Who Changed the Art of War*. New York: Little, Brown and Company, 2002.

Douhet, Giulio. *The Command of the Air*. New York: Coward-McCann, Inc., [1921], 1984.

Echevarria II, Antulio J. "Clausewitz's Center of Gravity: Changing Our Warfighting Doctrine - Again!". Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2002.

Gordon, Michael R. *The Generals War: The Inside Story of the Conflict in the Gulf*. Boston {etc.}: Little, Brown and Company, 1995.

Gordon, Michael R., and Bernard E. Trainor. *The Endgame: The Inside Story of the Struggle for Iraq, from George W. Bush to Barack Obama*. New York: Pantheon Books, 2012.

Gray, Colin S. *The strategy bridge: theory for practice*. Oxford: Oxford University Press, 2010.

Hart, B. H. Liddell. *Ghost of Napoleon*. New York: Praeger, 1954.

Kelly, Justin, and Mike Brennan. *Alien: How Operational Art Devoured Strategy*. Carlisle, PA: Strategic Studies Institute, US Army War College, 2009. http://www.strategicstudiesinstitute.army.mil/pdffiles/pub939.pdf.

Mueller, Karl. "Strategies of Coercion: Denial, Punishment, and the Future of Air Power." *Security Studies* 7, no. 3 (1998): 182-228.

NATO, North Atlantic Treaty Organization. "Allied Joint Publication-5 (AJP-5)." NATO HQ, 27 April 2005.

"BI-Strategic Command Pre-Doctrinal Handbook: Effect-Based Approach to Operations." NATO, 4 December 2007.

Perez, Celestino Jr., ed. *Addressing the Fog of COG: Perspectives on the Center of Gravity in US Military Doctrine*. Fort Leavenworth, KS: Combat Studies Institute Press, 2012.

Reynolds, Richard T. *Heart of the Storm: The Genesis of the Air Campaign against Iraq*. Maxwell AFB, AL: Air University Press, 1995. http://www.au.af.mil/au/awc/awcgate/au/reynolds.pdf.

Rosen, Stephen Peter. *Winning the next war: innovation and the modern military*. Cornell studies in security affairs. Ithaca: Cornell University Press, 1991.

Schelling, Thomas C. *Arms and Influence*. The Henry L. Stimson Lectures Series. Revised ed. New Haven and London: Yale University Press, [1966], 2008.

Strange, Joseph L. *Centers of Gravity & Critical Vulnerabilities*. Perspectives of Warfighting. Quantico: Marine Corps University, 1996.

———. "Centers of Gravity Critical Factors Analysis." Paper presented at the Royal Danish Air Force Air Power Conference, Ballerup, Denmark, 27-28 april 2009.

Strange, Joseph L., and Richard Iron. "Center of Gravity: What Clausewitz Really Meant." *Joint Forces Quarterly*, no. 35 (2004).

———. "Understanding Centers of Gravity and Critical Vulnerabilities. Part 2: The CG-CC-CR-CV Construct: A Useful Tool to Understand and Analyze the Relationship between Centers of Gravity and their Critical Vulnerabilities." In, *Unpublished paper* (2004). http://www.au.af.mil/au/awc/awcgate/usmc/cog2.pdf.

Sun, Tzu, Samuel B. Griffith, and B. H. Liddell Hart. *The art of war*. London, Oxford, New York: Oxford Univ. Press, [1963], 1971.

Vego, Milan. "Clausewitz's Schwerpunkt: Mistranslated from German - Misunderstood in English." *Military Review*, no. January-February (2007): 101-09.

Warden, John A. III. *The Air Campaign*. Lincoln, NE: toExcel Press, [1988], [1989], 2000.

———. "The Enemy as a System." *Air Power Journal* 9, no. 1 (1995): 40-55.

Weigley, Russell F. *The American Way of War: A History of United States Military Strategy and Policy*. Bloomington, IN: Indiana University Press, 1960.

Woodward, Bob. *Plan of attack*. London: Pocket, 2004.

Worden, Michael R. *Rise of the Fighter Generals: The Problem of Air Force Leadership, 1945-1982*. Maxwell AFB, AL: Air University Press, 1998.

[1] For a recent, detailed discussion, see Celestino Jr. Perez, ed. *Addressing the Fog of COG: Perspectives on the Center of Gravity in US Military Doctrine* (Fort Leavenworth, KS: Combat Studies Institute Press, 2012).

[2] As such, the article builds on Stephen Rosen's argument that the military services are far from monolithic; not only the services but also their individual branches have their "own culture and distinct way of thinking about the way wars should be conducted." Consequently, military organizations should be regarded as complex political communities that do not just compete for resources, but are engaged in an ideological struggle to (re-) define "a theory of victory, an explanation of what the next war will look like and how officers must fight if it is to be won." See Stephen Peter Rosen, *Winning the next war: innovation and the modern military*, Cornell studies in security affairs (Ithaca: Cornell University Press, 1991).

[3] Schwerpunkt can mean center of gravity, but also focal point or focus of effort or weight of effort. The Prussian use of the Schwerpunkt concept evolved over the course of the 19th and 20th Century. Initially it meant the focal point of strategic effort – the target – which normally was the enemy capital. In late 19th Century, it became the line or arrow pointing to the target. Finally, after WWI, it evolves to the focus of planning efforts, a hybrid of the target and arrow. See Milan Vego, "Clausewitz's Schwerpunkt: Mistranslated from German - Misunderstood in English," *Military Review*, no. January-February (2007).

[4] Carl von Clausewitz et al., *On war*, Oxford world's classics (New York: Oxford University Press, [1976], 1989). 28-29.

[5] Ibid., 489.

[6] Russell F. Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Bloomington, IN: Indiana University Press, 1960); Deborah D. Avant, *Political institutions and military change: lessons from peripheral wars*, Cornell studies in security affairs (Ithaca, N.Y.: Cornell University Press, 1994).

[7] Clausewitz et al., *On war*: 90.

[8] Ibid., 39.

[9] Ibid., 41-43.

[10] Note dated 10 July 1827, as well as undated note presumably from 1830. Ibid., 70.

[11] Ibid., 596.

[12] Ibid., 595-96.

[13] Joseph L. Strange and Richard Iron, "Center of Gravity: What Clausewitz Really Meant," *Joint Forces Quarterly*, no. 35 (2004).

[14] General Giulio Douhet (1869-1930) of Italy influenced contemporary air theory thinkers of the 1920s like Mitchell (US), Trenchard (UK), and the US Air Corps Tactical School. Giulio Douhet, *The Command of the Air* (New York: Coward-McCann, Inc., [1921], 1984).

[15] Sir Basil Liddell Hart (1895-1970) of United Kingdom authored the theory of "the indirect approach," first announced in 1927, in a book in 1929 and numerous times again in different writings. He befriended the contemporary Fuller, se below, from whom he also "borrowed" several ideas portrayed as his own.

[16] Major General John Frederick Charles Fuller (1878-1966) of United Kingdom wrote more than 40 books, primarily in the interwar period.

[17] Tzu Sun, Samuel B. Griffith, and B. H. Liddell Hart, *The art of war* (London, Oxford, New York: Oxford Univ. Press, [1963], 1971).

[18] B. H. Liddell Hart, *Ghost of Napoleon* (New York: Praeger, 1954). 352-57.

[19] John A. III Warden, *The Air Campaign* (Lincoln, NE: toExcel Press, [1988], [1989], 2000); John A. III Warden, "The Enemy as a System," *Air Power Journal* 9, no. 1 (1995): 40-55.

[20] Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914-1945*, ed. G. John Ikenberry and Marc Trachtenberg, Princeton Studies in International History and Politics (Princeton, NJ: Princeton University Press, 2002); Michael R. Worden, *Rise of the Fighter Generals:*

The Problem of Air Force Leadership, 1945-1982 (Maxwell AFB, AL: Air University Press, 1998).

[21] Warden, *The Air Campaign*: 7.

[22] The operational level of war is a relatively new military concept invented by the USSR. It represents the level of war that bridges strategy with tactics; it is the orchestrating of battles to win the campaign. See Colin S. Gray, *The strategy bridge: theory for practice* (Oxford: Oxford University Press, 2010). 20-21.

[23] The most prominent is General Deptula, United States Air Force. Deptula was a Lieutenant Colonel during the Gulf War and a key member of the United States Air Staff planning team "Check Mate" led by Colonel Warden during the time of the Gulf War. Check Mate was responsible for the initial air campaign plan proposed to General Schwarzkopf in the fall of 1990. Deptula later became a member of the US Central Command air planning team eventually responsible for creating the air campaign plan executed in 1991. See Richard T Reynolds, Heart of the Storm: The Genesis of the Air Campaign against Iraq, (Maxwell AFB, AL: Air University Press, 1995), http://www.au.af.mil/au/awc/awcgate/au/reynolds.pdf.

[24] Joseph L. Strange, *Centers of Gravity & Critical Vulnerabilities*, Perspectives of Warfighting (Quantico: Marine Corps University, 1996).

[25] See a description in Robert Coram, *Boyd: The Fighter Pilot Who Changed the Art of War* (New York: Little, Brown and Company, 2002).

[26] A clear illustration of this is U.S. Army colonel Eikmeier's utilization of Strange's COG concept. Eikmeier has over the years been advocating Strange's COG concept in the U.S. Army and joint doctrinal world, but he is actually closer to COG-Strategy School One than Three by focusing entirely on physical COGs, and primarily at the operational level of war. See Perez, *Addressing the Fog of COG: Perspectives on the Center of Gravity in US Military Doctrine*, Chapter 7.

[27] Joseph L. Strange and Richard Iron, "Understanding Centers of Gravity and Critical Vulnerabilities. Part 2: The CG-CC-CR-CV Construct: A Useful Tool to Understand and Analyze the Relationship between Centers of Gravity and their Critical

Vulnerabilities," *Unpublished paper*(2004), http://www.au.af.mil/au/awc/awcgate/usmc/cog2.pdf.

[28] Ibid., 1.

[29] Clausewitz et al., *On war*: 596.

[30] Strange and Iron, "Understanding Centers of Gravity and Critical Vulnerabilities. Part 2: The CG-CC-CR-CV Construct: A Useful Tool to Understand and Analyze the Relationship between Centers of Gravity and their Critical Vulnerabilities". 5-7.

[31] Ibid., 7.

[32] NATO defines the Instruments of Power as the Military, Political, Economic, and Civilian (MPEC) instruments of power, while US joint doctrine uses Diplomatic, Informational, Military, and Economic (DIME).

[33] As such, Strange's concept reflects the definition of NATO's Effect-based Approach to Operations (EBAO): "EBAO is the coherent and comprehensive application of the various **instruments of the alliance,** combined with the practical **cooperation** along with involved non-NATO actors, to create **effects** necessary to achieve planned **objectives** and ultimately the **NATO end state**." However, the EBAO concept is not clear on the role of COGs in Grand Strategy making. North Atlantic Treaty Organization NATO, BI-Strategic Command Pre-Doctrinal Handbook: Effect-Based Approach to Operations, (NATO, 4 December 2007).

[34] Echevarria would probably argue that he represents an additional COG school; however, I interpret his COG defined as "focal points that serve to hold a combatant's entire system or structure together and that draw power from a variety of

sources and provide it with purpose and direction" as compatible with COG-Strategy School 3. Thus, a Will COG provides purpose, direction, and cohesion for an actor at the strategic level; likewise the entity tasked with the main effort (the ability COG) – at the operational level the *supported* component – provides cohesion and for the overall effort and governs the purpose and direction of *supporting* efforts. For Will and Ability COGs, see next section. For Echevarria's argument, see Antulio J.

Echevarria II, "Clausewitz's Center of Gravity: Changing Our Warfighting Doctrine - Again!," (Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2002).

[35] Jacob Barfoed, "Center of Gravity Analysis and Operational Design: Ensuring a logical Linkage among National Strategic Objectives; Diplomatic, Informational, Military, and Economic Instruments of Power; and the Military Campaign," *The Wright Flyer Papers*, no. 38 (2009), http://aupress.au.af.mil/bookinfo.asp?bid=370; Joseph L. Strange, "Centers of Gravity Critical Factors Analysis" (paper presented at the Royal Danish Air Force Air Power Conference, Ballerup, Denmark, 27-28 april 2009).

[36] For a more detailed discussion of coercion, compellence and deterrence, see Karl Mueller, "Strategies of Coercion: Denial, Punishment, and the Future of Air Power," *Security Studies* 7, no. 3 (1998); see also Barfoed, "Center of Gravity Analysis and Operational Design: Ensuring a logical Linkage among National Strategic Objectives; Diplomatic, Informational, Military, and Economic Instruments of Power; and the Military Campaign". For the classic study, see Thomas C. Schelling, *Arms and Influence*, Revised ed., The Henry L. Stimson Lectures Series (New Haven and London: Yale University Press, [1966], 2008).

[37] For the purpose of this article, the grand strategic level represents the level that orchestrates all national/coalition instruments of power for achieving grand strategic objectives. Instead of "grand strategic", the term political-strategic is sometimes used, and instead of grand strategic objectives, political objectives or national objectives are often used. Moreover, the grand strategic level is often merged with the military-strategic level, using the label "the strategic level."

[38] Criteria for Success (CfS) is defined as *"…measurable or observable requirements with respect to the essential physical, cybernetic or moral conditions or effects that must be achieved, as well as any conditions or effects that cannot exist for the objective to be successfully accomplished"* and must be established for each objective. North Atlantic Treaty Organization NATO, Allied Joint Publication-5 (AJP-5), (NATO HQ, 27 April 2005). 3-13.

[39] See Justin Kelly and Mike Brennan, Alien: How Operational Art Devoured Strategy, (Carlisle, PA: Strategic Studies Institute, US Army War College, 2009), http://www.strategicstudiesinstitute.army.mil/pdffiles/pub939.pdf; See also Gray, *The strategy bridge: theory for practice*: 20-21.

[40] See a discussion of this in Michael R. Gordon, *The Generals War: The Inside Story of the Conflict in the Gulf* (Boston {etc.}: Little, Brown and Company, 1995).

[41] Not that this made the military strategy better integrated with the non-military instruments of power than in 1990-1991. See several studies, e.g. Michael R. Gordon and Bernard E. Trainor, *The Endgame: The Inside Story of the Struggle for Iraq, from George W. Bush to Barack Obama* (New York: Pantheon Books, 2012); Bob Woodward, *Plan of attack* (London: Pocket, 2004).

[42] Instead of having military strategic objectives and operational objectives, with no strategy linking them, the operational objectives should then be replaced by Criteria for Success, for each military strategic objective (see footnote 30).

[43] Another option would be to merge the military strategic and the operational level, as in the Iraq wars of 1990-1991 and 2003, while acknowledging that alliance warfare requires much more extensive and difficult coordination and interaction between the military commander and the political leadership, due to the requirement of consensus among 16+ nations. Consequently, SACEUR would be the top military commander and overall responsible for the military strategy; yet, for practical purposes, he would leave responsibility for the detailed military planning and execution to his deputy, designated as the Joint Force Commander (JFC). Thus, SACEUR would maintain overall military responsibility, but primarily coordinate upward (with the political level, i.e. the NAC and the MC, as well as the national heads of government) and horizontally (i.e. with other IGOs and NGOs), while the JFC primarily would coordinate downward (with the component level, i.e. land, maritime, air, and special operations).

[44] Clausewitz et al., *On war*: 90.

[45] This is my own translation; Howard and Paret's translation read, "Far from believing we have discovered a new technique, we are merely providing a rationale for the actions of very general in history, which serves to explain their connection with the nature of the problem." Ibid., 486.

Combat Case History in Advanced Officer Development: Extracting what is difficult to apply

By Brigadier general (retired) Michael H. Clemmesen

"*A little military history may be more dangerous than none at all.*"[1]
"Unless history can teach us to look at the future, the history of war is but a bloody romance".[2]

When you want to inspire a young man or woman to become a good and motivated professional officer in one of the armed services and then one of their branches, you should use national, service and unit history both as a bait and tool. Thereby you can offer a framework for the junior officer's initial efforts by presenting the organisation's roots and highlight the hoped for professional ethos, and it can present a well-illustrated role models copy.

Role of military history in officer training: From a Fort Bragg American Civil War staff ride for U.S. airborne officers.[3]

An inspiring Military-Naval-Air Academy history instructor or unit historian may even catalyse an interest in the history of the profession that will make the officer go on reading other history works relevant to his or her later responsibilities and missions. Together with the critical scepticism and human insight that ought to come with age, such reading should help in the development of robust insight that could make the officer a mature and consolidated professional.

However, to achieve this, it is important that both the choice of later literature and the way it is read is feeding and guiding that development. The successful career officer has very little time to read books and long history articles when not a student in staff and later war courses. Therefore it is critically important that the way historical cases is used in such courses is the best possible. It is likewise important than such use is mirrored in the historical studies that take should take place before new operations to gain relevant understanding of the character of the planned tasks and the regional conditions, thereby minimizing the risk of repeating avoidable mistakes and costly learning.

This article is an attempt to ensure that the "little military history" that the career officer consumes avoids being "dangerous". It might even help future commanders realising and countering sources of friction and inefficiency with deep roots in human and organisational opportunism and other frailties. To make the conclusion clear and limit the length the cases are focused on land/air-land combat cases.

Developing and writing the text has been what the wise Swedish historian of European military thought, Alf W. Johansson, characterised as "*an educational adventure*".[4]

The core role of the mature career officer

The essential role of the successful mature armed force officer - from major/lieutenant commander to general/admiral – is to predict the likely outcome of various possible actions. In the opinion of the author this understanding should guide and focus everything that is done to educate and motivate the officer from the time he or she has proven after

commissioning to be capable of effective leadership and independent thinking. If the officer is employed as a staff officer, the predictions should guide the planning and advice. If appointed as the responsible commander, the prediction decides how the officer interacts with the political or military superiors as well as with supporting agencies and allies. Thereafter the prediction of outcomes and the immediate learning from reality guide how the chosen action is implemented.

The professional senior officers' job is analysis, prediction and implementation – here the Israeli Chief of General Staff consulting with other officers.[5]

All prediction is built on an updated, robust and unsentimental understanding of the real strengths and weaknesses of all involved units and their equipment – whether own, neighbouring or supporting from own or other branches or services – and of their commanders.

However, even with that too rare understanding in place, the character of the military profession means that predictions cannot by based fully on a combination of investigations and calculations as that of an engineer building a bridge. It cannot even be built on a thorough practical training and personal experience as those of a doctor of

medicine. Lack of time and relevant intelligence, the independent mind of the enemy (as well as subordinates, partners and allies), the unique character of any major military operation as well as the role of chance and "*friction of war*" means that maximum concrete assistance a staff officer or commander can get are "*rules of thumb*" and norms for force and logistic requirements extracted from simplified analyses of somewhat similar cases. Even an officer fortunate or unfortunate enough to have much combat in his earlier career – as the British army officers in France in 1914 and 1940 had from colonial warfare and policing – cannot count on such experience as being a safe base for prediction of outcomes.

Ever since the period of Enlightenment military theorists and others have tried in vain to produce *positive* theory meant to guide the commander and ensure victory by scientific management of resources. Henry Lloyd and Dietrich von Bülow did so in the 18th Century and, Henri Jomini and Karl Wilhelm von Willisen tried after 1815. The French Army battle managers and the United States' Air Corps Tactical School in the Interwar Period sought scientific guidance to avoid a repetition of the losses and costs of 1914-18 in a new major war.

After the Second World War Robert McNamara's team simply forced the U.S. and Allied militaries to copy the current civilian scientific management and game theories until both they and their theories lost legitimacy by the U.S. failure in Vietnam. After that war John Warden III developed a modernised version of the Air Corps Tactical School doctrine that should be relevant at all levels of war-fighting and this was later morphed into similar dogmatic U.S. and NATO guidelines under a sequence of buzzwords.

The problem is simply what Carl von Clausewitz realised in his testing of various positive theories against his own combat experience and the analysis of a large number of wars in depth. The character of war and war-fighting and the uniqueness of any war made it futile to attempt to develop a positive theory that could become a guide for action by its predictive value. War theories had to be limited to assisting the officer in focusing his interests and efforts thereby developing relevant

professional insight when gaining personal maturity and experience and studying earlier wars. However, because of his own experience with the difference between the brutal character of war in his own time and earlier, more limited 18th Century warfare, Clausewitz saw it as important to focus study on the most recent conflicts.

As already stated it is the understanding of this article that the central element and result of adequate professionalism is the ability to outline probable outcomes and risks of a course of action. It follows that all activity of a military organisation - such as structure and doctrine development; administration; training and education - is built on a more or less conscious understanding of what will be effective in operations. As the military profession is a practical one this understanding - this "*theory*" - is to a significant degree based on an analysis of projected experience. All experience in a profession that cannot conduct realistic experiments must be historical.

As the central and unique mission of the military is fighting and the ability to influence, deter, coerce or enforce by the effective ability to fight, the focus of the historical investigation must be combat cases.

During the long process of developing and writing this text, the author has discussed with colleagues, both historians and regular officers, why so little has been written that could guide and inspire. The conclusion was that most professional historians considered it presumptuous and irrelevant to study to seek applicable learning, even the most general. German military historians among them probably do so because they reject what happened in the past and the notion that such learning might be relevant in the European future. On the other hand both most war studies political scientists and some scientifically minded regular officers who focus on actual warfare and strategy have continued the Enlightenment tradition of identifying theoretical patterns and seeking positive guidance from a systematic analysis of the measurable extracts of a significant number of cases. However, most regular officers do not really feel the need to extract learning or insight from the study of historical experience. They do not experience an urge to answer the question what else can create the foundation of a profession where

personal practical experience is likely to be very limited and never general in character. For one responsible for advanced officer education for decades all these positions are fundamentally inadequate.

The conclusions of Michael Howard when young war veteran and historian

The only really usable advice was given by the young, decorated Coldstream Guards war-time officer, Michael Eliot Howard, who had just returned from the Second World War Italian Campaign, proceeded to resume his history studies at Oxford University.[6]

He went on to lecture in King's College, London, where he led the creation of the Department of War Study and started his life-long effort to bridge between the military profession, the historians and any interested political scientists. In November 1961 the 39 years old historian gave his ground breaking lecture on "*The Use and Abuse of Military History*" to the Royal United Service Institute audience.

He accepted - as this article does - that the use of historical myth might have some legitimate social function. However the focus of his analysis was how military history could be used to catalyse and nourish professional insight among armed services' regulars. To achieve this, he thought that they had to move beyond the myths of the past to a deep and comprehensive understanding about how and why a war, campaign or battle ended as it did.

This was and is complicated by the confused and contradictory narratives from battlefields due to the chaotic character of fighting. However, the effort had to be done, because "*war is a distinct and repetitive form of human behaviour… war is … clearly defined with distinct criteria for success and failure*". The military professional had to seek understanding from military history, because there was no other real alternative path to gaining robust insight than the study experience. By studying and seeking wisdom from cases from different time periods, places and types of conflict, the officer could develop an understanding of the character, possibilities and limitations of armed forces as political tools. Otherwise

the profession could repeat past mistakes that might have been avoided. However, if the officer studied superficially, he was likely to be guided by extracted positive theoretical guidance that was rendered obsolete by technological or political changes or irrelevant by fundamental differences between the past and the actual problem or situation.

Michael Howard recommended that the officer studied in "*width*" to become alert to the fundamental changes in war and warfare through history and the differences between his specific case and other superficially similar cases. The hoped for insight can probably only be achieved by successfully inspiring the young cadet or officer to read military history continuously throughout his career. Otherwise Howard emphasized that any chosen case should be studied in both "*context*" and "*depth*" to make it possible to extract general and not anachronistic professional insight.

Sir Michael's guidance is the foundation of this article. His recommendations were roughly in line with the now century old contributions from such historians as the German Hans Delbrück[7] , the Swede Carl Bennedich[8] and the Dane August Peder Tuxen,[9] however such studies built on in-depth understanding of both sides of the strategy process have been rare thereafter, especially in Continental Europe.

The author only aims to add a few warnings and rules of thumbs on how to conduct case studies during formal advanced officer education and in any individual effort to seek focused insight by study of cases. What he recommended and what this article recommends is to seek general answers to open scientific questions. It does not in any way inspire to formulate any positive "theory". It would be both futile and potentially dangerous, at Clausewitz convincingly argued in "On War".

The normal approach: Cases simplified to illustrate desirable behaviour

The typical choice of military history focus in north-western European advanced officer education has – *firstly* - been on homage to the professionally brilliant, momentous and heroic (such as 1916 Verdun,

Guderian's break-through at Sedan in 1940, the 1944 Normandy landings and John Frost's last but futile stand in September that year at the Arnhem Bridge).

Secondly it has been on cases meant to teach the officers something about their conditions in the expected war such as Operation GOODWOOD in Normandy (the effects on defence of massive fire-power) or the battle for the Seelow Heights during the final Soviet offensive in Europe during the Second World War (Soviet offensive tactics).

Operation GOODWOOD for illustration of massive (tactical nuclear) fire-power. Here heavy Tiger Tank after the bombardment.[10]

Thirdly military history cases have been used to as pure illustrations to support the teaching elements of current doctrine and best-practice. When an army staff course directing staff focused on e.g. offensive division level operation, the military history teacher was brought in to

lecture on a Second World War example, thereby adding reality and a reference framework and thus reinforcing learning (in reality assisting indoctrination and potentially dangerous dogmatism).[11]

Civil war general "Stonewall" Jackson as British Staff College role model.[12]

The use of military history cases as illustrations is no new idea. In "*On War*" Clausewitz constantly integrate references to historical cases in his arguments. Alfred Mahan did the same when he started his teaching in the U.S. Naval War College. The British Army staff education on the eve of the First World War was nourished by a heavy and ever more superficial diet of George F. R. Henderson's brilliant studies of American Civil War operations. When the author had been the lecturer, he had been able to make his case relevant, but his successors lacked the in-depth knowledge to ask for more than an empty copying of the manoeuvres of the brilliant "Stonewall" Jackson.[13]

The observation and conclusions of the main theoretical writers of the late 19th and early 20th Century such as Cardwell were massively supported by references to historical cases.[14] It was obvious that these authors could assume an intense historical interest and high level of knowledge among their readers.

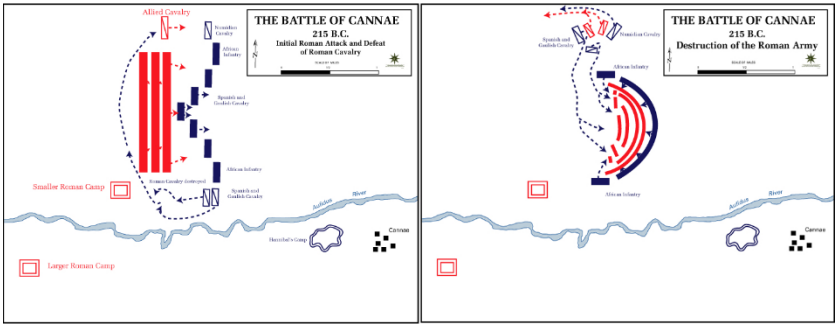
Schlieffen's Cannae case and thereafter.

The most influential use of a historical case came from that period. Germany needed quick and total operational victories in a future continental war. The now retired Chief of the General Staff, Alfred von Schlieffen, tried to educate his country's operational commanders and

their General Staff assistants in the operational and tactical behaviour that would enhance the chances of such a victory. He found a usable template for "*best practice*" in Hannibal's victory at Cannae 216 before Christ. He thereafter presented his analysis of the battle scheme as the operational model for Germany's military strategy.

Schlieffen accepted that both the arms and modes of combat had changed completely during the more than 2000 years since the battle. However he considered that "*the greater conditions of warfare have remained unchanged*". Therefore he noted that a "*battle of extermination*" might use roughly the same idea as the one demonstrated by Hannibal. It was essential to understand that the own forces' main attack should not be directed against the enemy front. The essential thing was to destroy the flanks in the entire depth of the enemy army formation with own mass and reserves. The operation should thereafter complete the destruction of the enemy army by mobile attacks against its rear.

The Cannae case highlighted the necessary way op operating when the strength of modern defence made direct frontal attack costly and unlikely to succeed.[15] The U.S. Army War College published a complete translation in 1931, because "*these theories must be weighed, whether accepted or denied, in whole or in part, in the major conceptions of a future war should, unhappily, such occur.*"[16]



Schlieffen's illustration of best practice: The battle of Cannae. (dcc.dickinson.edu/nepos-hannibal-essays/4)

Schlieffen's endeavour may have mirrored the need to study "*in depth*" later underlined by Michael Howard. However, the purpose of the study was far more ambitious than the latter would consider realistic and sound, as the field marshal sought directly applicable guidance rather than mere general professional insight. He did his study with a clear focus on evidence supporting his operational idea rather than with an open mind for contrary evidence and case irrelevance due to the fundamental differences between the conditions of Italy 216 B.C. and Europa 1907 A.C.

Normal officers of the services are practical utilitarian persons, and during the next many decades other lesser and less diligent professionals followed the same path. With less credibility than the field marshal they looked for the supporting evidence in historical cases for their preferred doctrinal choices.

In the post-WW2 period, when the Finnish Army was considering how to deter or meet and stall another possible massive Soviet invasion, it naturally sought inspiration and illustration from their own successful defensive operations in the 1939-40 "*Winter War*" and the final months of the "*Continuation War*" in 1944. The enemy, the terrain and the climate was the same, but even so, a critical Finnish staff officer has argued recently that such use of military history cases does more harm than good. [17]

To the new German post WW2 Bundeswehr and Austrian Army the enemy was the same, and they used Second World War Eastern Front cases as guidance in the preparation for another war with the Soviet Union. [18] Their experience with actually fighting the potential enemy made senior German officers cherished contributors to NATO's doctrinal thinking as the Alliance in the 1970's moved beyond its previous heavy dependence on immediate use of tactical nuclear weapons on the battlefield.

The wish and requirement to illustrate, document and legitimise by using historical cases was also illustrated in the new joint U.S. Army and

Marine Corps Counter-Insurgency doctrine developed in the middle of last decade. [19]

Rejection of use as "best practice" guides

The author's own first experience with the use of military history in support of doctrine dates back to the time in the Military Academy 1965-68 and the follow-on service as junior officer in one of the two armoured infantry brigades tasked with the defence of the main Danish island of Zealand against Polish and Soviet sea and air landings. The example of the German reaction to the British air landings at Arnhem in September 1944 was used to highlight the need to react immediately within the designated unit area of responsibility. Because the Germans had been successful in immediate reaction to the landings, Danish companies and battalions should copy their action - *within their area of responsibility*.

However, the use of the case did not include an attempt to transmit or understand the German battle philosophy that was the foundation for the German tactical behaviour. This may have been because of the lack of awareness of that philosophy. However, it may also have been because of the battle management philosophy that totally dominated the tactical nuclear period of Western land warfare doctrine. Actually, another military history example, an incident in the Battle of Schleswig in 1848 early in the Danish-German Three Years War was used to underline the risks of unauthorized action by part of the army. In this battle the Prussian commander's balanced and well-considered plan was derailed due to tactical opportunism by parts of his avant-garde.

Teaching tactics became supported by selected pieces of military history cases. Here from the Baltic Defence College 2014 use of the German 1917 landings on Saaremaa.[20]

Fifteen years later – around 1990 – the author was tasked with teaching military history in support of the advanced operational education of future army general staff officers. That included assisting students' work with their military history lectures within the framework of the teaching of the Danish Army doctrine for attack, defence, delaying action, etc.

The experience made clear that such use of cases did not encourage the officer to gain the insight critical for any later professional development and contributions. Instead it promoted direct application of the case and thus illustrated doctrine. It liberated the officer even more from having to think independently to identify difference between the case and the requirements of the actual situation. It became a case of a little military history being worse than none. It certainly did not encourage understanding that military history studies might be relevant for the later career.

Simplifying historical cases to illustrate legitimises and reinforces the already too widespread tendency of the intellectually lazy to make doctrine dogmatic. Copying what was learnt from memory always seems more bureaucratically safe than independent analysis of situation and options.

It also gave good support to those who saw use of military history in officer development as anachronistic and to those purists who felt deeply that military history like all history should just be studied, never be used, because every historical situation is unique.

The author's immediate reaction was to ask the students to refocus the use of the cases in a basic way. Instead than focusing on the winning side of a campaign, battle or engagement to learn good bits to memorize and copy, they were to analyse the case to extract understanding of why the original operational plan failed fully or partly. Thereby they might realise the reality of friction, uncertainty and chance in combat and gain some insight into what was required to succeed in spite of these fundamental conditions of military action.

However, before having the chance to test and develop this pedagogic option, the author moved on to command and responsibility and would only return to the issue recently when tasked with teaching how to learn lessons from own and others' experience recent or more distant experience of war.

The basic issue

The basic problem is how to develop professional judgment in staff officers and commanders so they can better understand the real requirements in force development and in the choice of operational options. Thereby they should become better at perceiving both the necessity and limitations of planning and other pre-battle preparations and somewhat more accurate in advice on risks and likely outcomes.
One way to do so was the Soviet Army extraction of norms from historical cases that should be used to establish the force requirements and tasks for any combat mission. It was deliberate done to create

"*scientific*" certainty of the outcome of any operation. The costs, however, were huge. They eventually led to unrealistic demands on economy and society, to predictability of action as well as to the loss of flexibility and initiative in execution because all subordinates became reduced to dependent tools. In any operation different from a traditional force-on-force operation such as counter-insurgency both this Soviet method and the American somewhat similar massive firepower management approach proved both wasteful and counter-productive. Both approaches had their roots in the positive military theories for operational action of the Enlightenment already mentioned and in the writings of their successor Henri Jomini.

We should now return to Clausewitz' classical analysis. It was nourished by his rejection of the positive enlightenment theories. Experience and study had made him realise than the maximum theory could do was assist the maturing commander in gaining insight that could help him towards developing some of the "*genius*" that a field commander required to succeed in the fundamentally chaotic conditions of land engagements and battles. The insight into requirements and risks were also essential for the military participant in the decision-making at the state level.[21] We will combine Michael Howard's recommendation with Clausewitz' understanding of the limitations of theory.

Land battle chaos in art through two centuries: in Clausewitz' time at Borodino in September 1812 and at Ypres in 1915 in painting, on OMAHA Beach in 1944 in film and here in the "Six Days in Fallujah" computer game inspired by the 2004 battle. (Atomic Games).

This focus is to some extend also inspired by the revisionist, journalistic approach to battle reconstruction and lessons learning recommended by the controversial official U.S. Army Second World War historian S.L.A. Marshall. His view of the necessity of a bottom-up method of building using oral history in gaining an understanding of reality mirrors how Clausewitz originally met siege warfare as a teenage boy in the War of the First Coalition. The approach differs from how the traditional general staff histories were developed based on plans and reports from the various headquarters' and national levels. In 1988, the U.S. Army Military History Institute put Marshall's method within the framework of its history of lessons learning when it outlined how it lived-on in the Israeli Defence Forces.[22] Fortunately much of what had been published during the latest decades have done what Marshall recommended, even if authors such as Stephen E. Ambrose may not have been directly inspired.

One could say that what is aimed at here is roughly similar to what Colonel J. F. Maurice had as his ambition lecturing military history in Camberley in the 1880s. The Staff College student was not only to collect facts about battles and identify causes to what happened, "*but to improve his judgement as to what ought to be done under the varied conditions of actual war*".[23]

The suggested way forward

"Gentlemen, in spite of your excellent training and orders, do not be daunted if chaos reigns. It undoubtedly will".[24]

If a case is to give meaningful professional insight, both sides must have had a reasonable objective chance to succeed at the outset of the engagement. If it was or seem obvious who would succeed due to numerical or technological superiority, insight is reduced to a confirmation of the need to be superior at the decisive place and time. If, however, the result must be considered uncertain and in balance, the author suggests that the chances to learn something really relevant with a limited study are far better.

The ideal is still to follow Michael Howard's advice to study cases in context and depth, but this is unfortunately not a realistic option for most career officers.

It is also suggested that focusing on the eventually defeated side in the search for reasons is more useful than searching for the reasons leading to success. One reason is that it reduces the temptation to copy what has been learned directly. However, the essential is not mainly which side is studied for insight; it is that the focus of the investigation should be on *why* rather than *how*. The important is that study is conducted in depth and with full understanding and acceptance of the context. The main aim of the analysis would be to find and understand human, organizational and technological friction and the role of chance that influence combat.

Case Market-Garden revisited

"*General Sosabowski was again astonished at the casualness with which his British counterparts received the briefing. They sat about, cross-legged, looking bored*".[25]

MARKET-GARDEN is one such balanced operation open to extraction of the elements leading to failure. The basic one, of course, was arrogant contempt of the German enemy's ability to recreate a stable defence after the massive defeats and losses during June, July and August.
The analysis of the case concentrates on the critical northern part at NIJMEGEN and ARNHEM as well as the area between the WAAL River at the former town and the LOWER RHINE River at the latter.[26] To add context, the case should be considered through the best analyses of the strengths and weaknesses of the British,[27] German[28] and to some extent American[29] Second World War armies.
The certainty of the Allied planners of early final German defeat led to insufficient use of the intelligence that came from the Dutch Resistance from early September onwards of a German reinforcement and stabilisation of the front and rear in Belgium and the Netherlands. Sir Bernard Montgomery was aware that the situation was quickly changing in the days after 7 September, and the commander of the British 2nd Army, Sir Miles Dempsey, considered any risky operation as unjustified. However, the outline MARKET-GARDEN idea was approved by reached the Supreme Allied Commander, General Eisenhower, on 10 September and adopted by an Allied Airborne Army eager to get a visible role to prove itself in the final phase of the war.

The intelligence of German armoured units had reached Eisenhower's HQs and the 1st British Airborne Corps. It been accepted in both staffs as significant and thereafter ordered controlled and was confirmed by aerial photo reconnaissance. However, it was ridiculed by Montgomery and deliberately ignored as inappropriate instead of triggering additional tasking of the Dutch Resistance.

The arrogance had other effects. After the landing the use of the local Resistance and the initially intact Arnhem telephone system could have improved both tactical intelligence and its use might have helped

establishing effective communication between the different elements of the 1st British Airborne Division.[30]

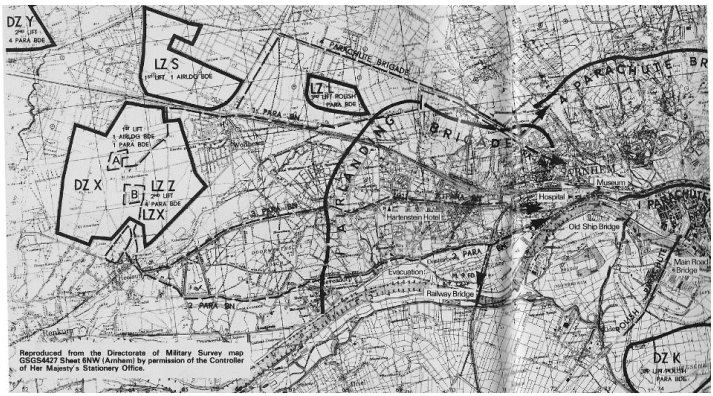
The very light-hearted attitudes to the challenges ahead may also have been the reason why the Airborne Corps Commander, Sir Frederick Browning, did not ensure a common focus on the mission of capturing the bridges and holding them to until the arrival of the overland offensive. Only the 101st Division's plan was effectively focused on this mission. The 82nd gave first priority to capturing and holding the Groosbeek Heights, which succeeded, but did little to limit the German freedom of action to attack the corridor and hold the Waal River bridges at Nijmegen. Neillands note that Browning contributing actually contributed to that loss of focus by asking Gavin to take a hold the heights because he wanted the area for his corps HQs. Nobody seemed to see the contradiction between seeing the heights as a likely concentration area for German counter-attack forces and using it as the location of a corps HQs.[31] Due to the width of the Waal, the main channel of the Rhine River, the demolition of the two bridges would have left all forces north of the river unassisted to be destroyed and the operation as a total failure. The fact that the division did succeed in capturing both the Grave and Waal bridges intact in time to support XXX Corps crossing has obscured the lack of mission focus. To support the overall mission, all landings – both at the Grave and the Waal - should have been made at the bridges, aiming at capturing both their ends. The heights were secondary to that main mission – nice, but not need to take - so the 82nd Airborne plan was as faulty as that of 1stAirborne, both due to weak professional leadership from Browning, but the former formation escaped blame due to luck and a friendly and uncritical historical narrative tradition. The too late capture of the Waal Bridge, which was Gavin's fault, was the main reason why the XXX Corps advance from Nijmegen to Arnhem became seriously delayed.[32]

The operation was not under one, dynamic operational commander driving and focusing both the Airborne and over-land parts. MARKET-GARDEN planning seems in practice to have been left to hopefully friendly co-operation between Browning and Sir Brian Horrocks, the XXX Corps Commander, instead of being closely monitored and

directed by Dempsey (or by Montgomery, who actually wanted to control everything himself).[33]

Therefore nobody was around with sufficient authority – based on professional arguments and will power - to force the air forces to do what was necessary to support an effective operation such as flying more than one sortie a day, fly where the airborne forces needed to land to make immediate tactical success more likely and employ fighter-bombers in close support of the airborne troops. Such use of Allied air power might have led to higher initial casualties, it would have been stressing for the squadrons and might have led by bad blood between the two services, but it would have enhanced the chance of success significantly. However, the senior American air force commanders were allowed to derail the logic that had guided Plan COMET that had preceded MARKET GARDEN. The preparation of the airborne operation was probably also hampered by the lack of trust of that was allowed to exist between the senior British and U.S. commanders.[34]

General Urquhart*: "A whole brigade dropped at the bridge would have made all the difference… Both the Army and the R.A.F. were over-pessimistic about the flak."*[35]
"It appears that at Nijmegen Gavin and Browning either forgot or elected to ignore one of the principles of war. Their prime task was to take the bridges…"[36]



Map from the Arnhem planning shaped by the concerns of the key air force generals.[37]

The commander of the 1st British Airborne Division correctly saw himself as less than perfectly suitable for the position. The British army was hampered throughout the war by mediocre generals and Roy Urquhart was probably very suitable for the command of a normal infantry division, but the way he commanded at Arnhem proved that he was out on his depth. He simply did not have the necessary understanding of the special strengths and weaknesses of the different parts of his formation. Neither he nor his staff seemed to understand that the decisive phase of an airborne operation was a combination of reinforced company-battalion level engagements. He failed especially by not effectively resisting the air force choice of drop and landing zones.
The brigadiers were the highest command level with a meaningful coordinating role when reality after landing failed to mirror planning assumptions. All previous airborne operations of the war had illustrated the fundamental chaotic character of the post-landing situation. The operation might only later develop into a more traditional offensive or defensive engagement, where the division level could influence the battle by the employment of any reserves and heavy support. The division's pre-landing task could not go beyond the development of a clear and realistic and flexible plan for each reinforced brigade. To enforce the seniority principle for promotion to command in war is an irresponsible experiment. The British airborne generals misunderstood the character of the battle. The degree is illustrated by Browning's decision to fly-in his HQs on D-day. Thus he occupied a large number of transport aircraft and gliders needed for other purposes.[38]

Post-battle photo – view east towards Arnhem - of the summer resort "Westerbouwing" on the high ground controlling the Driel Ferry-crossing.[39]

The division plan execution in Arnhem ignored the basic principle for river crossings that options should be created at the widest possible front, here meaning the main bridge in Arnhem, the bridgehead terrain of Westerbouwing covering the Driel Ferry and thirdly the more exposed railway bridge. [40] When the railway bridge blew-up in the face of the battalion tasked with its capture and move-on to the south-end of the road bridge, the chance of capturing an intact crossing had all but gone. However, no full terrain analysis seems to have been conducted at by corps or division as a basis for the plan; identifying what areas north and south of the Lower Rhine should be captured immediately and held, and when Urquhart decided to land his artillery on D-day rather than his last British parachute brigade, he tied-up his air-landed brigade to the defence of the landing zones and became reduced to only three combat battalions until the follow-up landings on the second day.[41] This illustrated his orderly, phased way of understanding tactical manoeuvre.

Neither Browning nor Urquhart seemed to understand that airborne operations succeeded by combining surprise with tough and preferably

realistic and detailed preparation, creating chaos in the enemy reaction at the same time as the airborne units maintain the ability to act effectively in spite of the confused environment. Urquhart assumed that he would be allowed to conduct an orderly, phased land operation, where the enemy was controlled as in a peace time-exercise. This was the natural consequence of the tactical orderly management paradigm that guided most British land operations in the war. The result became that the main bridge was left partly in German hands so that they could destroy it if necessary and that the final bridgehead at Oosterbeek was without any tactical purpose because it did not control the high ground over-looking the Driel Ferry.[42]

Urquhart's combat management ambition ended up as totally unrealistic because of the failure of proper field testing and training in the use of the tactical and long range radio equipment. The division signals officer did expect problems, but failed to convince the bureaucrats that more powerful tactical sets were required in the built-up, sandy and wooded area.[43] The only radios that worked properly during the operation were those of the artillery support nets.

It was not only the air force generals, the 1st British Airborne Division and Browning that failed professionally. In its systematic progress up the road to Nijmegen and onwards to Arnhem the XXX Corps cleared obstacles with fire support and engineers before proceeding. The weak German forces opposing it were never being stressed and bypassed by aggressive use of dismounted, outflanking infantry. The Guards infantry unit working together with the forward armoured regiment was only deployed when the advance had been stopped.

It is only 10-15 kilometres on foot between the Waal to the Lower Rhine, easily within support distance of field artillery. That distance could have passed by infiltrating infantry with ease in one night. It seemed as if the infantry had unlearned to leave the trucks and carriers behind move quickly on foot, infiltrating around the weak enemy forces blocking the roads.[44]

Stanisław Sosabowski was right in his observations on 10 September. His British counterparts considered the war to be over. His counterparts considered the war to be over. The best analysis – and most brutal condemnation of the MARKET-GARDEN planning and decision process - has been given by John Buckley, He presents how Montgomery's, Browning's, Gavin's and others' ambitions – and Urquhart's lack of professionalism all contributed to the failure. He also clears Dempsey of responsibility. Montgomery simply forced the 2nd Army Commander to implement Browning's plan.[45]

Simple insights

It is important to repeat that no case, and no number of cases, can give positive guidelines for future action. The maximum they can do is to highlight general human and organisational as well as specific cultural frailties that are likely to undermine the effectiveness of preparations for and action in war. If the future commander or planner is able to accept, learn and find the morale courage and will-power to address these problems, he will be able to minimize the risks and effects of friction and be able to develop and maintain more effective military units and create more realistic and robust plans for action.

The enemy
The MARKET-GARDEN case underlines the risks resulting from implicitly assuming that the enemy is defeated. The assumption led to deeply unprofessional operational and intelligence planning and preparations. It may have contributed to Browning's weak performance in controlling the mission focus of the 82nd and 1. British Airborne planning and the rather unprofessional character of the latter.

Mission focus
However, as the lack of effective common control of the two employed corps and the lack of forceful integration of the air and army operations, the reason may also have been the always present lack of will to force allies and other armed services to act towards one objective rather than accepting a risky compromise.

Tribal live and let live behaviour

Forcing other organisational "*tribes*" to act in full support of the common plan takes both effective professional arguments built on a though understanding of the others' capabilities and limitation and much determination and energy. Browning never lived up to that requirement. The reason was probably that he was a case of promotion a couple of steps beyond his professional command ability.

One of the most difficult rules to enforce is always joint unity of command because all the tribes agree that coordination is sufficient to ensure effectiveness.

Personnel management

The appointment of the sound infantry officer Urquhart as Airborne Division commander must be read as any mainstream organisation's automatic reaction to upstarts elements such as the airborne units. Where the American Airborne forces had been developed within the framework of reactivated infantry division that had attracted some of the best officers, the British had been created outside the regular forces and thus *had* to be brought under normal administration by bureaucratic action.

Any organisation will promote centralisation and standardisation when not forced to act otherwise. It takes extraordinary effort and energy to avoid the suffocating of new, necessary capabilities.

Chaotic land battle

The same applies to the organisation's drive for orderly, managed tactics with optimistic, maybe hidden, assumptions about enemy action that was must be judged to be behind the British Arnhem plan. The British 1944 combat units had received tough training, but this may not have been the case with the higher officers.

The actual character of land combat means that there is always a requirement to ensure the presence of independent, high quality subordinates rather than loyal, well-drilled obedient clients.

Challenging plans
MARKET –GARDEN underline the importance of a robust and simple plan as well as the requirement of brutal testing of any plan by gaming aimed at "*destroying*" it. Redundancy and well-prepared delegation of authority to subordinates as well as the encouragement of local flexibility and initiative is always essential.

Equipment
The case also pointed at the need for realistic testing of key equipment, effective training in its operation and the replacement with more suitable equipment if necessary. If the testing and training proves insufficient to solve the problems, alternatives should be developed including alternative tactics and procedures.

All these insight should just be simple common sense to a mature professional. However, they are never easy to follow when exposed to the realities and pressures of any future operation.

Consolidation

"If … some historical event is being presented in order to demonstrate a general truth, care must be taken that every aspect bearing on the truth at issue is fully and circumstantially developed – carefully assembled, so to speak, before the reader's eyes. To the extent that this cannot be done, the proof is weakened, and the more necessary it will be to use a number of cases to supply the evidence missing in that one…"
- Clausewitz: On historical Examples[46]

As quoted above, Clausewitz recommended that insight from one case should be tested against similar cases for rejection, consolidation or supplement.

The author has therefore chosen the one rather similar operation: Unternehmen MERKUR (Operation MERCURY), the German invasion of Crete in May 1941.[47] As MARKET-GARDEN, MERKUR is very well covered by a variety of studies. The purpose of the second case it to reinforce general observations from the first or identify these as case specific.

Case MERKUR (Crete May 1941)

"*The airborne troopers had a decentralised command concept different from the centralised one guiding the New Zealanders. The German troopers had been trained to act independently, not to wait for orders. They were guided by* Auftragstaktik. *After the landing there were no superiors around, everybody was alone but sought to join others. Small groups formed with a clear sense that their mission was to attack. No orders were needed for that, and it happened even if officers became casualties.*"[48]

As in MARKET-GARDEN, the Crete battle could have gone both ways, but it differed by being was far more stacked in favour of the British defender. He had availability of accurate intelligence about the enemy operational plans and the date of attack as well as the resulting knowledge that the defence deployment matched requirements. At MARKET-GARDEN only gained access to the Allied plan by chance after landing.[49]

As roughly three years later in the Netherlands, Crete' defenders consisted of army formations disorganised and materially weakened by previous unsuccessful defensive fighting. The main losses to the Crete defence were the heavy equipment and transport left in Greece rather than human casualties. However, the equipment losses of the Crete defenders were aggravated by incomprehensible peace-time like administration. When the New Zealanders evacuated from Greece landed in Chania late April, they were ordered by the Suda Base representative to leave all weapons but rifles and side arms on the jetty. Even when their commander protested, the order was enforced by military police. Therefore the later defence against German elite infantry armed with submachine guns had to take place without the normal complement of machine guns and mortars.[50]

As in MARKET-GARDEN, the Crete battle was decided at two places within less twenty Kilometres from each other with one more important than the other: In 1944 Wolfheze-Arnhem-Nijmegen, in 1941 Maleme-Galatas. Both battles were decided by highly intensive, well-fought short engagement by a few good battalions on each side. The New Zealand

forces involved in Crete were renowned to be some of the best all-round infantry units of the British Empire during war.

Where the MARKET-GARDEN case focused on the events at Arnhem and Nijmegen, the MERKUR case focuses on the roots of the unsuccessful engagement of the 5th NZ Infantry Brigade at Maleme-Platanias against the German Airborne Assault Regiment and to some extend on the equally unsuccessful 4th and 10th NZ Infantry Brigades at Galatas on the road to Chania. The former was the more important due to the presence of the Maleme Airfield, which was the only entry point for air landed follow-on forces, logistics and heavy weapons in the area. However, in both places the local tactical outcome was the same.

As MARKED-GARDEN, MERKUR was decided by the success or failure of an airborne operation; however where the objective of the Allied landings in the Netherlands only was to facilitate a major over-land offensive, in MERKUR, the purpose of the planned follow-up surface operation was only to reinforce the airborne forces in their mission and sustain this logistically. This should be kept in mind during the analysis.

In both battles, the attacking side enjoyed clear air superiority over the battle area.

In the Netherlands the terrain between the two main rivers – "*The Island*" - was flat, open farm land with off-road armoured movement hampered by meadows, dikes and ditches and with the terrain north of the Lower Rhine wooded or urban. In Crete the terrain was characterised by foothills and creeks extending north from the mountain range further south with road movement limited to the coastal road and with unobserved foot movement eased by olive groves, some bamboo thickets and the generally rough terrain.

In Crete, the landing succeeded, in spite a fundamental lack of surprise. One element was probably that here the British forces were hampered by having no tactical success against the German Army during the previous

year of fighting. On the other side the Germans had no experience of any serious and lasting tactical defeat.

German paratroopers in Crete advancing.[51]

The only element of the German plan unknown to Freyberg, the British commander, was knowledge of the balance between the air landed and sea transported parts of the German forces. Therefore it is not possible to criticize the deployment of units close to the possible landing places on the coast. Freyberg did misinterpret the intelligence in the sense that he saw the treat as a landing operation rather that the transport of reinforcements and supplies to a bridgehead already established by air landing. This perception does not seem to have been followed-up by an identification of the relatively few really suitable landing places. The general had been selected as commander by Churchill for his courage in First World War rather than for any clear ability to think and command effectively. As commander he was known for his lack of will both to replace unsuitable commanders and to force subordinate commanders to comply with his orders and directives. The latter weakness resulted in a timely lack of integration Royal Air Force and Royal Marine forces into the defence of the Maleme Sector.

Even with the misguided focus on defence against an assault from the sea, the defensive deployments of the NZ forces and their defence arrangements are far from logical. This applies to the over-extended deployment of the 22nd Battalion and therefore weak defence of the airfield, worsened by the lack of clearing bamboo thickets from the fields of fire towards the air field of the company on the slope of Hill 107. It is also indicated by the disorganised character of the defensive perimeter with the remnants of the RAF presence in the area left politely un-integrated between three infantry company positions. Both mean that the companies could be defeated one by one.

With the knowledge that the enemy planned landings at the airfields, it is rather difficult to understand that the Maleme field remained unmined, only lightly blocked and thus fully intact after previous German airborne operations had been aimed at airfields necessary for follow-on operations. It had been evacuated on the morning 19th April, when the last surviving RAF Hurricane fighter took off. That the RAF might return is only an explanation, not professionally valid justification. Simply cutting the runway by ditches or prepared demolition would not have hindered later use. It seems as if the defenders were without both a perception of the threat and a sense of urgency to counter it.

The whole problem of the deployment is likely to have roots in the original late April brigade understanding of its mission to "*deny the advance of enemy landing parties from the west*". Thus in this framework the 22nd Battalion mast be considered as the forward element in a west-facing main defence line based on 21st and 23rd Battalions placed behind it and with 28th Battalion in reserve. The original defence plan was apparently not inspired by a threat analysis, but by the wish to defend own values directly, meaning defence of Chania with the Suda Bay naval base. Freyberg's island defence plan of 3 May placed the 4th NZ Brigade in corps reserve behind the 5th Brigade but in front of Chania. It had orders to deploy as central reserve on the coastal road. Nobody seemed to realise that enemy control of the air would mean that reserves would be unable to influence the battle outside its own area.

To this author with four decades of army service the far most likely explanation is that the NZ brigades were never deliberately fully redirected against the ever clearer threat as their deployment covered the enemy objectives in a general sense. Anything that happened was an adaption of the original plan and deployment, not a fundamental reorientation as assumed in the final operational instructions. The brigade HQs remained in place in Platanias, incomprehensible except within a framework of a west-facing defence with the forward companies controlling the open river bed by its fire. Depending on telephone communications due to lack of radios and batteries for these, the commanders remained more or less anchored to their command posts as underlined by Beevor. It was considered impossible to move the complete - rather weak - 21st Battalion forward to support the 22nd Battalion. A move forward had been prepared, but only one platoon was in a position extending the 22nd's perimeter.

The mission of the strong air defence artillery placed around the airfield was the same as the mission of the 22nd Battalion. However, the batteries remained in the open, not dug-in and not accepting a coordinating role for the battalion commander. True to his considerate command style, Freyberg had been unwilling to force the Suda Base commander to accept local defence integration, and as the guns had been employed in the open in general air defence, many had been destroyed by German suppression operations during the days before the assault. Andrew's infantry platoons in the company defending the air field were dispersed with the guns to protect the guns until these were destroyed. Thereafter the platoons should control the field with the fire of their rifles. They were to fight from their prepared defensive positions, not leave these to fight the enemy.

22nd Battalion had been ordered to conduct "*static defence*" of the airfield. That this meant defending positions rather than anything more active was clear to Andrew, another brave First World War veteran. However, the perimeter had not concentrated on holding the three key points: the airfield itself, the dominating hill 107, and the west slope of that hill overlooking the open river bank of the Tavronitis. The battalion was responsible for an area twice as large, and due partly to its size, the

companies were unable to support each other. Some minefields had been established in front of the positions but left unarmed not to hurt Greek civilians.

The acting division commander, Brigadier Puttick, had realised that the area immediately to the west of the Tavronitis and 22nd Battalion should be covered, but this could not be done with his own units without a major redeployment. When Freyberg visited the Maleme area for a second time on 14 May, Puttick asked the island commander to send Greek troops to the area. However, the idea was thereafter dropped. The German attack was still expected to come three days later, and the positional defence minded New Zealand commanders thought than the Greeks would have to construct field fortifications before they would effective. With the limited amount of entrenchment tools that could be spared such work could not be completed within the available time. The decision was not changed when Freyberg received intelligence about the postponement of the invasion.

21st Battalion had three missions: to stay in position, to move to Tavronitis in case of attack, and to replace 23rd Battalion if that unit moved to counterattack. 23rd Battalion should hold his position until called upon to assist 22nd Battalion. Any action depended on orders from the 5th NZ Brigade commander, James Hargest, or a direct request from 22nd Battalion.

Hargest had been a young battalion commander in the First World War. After that war he had returned to farming, and during the last decade he had been a Conservative Member of Parliament. As all the New Zealand brigade commanders, he was an amateur handicapped by a view of land warfare formed in trench warfare. He had been politically appointed brigade commander in spite of the fact that Freyberg considered him both unsuitable and too old.

Puttick was as old as Hargest. He was reputed to be a good administrator. As a tactical commander he was a worrying manager, afraid to take decisions because they ruled-out other – theoretically better - options.

Signal communication was so weak that action depended on visual signals. As already noted, the commander of the much dispersed 22nd Battalion had only the unprotected field telephone communications with his five subunits and his reserve platoon, the two Mathilda tanks, and the Bren gun Carrier platoon. All these reserve elements were deployed close to his command post.[52]

When the landings took place in the Maleme area, the paratroopers dropped to the east landed in 23rd Battalion's area and many were slaughtered before they reached their heavy weapons dropped separately in containers. They landed only armed with submachine gun and hand grenades. However the gliders landing in the Tavronitis River bed and the paratroopers dropped west of 22nd Battalion could form-up and attack the airfield with its 40 mm Bofors and 3" anti-aircraft gun positions. During the initial assault the Maleme air defence did not fire on the transport aircraft and gliders because of lack of authority from the Suda Base air defence commander.

After landing intact elements of the air assault troops attacked the battalion perimeter from the south-west using the uncovered dead ground along the slopes of the river bed and infiltrating through the RAF compound that formed a weak point in the perimeter here. The air force had vetoed the construction of 22nd Battalion defences through its camp.

The bombardment had cut the field telephone cables and the battalion commander now depended on runners. The radio connection to brigade was at best erratic. The static defence of the dispersed 22nd Battalion meant that Germans were allowed to defeat the New Zealand unit in detail. One by one the two western companies' platoons were successfully attacked by the surviving, weakened, but reorganised groups of German assault troopers.

"… *Andrew's* (22nd NZ Bn commander) *bravery is not in doubt. Like his superior officers in the chain of command upwards – Hargest, Puttick* (acting division commander) *and Freyberg – his imagination and instincts seem to have*

become shackled to his command post. This did not mean that Andrew was behaving like an ostrich – he did not try to belittle the threat – but his thought processes had jammed."[53]

When the two heavily armoured Mathilda tanks were finally launched in a counter-attack, they failed totally due to lack for equipment testing and effective tactical preparation. Their turrets could not turn and the ammunition did not fit the guns. The fact that the tanks had not been tested in spite of coming directly from repair shops indicates the low level of preparation and crew quality. The two tanks attacked - or rather just rolled - north, without any mutual or other effective support and apparently without any understanding of their mission. Detailed instruction and reconnaissance was essential because the tanks lacked radios.

The 21st and 23rd Battalions waited for brigade orders or requests for support, the latter unit occupying itself with small-scale mopping-up of the remainders of those dropped on top of its companies. However, both battalions were ready to assist 22nd Battalion if ordered forward. With the brigade commander far to the east in Platanias, the brigade stayed in the dark assuming all was fine, giving orders built on assumptions rather than intelligence. All seemed content with waiting for the clear situation picture that could result in a measured, logical management of the battle. Neither brigade nor the two reserve battalions, with the 23rd nearly within shouting distance of the closest 22nd subunit, sought information by seeking contact and clarity personally or as a minimum by liaison combat patrolling. The brigade's fourth battalion, the 28th (Maori), remained unemployed, in position, five kilometres from the decisive action (meaning 3-4 hours' cross-country march in the actual terrain). Even considering that the brigade thought than it needed to protect the coast around Platanias against a sea landing, the largest part of its infantry could have been deployed to support 22nd in the afternoon of 20 May with the 23rd reinforcing the airfield defence and 21st assisting in the defence of Hill 107.

However this did not happen, and when the German operational commander, general Kurt Student, took the risk of reinforcing the

Maleme battle by crash landing transport aircraft with mountain infantry units in the airfield from the evening of the first day, this desperate measure became decisive when combined with the decision of the commander of the divided and unsupported 22nd NZ Battalion to withdraw east to avoid total destruction. Andrew's decision was logical within the framework of the original late April brigade mission. [54]
In the early afternoon the New Zealanders captured a map indicating a German operation against Chania, probably something that might have contributed continuing lack of focus on fighting the actual battle to ensure complete destruction of the enemy air head before it could be reinforced. The remaining parts of the NZ division, the 4th and 10th (ad hoc) brigades and the Greek units under NZ command, remained in place at Galatas west of Chania.

Even before noon 5th Brigade's reports had underlined that the decisive assault in the west had been against the Maleme airfield and the 22nd Battalion area, but the two other NZ brigades and Greek units were occupied by direct attack of the reinforced German 3rd Parachute Regiment. The combat north and immediately west of Chania made it impossible for both the division and the force commander to consider assisting the 5th Brigade during the crucial late hours of the first day, even if it had been possible to use the coastal road in spite of the complete German control of the air.[55]

The follow-up mountain troops air-landed under fire – an image of air power in effective support of the mission.[56]

Simple insights

Let us then compare the "why" of MERKUR with that of MARKET-GARDEN.

The enemy
The problem of underrating the enemy did not apply in Crete. It was specific to the MARKET-GARDEN case. If anything the defeated British troops may have harboured an inferiority complex that reinforced the tendency to seek an orderly battle where any available fire-power could support moves by the infantry.

Mission focus
The insufficient mission focus of the defeated side was as significant in MERKUR as three years later, even if its form and specific consequences were different.

The confiscation of the heavy infantry weapons in Suda Harbour on landing in late April is only really understandable to somebody with a lifetime's experience on unfocused bureaucratic administration.
The Platanias-Maleme area commander never seemed to come to a clear understanding that his mission was no longer a forward defence of the Suda Bay base, but a decisive defence of Maleme airfield and what General Freyberg saw as possible landing beaches in his area. The general never energetically forced the army and marine anti-aircraft artillery batteries to integrate fully into the 22nd Battalion defence plan in spite of clear requests from the battalion commander.

Tribal live and let live behaviour
The lack of the defeated side's willingness to enforce effective cooperation by unity of authority and responsibility applied in both cases.

Thus the lack of drive and focus left the airfield intact and unblocked after the last RAF fighter had been evacuated in spite of intelligence that the enemy assault would take place the next day. No steps seems to have been taken to make effective use or evacuate the now redundant RAF personnel of the administrative base area on the western slope of hill 107 or at least ensure that it did not block observation and fields of fire.

Personnel management
Again same problem, but different form.
Of the three key commanders Hargest and Puttick were too old without updated tactical understanding. Neither of the two could or should be considered suitable for their command. As already mentioned, Hargest was politically appointed against the opposition of his commander, Freyberg. The 22nd battalion commander, Andrews, had a regular and routine officer's career in the Interwar Period. As 44 years old he was beyond the age of an infantry battalion commander and he too was hampered by his First World War tactical experience. However, he basically did well under the impossible conditions offered by Hargest' distant combat management.

The 2nd NZ Division was still in transition from the criteria guiding command appointments in peace to the essentially different standards required for war. The fighting in Greece had not lasted long enough to create a basis for the promotion to brigade command based on demonstrated talent.

Chaotic land battle

This observation and the implications were the same as three years later. The British not only planned for initial phase of the operation to create a basis for designing combat and logistic support. Their ambition was to create an orderly framework for the later management of the battle, expecting that intelligence would supply the foundation for launch of foreseen tailored actions in later phases of the engagement. This led to damaging hesitation, passive command style and defeat in detail while waiting. With the commanders' First World War background, this tendency to expect a controlled battle was easier to understand and accept in 1941 than in 1944.

Challenging plans

Again, similar story: No full critical discussion, testing of even partial gaming of the developing 5th NZ Brigade plan is reported in the literature to have taken place.

Equipment

As later at Arnhem, the defeated side was hampered by lack of proper equipment testing, training in its use and the search for technical or tactical alternatives. Proper preparation and use of the two infantry tanks would have been likely to have given the Germans serious problems. However, their use had not been tested or otherwise prepared and this led to total failure. No attempt seems to have been made to improve telephone communication in and between battalions by redundancy in spite of the constant experience with the effects of bombardment, and the measures to compensate in other ways seems to have been half hearted.

Concluding observations

For anyone who is looking for positive guidelines for operation action, what has been extracted from the two cases must be considered deeply unsatisfactory and meagre. However, this is what has been extracted:

Firstly that it is essential to plan and act on the insight that tactical land combat remains chaotic due to friction and chance. Only overwhelming superiority in quantity or quantity may render condition irrelevant for the outcome. This means normally that success depends on delegation of resources and authority to implement the plan in a flexible way. This is no easy observation to have accepted in the western culture with its belief in the possibilities of scientific management built on standardisation and centralisation.

Secondly that personal management of command personnel must understand the destructive effect of privilege and nepotism and the essential importance of recent demonstration relevant practical leadership as well as the ability to act independently and "*outside the box*". Ignoring privilege and seniority and promote on the basis of "*subjective criteria*" is certain to lead to jealousy, frustrations and conflict and will therefore normally be avoided.

Thirdly that the commander must be willing and inconsiderate enough to enforce and maintain effective and robust coordination between contributions from allies and different elements of own armed services and other state agencies. This will bring frustration and "tribal"-organisational self-defence, but is essential.

Fourthly that any plan must be tested by ruthlessly honest, critical gaming whenever time is available. As a minimum it must be tested by candid analysis of alternatives. Plans must be adjusted according to any new understanding of opportunities and risks. This is not necessarily easy to achieve due to the natural inclination to please senior officers, who control ones' promotion chances, and to doctrinal "*group-think*".

Fifthly there is the need to ensure the testing of equipment and training of the crews under realistic conditions as well as to develop redundancy of capabilities in all key areas. It means confronting and defeating the optimistic assumptions and views of rationality held by civilian or uniformed managers. Not confronting such assumptions and views is to invite defeat or extended losses (as happened in the invasion of Iraq in 2003).

This small analysis was focused sharply on extraction insights from a close look on the defeated side in two narrowly balanced air-land operations. Similar benefits can be extracted from any critical in depth, in context study of an operation or battle, if the study focuses on the difficulties and problems rather than trying to learn and copy how to succeed.

In pure sea or air operations technological factors will have a far more decisive influence than in land engagements. If insights are sought from the study of extended campaigns such as insurgencies/counter-insurgencies, the in-depth study of the military elements must be balanced by similar thorough analysis of the cultural, political and economic factors to develop a meaningful level of insight.[57]

As mentioned Clausewitz recommended focusing on in-depth studies of recent wars, because any conflict would be shaped by the spirit of the time and the character of the warring societies. Normally military professionals studying cases would hope to be able to extract something more that the general insights into the effects of human and organisational frailty listed here. If so, if the officer needs to identify current trends in a special type of warfare as a foundation for prediction and advice, Clausewitz recommendation is even more relevant now than in his time. Currently we de not only experience a fast and constant development of societies and cultures and of their interaction. Both the societies and their wars are shaped and nourished by fast interaction of new technologies in a way that has only been the case previously in the years 1890 to 1920.

[1] Quoted from John P. Kiszely: The relevance of history to the military profession: A British view. In: Williamson Murray and Richard Hart Sinnreich: The Past as prologue. The Importance of History to the Military Profession. (Cambridge 2006), p.32

[2] J.F.C. Fuller: British light infantry in the eighteenth century (London 1925), p.242.

[3] foto: Sgt Michael J MacLeod, www.army.mil media290531

[4] ”bildningsäventyr”. He did so in the foreword of his: Europas krig. Militärt tänkande, strategi och politik från Napoleonstiden till andre världskrigets slut, (Stockholm 1989). Unfortunately the book was never translated. Alf’s Clausewizian view of the relationship between theory and history is basically what is mirrored here.

[5] (foto: IDF. www.blog.standforisrael.org/articles/live-updates-pillar-of-defense-day-2)

[6] Se his own narrative in: Captain Professor, a life in war and peace, (London 2006).

[7] See Arden Bucholz (ed.): Delbrück’s Modern Military History, (Lincoln 1997).

[8] See Gunnar Åselius: Military history in an age of military change. Carl Bennedich, the Swedish General Staff, and the First World War in: Claes Ahlund (ed.) Scandinavia in the First World War. Studies in the War Experience of the Northern Neutrals, (Lund 2012).

[9] Unfortunately Ole A. Hedegaard: Generalløjtnant A. P. Tuxen. Militærhistoriker og æresdoktor, (Viborg 1982) does not place his ground-breaking work on the Great Nordic War in context.

[10] Imperial War Museum

[11] Is a short outline of the use of military history in the Danish Army Operational Command Course and the Joint Staff Course from 1979 until recently.

[12] www.history.com/topics/american-civil-war/stonewall-jackson

[13] Brian Bond: The Victorian Army and the Staff College, 1854-1915, (London 1972), p. 157.

[14] Important examples are C.E. Callwell: Military Operations and Maritime Preponderance: Their Relations and Interdependence, (London 1905), and his Small Wars. Their Principles and Practice (3rd Edition), London 1906, as well as George Grey Aston: Letters on amphibious wars, (London 1911).

[15] VI and X annual volumes of "Vierteljahrshefte für Truppenführung und Heereskunde", (1907, 1913). Berlin; Arden Bucholz: Moltke, Schlieffen and Prussian War Planning, (New York/Oxford 1991).

[16] Brigadier General Stuart Keintzelman's foreword to: General Fieldmarshal Count Alfred von Schleiffen: Cannae, The Command and General Staff School Press, (Fort Leavenworth (Kansas), 1931).

[17] Mika Kerttunen: An Abstract Approach, Rational Non-sense to Replace Historical Nonsense in Educating Leaders, in: Journal of Military Studies, Vol 2 (2011), No. 1, Helsinki.

[18] One small example is the small booklet Truppendienst: Gefechtsbeispiele Aus dem zweiten Weltkrieg, Wien 1971.

[19] FM 3-24 (MCWP 3-33.5) Counterinsurgency, FM 3-24/MCWP 3-33.5 Headquarters, Department of the Army (Headquarters United States Marine Corps), (Washington (DC) 2006).

[20] www.baltdefcol.org

[21] Carl von Clausewitz: Vom Kriege. Siebzehnte Auflage. Vollständige Ausgabe im Urttext mit historisch-kritischer Würdigung von Dr. Werner Hahlweg, (Bonn 1966), especially Book 2, 2nd Chapter; Michael H. Clemmesen: Clausewitz – Liv og Person: Nils Berg (ed.): *Clausewitz: Om Krig III* (Copenhagen 1981); Patrick J. Speelman: Henry Lloyd and the Military Enlightment of Eighteenth-Century Europe. (London 2002); Baron Antoine Henri de Jomini War: The Art of. (London 1992); Andrej N. Merzalow & Ljudmila A. Merzalowa: Antoine-Henri Jomini – der Begründer der wissenschaftlichen Militärtheorie. Eine Bewertung aus russischen Sicht. (Zürich 2004).

[22] S.L.A. Marshall: Men Against Fire. The Problem of Battle Command, (New York 1947); F.D.G. Williams: SLAM. The Influence of S.L.A. Marshall on the United States Army, (Fort Monroe (Virginia), 1990); Dennis J. Vetock: Lessons Learned. A History of US Army Lesson Learning, (Carlisle Barracks (PA) 1988), pp.69-70, 163-165.

[23] Brian Bond: The Victorian Army and the Staff College, 1854-1915, London 1972, p. 136

[24] Brigadier James Hill, 3rd British Parachute Brigade, just prior to the D-Day landing. Quoted in John Buckley: Monty's Men.

[25] On 10 September, after the Airborne Division Commander had announced the dropping zones more than 10 kilometers from the bridge, Cholewczynski, p.82.

[26] The key works used from of the large number of books about the operation Robert J. Kershaw: 'It Never Snows in September'. The German View of Market-Garden and The Battle of Arnhem, September 1944, (Marlborough, Wiltshire 1990); The far best an most balanced analysis of the Allied side is by Robin Neillands: The Battle for the Rhine 1944. Arnhem and the Ardennes: the Campain in Europe, (London 2005); Cornelius Ryan: A Bridge Too Far, (London 1974); George F. Cholewczynski: Poles Apart. The Polish Airborne at the Battle of Arnhem. (New York 1993); James A. Huston: U.S. Army Airborne Operations in World War II, (Nashville 1972); James M. Gavin: Airborne Warfare. (Washington (DC) 1947); Lawrence Wright: The Wooden Sword, (London 1967).

[27] See Elizabeth Kier: Imagining War. French and British Military Doctrine Between the Wars, (Princeton 1997); David French: Raising Churchill's Army and the War against Germany, (Oxford 2000); Brian Bond: British Military Policy between the Two World Wars, (Oxford 1980); John Buckley: Monty's Men. The British Army and the Liberation of Europe, (Yale 2013)

[28] The key works remain James S. Corum: The Roots of Blitzkrieg. Hans von Seeckt and German Military Reform, University of Kansas 1992, and Robert M. Citino: The Path to Blitzkrieg. Doctrine and Training in the German Army, 1920-1939, (Boulder (Colorado) 1999).

[29] The most convincing analyses are William O. Odom: After the trenches. The Transformation of U.S. Army Doctrine 1918-1939, (Texas A&M University 1999) and Brian McAllister Linn: The Echo of Battle. The Army's Way of War, (Cambridge (Mass) 2007).

[30] Ryan, pp.86, 107-110, 285-287.

[31] Neillands, pp. 95, 102-103.

[32] Neillands, pp.109-113.

[33] See the the description of the relation between Montgomery and his subordinate British commanders in John Buckney: Monty's Men.

[34] Neillands, pp.90-94.

[35] Quoted by Lawrence Wright, p. 234.

[36] Quoted from Neillands, p.106.

[37] (arnhemjim.blogspot.dk)

[38] Kershaw, p.139, Neillands, pp.105-106.

[39] www.panoramio.com

[40] Realised at the time, see Ryan p.281.

[41] Niellands, pp.132-136. Niellands does not really see that the division – as the corps – would not really have any relevant mission on the first day.

[42] Ryan, 92-95; Cholewczynski, p.82.

[43] Neillands, p.132.

[44] E.g. Ryan pp.204ff, 240.

[45] Buckley: Monty's Men, Chapter 8.

[46] Quoted from ”On Historical Examples”: Clausewitz: On War, Book 2, Chapter 6.

[47] The most important work is the relevant volume of the Official History of New Zealand in the Second World War: Daniel Marcus Davin: Crete, (Wellington 1953). This very detailed narrative includes quotations from the here essential plans, orders and reports from the preparations and decisive combat. The main supplement is the first volume of F.H. Hinsley: British Intelligence in the Second World War. Volume 1, (London 1979), that includes the Enigma intelligence information unavailable to Davin. Both are supplemented by: Howard Kippenberger: Infantry Brigadier. (Oxford 1961). The most important newer works are especially Heinz A. Richter: Operation Merkur: Die Eroberung der Insel Kreta im Mai 1941, (Wiesbaden-Erbenheim 2011), and Antony Beevor: Crete: The Battle and the Resistance, (London 1991). Older works used are John Hall Spencer: Battle for Crete, London 1962; Franz Kurowski: Der Kampf um Kreta, (Bonn 1965); George Forty: The Battle of Crete, (Hersham 2001). An earlier analysis by the author is: Kampene ved Maleme i maj 1941. *Militært Tidsskrift, Juli, August, September 1987*.

[48] Translated from Richter, p.119.

[49] Hinsley, pp.417-421, Beevor, pp. 82-101.

[50] Beevor, pp.59f.

[51] Bundesarchiv

[52] Davin, pp.28, 33, 45, 53-66, 92, 98; Richter, pp. 90-120; Beevor, 82-128.

[53] Quoted from Beevor, p.124.

[54] Davin, pp.88-138; Kurowski, pp.28-55.

[55] Davin, pp.139-169; Kippenberger, pp.46-58.

[56] Crete. Official History of New Zealand in the Second World War 1939–45

[57] See e.g.: Gil Merom: How Democracies Lose Small Wars. State, Society, and the Failures of France in Algeria, Israel in Lebanon, and the United States in Vietnam, (Cambridge 2003); Douglas S. Blaufarb: The Counter-Insurgency Era. 1950 to the

Present, (New York 1977); Richard Duncan Downie: Learning from Conflict. The U.S. Military in Vietnam, El Salvador, and the Drug War, (Westport 1998); David H. Ucko: The New Counterinsurgency Era. Transforming the U.S. Military for Modern Wars, (Washington (DC) 2009).

NATO Tactical Nuclear Weapons in Europe – towards Modernisation or Withdrawal?

By Dr. Robert Czulda

The Origins of NATO's Nuclear Policy

Any presentation and analysis of this topic in the modern context should start with the origins of the issue itself. This will facilitate the creation of an overview of the evolution of the role of nuclear weapons within the context of NATO's defence policy. It is no exaggeration to say that nuclear means were of particular importance during the Cold War. At first, defence was based on a strategic doctrine of so called *massive retaliation*, which was proclaimed by the United States. Three years later it was officially adopted by NATO.[1] The later transition to the doctrine of *flexible response* (adopted by NATO in 1967) implemented in the United States in 1961 thanks to Secretary of Defense Robert McNamara and President John F. Kennedy, influenced the possible ways of use of nuclear weapons but not their role. It was still believed that strategic and tactical nuclear weapons were an effective substitute for NATO conventional forces in face of the numerically superior Soviet army. There was also a financial reason: the costs of this type of weapon was significantly lower than the costs of a modern tactical bomber or a major combat surface vessel. Thus, it is no surprise that there were 7000 nuclear warheads in Western Europe at the end of the 1960s and as many as 8000 only a decade later.

Parallel to the strategic nuclear weapons tactical ones were developed as well. The first tactical nuclear weapons were introduced to Europe in 1954 (MGR-1A *Honest John* surface-to-surface missiles with W7 variable yield nuclear warheads). Since that moment NATO tactical nuclear weapons had developed rapidly, particularly in the second half on the 1950s. Paul Shulte is of the opinion that at that time 'this was the high point of NATO doctrinal reliance upon TNWs'.[2]

The total number of nuclear weapons at the beginning of 1960s was estimated at 3000. They were mainly W33 nuclear artillery shells for M110 and M115 howitzers (203 mm), above-mentioned MGR-1A *Honest John* missiles and MGM-5 *Corporal* guided surface-to-surface missiles. The United Kingdom also contributed to a joint effort providing, for instance, so called the V-bombers (*Valiant, Vulcan, Victor*) , *Canberra* light bombers, *Buccaneer, Sea Vixen* and *Scimitar* strike jets, armed with *Red Beard* freefall nuclear bombs, later replaced by WE.177 tactical/strategic thermonuclear bombs[3]. Therefore London provided a tactical NATO's nuclear umbrella over strategically vital theatres, including the Middle East for many years, as well as in the Far East (bases in Singapore).[4]

The *burden sharing* rules that exist up to this day originated in the 1960s: sharing political responsibility and risk, influencing the formulation of NATO's nuclear policy, and using US nuclear forces designated to operate as part of NATO strike forces. Pursuant to the agreement, some member states allocated delivery means from their own armed forces, while other hosted U.S. nuclear bombs within their territories. Among the latter were: Canada, Turkey, Greece, and states that still provide storage facilities up to this day: Italy, the Netherlands, Belgium, and Germany. The introduction of the *burden sharing* concept effort had a significant political aspect too. It facilitated restraining the possible ambitions of such states as Germany or Italy to develop their own unconventional weapons.

A negative consequence of this solution was the introduction of the almost complete dependence of European NATO member states on the U.S. nuclear umbrella which still exists today. There are only two states possessing their own thermonuclear arsenals in Europe. The first is France, which was withdrawn from NATO's integrated military structure in 1966 by Charles de Gaulle as he believed that 'embedding France's nuclear deterrent, the *force de frappe* (strike force) in NATO's unified military command would mean enmeshing the powerful French air arm to NATO's American-led bureaucracy'.[5] Although Nicolas Sarkozy revoked this decision in 2009 French thermonuclear forces still remains outside NATO's command. The situation of United Kingdom is quite similar: although it agrees to share its own thermonuclear forces with

NATO it renounces the sole right to decide on their use.[6] No wonder that several NATO's strategic concepts labelled French and British nuclear forces as 'independent'. Therefore, in practice, in the case of a conflict NATO would rely on US nuclear forces, both strategic and tactical.

Quantitative Reductions in Nuclear Arsenals

As was mentioned above, the United States deployed a significant amount of tactical nuclear weapons in Western Europe in order to stop the large groups of advancing forces of the Warsaw Pact. The INF (*Intermediate-range Nuclear Force*) Treaty of December 1987 about missiles reduction (both ground-based ballistic and cruise missiles) of medium and intermediate range (500 – 5,500 km) did not cover tactical nuclear weapons. Therefore NATO's reductions were the result of a unilateral decision by the US that withdrew most of the approximately 4000 warheads from Western Europe.[7]

At the same time, NATO had decided to follow so called Montebello decision of 1983 to withdraw unilaterally approximately 1,400 warheads but also to modernize remaining short range (below 500 km) nuclear forces in Europe, but mainly due to a political pressure of reluctant Germany NATO failed to accomplish this goal. The plan to substitute B61 variable yield nuclear bombs with BGM-109G *Gryphon* ground-launched cruise missiles and MGM-31B *Pershing* II medium-range ballistic missiles failed too due to the fact that both systems, were banned by the INF Treaty.[8] It is worth to stress that tactical nuclear weapons in Europe are not a subject to any arms control agreement and remain one of the pillars of NATO's defence. Alliance's approach to this type of military mean was defined in the Strategic Concept of 1991 and then confirmed, in almost the same form, in the 1999 document. It was confirmed there that the Alliance, in order to sustain an effective deterrence 'will maintain adequate nuclear forces in Europe' with 'appropriate flexibility and survivability' at 'the minimum level sufficient to preserve peace and stability'.[9]

In 1991 that George H.W. Bush and Mikhail Gorbachev announced the withdrawal of most of the tactical nuclear weapons from Europe. Both admitted that they had no military value.[10] The United States announced a withdrawal of all tactical nuclear weapons: land-based from overseas military bases (including artillery shells and MGM-52 *Lance* surface-to-surface missiles) and sea-based from U.S. naval assets (airplanes, surface combat vessels and submarines). During this stage Washington removed 700 air-delivered nuclear weapons from Europe.[11] Moscow removed tactical nuclear weapons to its own territory as a part of a withdrawal of troops from former Warsaw Pact states. During this time the Russian decommissioned many military systems, including nuclear artillery shells, nuclear land-mines and some air-delivered nuclear tactical weapons as well. Two decades later, in 2013, the United States unilaterally withdrew the last naval tactical nuclear weapon system from its arsenal: BGM-109 *Tomahawk* cruise missiles in TLAM/N (Tomahawk Land-Attack Missile/Nuclear) configuration. Earlier US Navy retired SUBROC and ASROC anti-submarine missiles and RIM-2 *Terrier* surface-to-air missiles).[12] The United States still stockpiles B61 gravity bombs[13] in Europe which currently are, with B83s, the only nuclear air-delivered bombs in the US arsenal.

The presence of the U.S. tactical nuclear weapons in Europe to this day is no secret. However, the size of NATO's stockpile is a subject of speculation. It was estimated that there were approximately 480 B61 bombs (variable yield) in storage in 2001.[14] Now it is not more than 160 – 200 bombs in Europe.[15] It means the numbers have dropped by approximately 95% as compared to the peak during the Cold War. Just as in the past, today, they are the property of the United States but in the case of war control could be handed over to the Allies who would be authorized to use than with their own air delivery systems (aircrafts).

State	Base	Capacity	DCA	Airplanes [1]	Bombs
Belgium	Kleine Brogel	44	F-16AM/BM	59	10 – 20
Germany	Büchel	44	Tornado IDS	69	10 – 20
Italy	Aviano	72	F-16C/D (U.S. Air Force)	21	50
	Ghedi Torre	Less than 40	Tornado IDS	55	10 – 20
Netherlands	Volkel	44	F-16AM/BM	72	10 – 20
Turkey	Incirlik	?	F-16C/D	213	60 – 70
Overall					150 - 200

[1] – Total amount of all airplanes, not only DCA (source: *Military Balance 2013*)

US nuclear posture in Europe (2013)

According to Hans M. Kristensen, U.S forces still deploy up to 20 B61 bombs at Fliegerhorst Büchel air base, which hosts Luftwaffe's Jagdbombergeschwader 33 fighter-bomber wing equipped with *Tornado* IDS combat jets. Germany, who during the Cold War acquired a limited influence on the use of NATO's nuclear weapons, regularly practice using it, including simulating the dropping of bombs on targets using *Tornado* aircrafts. By the end of the last decade, bombs were withdrawn from air bases: Ramstein, Memmingen, Nörvenich (Germany), Araxos (Greece) and Lakenheath (United Kingdom). Remaining B61 bombs are stored in bases in Belgium (Kleine Brogel: 20?), Italy (Ghedi Torre: 40? And Aviano: 50?), Netherlands (Volkel: 10 - 20?) and Turkey (Incirlik: 60 – 70?).[16]

Delivery Systems of Tactical Nuclear Weapons

According to the Cold War rules, the United States contributed with nuclear weapons and some NATO members were allowed to use them (with Washington's consent) in case of the outbreak of a war with the Soviet Union. For example, Canada deployed several types of nuclear missiles: CIM-10 *Bomarc* (surface-to-air), AIR-2 *Genie* (air-to-air) and MGR-1 *Honest John* (surface-to-surface).[17] Turkey and Italy shared with the Americans, who controlled their warheads (so called a dual-key arrangement), PGM-19 *Jupiter* medium-range ballistic missiles while the United Kingdom shared PGM-17 *Thor* intermediate-range missiles.

The end of the Cold War and the methodical reductions in nuclear weapons limited the sharing scheme to tactical B61 bombs with NATO partners covering the costs of maintaining so called Dual Capable Aircrafts (DCAs). Over the years, several types were used for that role, including AJ-1 *Savage*, F-100 *Super Sabre*, F-111 *Aardvark*, F-4 *Phantom*, and F-104G *Starfighter*. In the 1990s, the United States limited the number of their DCAs, keeping two tactical fighter wings to provide support for NATO nuclear operations: 4th Fighter Wing at the Seymour Johnson Air Force Base (North Carolina) and 27th Special Operations Wing (former 27th Fighter Wing) in Cannon Air Force Base (New

Mexico).[18] Currently, the United States formally uses F-15E *Eagle* jets (4th Fighter Wing) and F-16C/D *Fighting Falcon* multirole fighters (27th Special Operations Wing) as DCAs but nuclear operations are no longer a priority for these units. High nuclear alert is no longer maintained. In practice current NATO's DCA aircrafts are *Tornados* and F-16 *Fighting Falcons*.[19]

Some years ago, the decision was made that the fifth generation stealth F-35 *Lightning* II Block IV jet will become the certified tactical fighter-bomber and will be part of the nuclear deterrence forces together with nuclear-capable heavy bombers. This decision was confirmed in President Barack Obama's *2010 Nuclear Posture Review*.[20] It was an obvious choice as this aircraft was designed from the very beginning as an export offer for NATO allies, some of whom use F-16 *Fighting Falcons* today. The replacement of F-16 by F-35 not only for a number of conventional tasks but also for nuclear missions was the obvious thing to do.[21]

However, unforeseen technical and financial obstacles occurred in the F-35 project postponing the moment of a full operational readiness of the aircraft in NATO member states' air forces to the distant future. The issues with the F-35 are thus the issues of the NATO's DCA modernisation project. Scale of this problem is even bigger if we take into account a fact that other European jets, such as Eurofighter *Typhoon*, are not capable of delivering U.S. nuclear weapons. According to some sources European manufacturers did not want their state-of-the-art technologies to be disclosed to their U.S. allies.[22]

European NATO states have a small potential of DCAs. They are, however, uninterested in modernising them or even maintaining nuclear capabilities. The United Kingdom is a good example. In the past this country deployed *Tornado* GR1 jets with WE.177s. However these bombs, the last nuclear type in service with RAF, were retired by RAF in 1998. Ever since British nuclear deterrence has been conducted solely by four *Vanguard*-class submarines armed with up to 16 multi-warhead intercontinental *Trident* II (D5) missiles. Since then, the British *Tornado* aircrafts have been designated for conventional operations only. This

fact distinguishes United Kingdom from, for example, Italy whose *Tornado* IDS aircrafts still serve as NATO's DCA for B61 bombs.

The German contribution to NATO's means of delivery of nuclear bombs are *Tornado* fighter-bombers. According to the *Military Balance 201*3, Berlin has 90 *Tornado* in service: 69 of the IDS variant (interdictor/strike) and 21 of the ECR (electronic combat/reconnaissance) variant.[23] Their service life is coming to an end and they should be decommissioned by the end of the decade; unless present plans are amended. What next? The *Tornado's* successor, also as a strike aircraft, is the multirole Eurofighter *Typhoon* but it is not a DCA as was mentioned before. The German government admitted that it has not made any analysis as to the nuclear-capability of this platform.[24] According to RUSI, in order to acquire a DCA capability for Eurofighter *Typhoon* jets Germany would need to spend roughly 300 million EUR to upgrade avionics. [25]

Turkey is involved in nuclear weapons sharing with the United States. It has B61 bombs in its territory (Incirlik Air Base) but no DCAs. It means that in case of war U.S. aircrafts, for example based in Italy, would be required to serve as a delivery system.[26] The Turkish Air Force's task would be to provide cover for U.S. aircrafts delivering B61 bombs to enemy territory. Hans M. Kristensen pointed out that while the bombs are for delivery by US forces, 'Turkey has denied US request to deploy a fighter wing at Incirlik. In a crisis, US aircraft from other bases would have to first deploy to Incirlik to pick up the weapons before they could be used'.[27] Greece would play a similar role, having withdrawn the B61 bombs from its territory in 2001, its task would be to protect NATO's nuclear air forces.

Belgium's contribution is more significant. It consents to the storage of 10 to 20 B61 bombs in the Kleine Brogel base under the control of 701st Munitions Support Squadron, a U.S. Air Force unit. The maximum capacity of 11 vaults is 44 B61 bombs.[28] Brussels uses F-16AM/BM *Fighting Falcon* as DCA. They are supposed to be being decommissioned no sooner than in 2025. Belgium has yet to join the F-35 project but according to press information from September 2013 Belgium considers

buying 35 – 55 new jets.[29] A decision should not be expected until late 2014 – however such procurement seems very doubtful due to financial austerity and budget cuts. It is mote probable that Belgium will decide not to maintain fighter squadrons at all, including DCAs. It is believed that much depends on the direction in which the Netherlands and Germany will go.

The Netherlands also designates its F-16AM/BM *Fighting Falcon* multirole fighters to nuclear missions. In due time, they are to be replaced with the F-35 *Lightning* II. [30] It should be noted that the Netherlands' position is clear: the successor to the F-16 must have equal capabilities, also of nuclear deterrence.[31] The same also applies to Italy, which hosts American DCAs (F-16C/Ds) at its Aviano Air Base. The total capacity of the vaults at the base amounts to 72 bombs. Rome designates its own *Tornado* IDSs as DCAs. They are ultimately to be replaced with F-35s.[32]

Due to its operationally and decision independence France cannot be considered a part of NATO's DCA potential. This country has sea-based component of nuclear deterrence (four *Le Triomphant*-class submarines armed with 64 M45/M51 in total multi-warhead ballistic missiles) as well as air-based: approximately 20 *Rafale* M F3s (naval air fleet), 25 *Mirage* 2000Ns and 20 *Rafale* B F3s equipped with ASMP medium-range air-to-ground missiles with nuclear warheads.[33]

The number and technological advancement of delivery means is one aspect but utilising them in time of crisis is another matter entirely. Even deploying modern and technologically advanced DCAs does not automatically mean that the United States would provide tactical nuclear weapons to its allies. The speed of decision-making within NATO is also an issue. Would the Alliance be able to make a quick and correct decision in the case of a crisis? Taking into consideration the number of member states involved in the decision-making process and the importance of the decision itself, the answer seems to be rather in the negative.

B61 Life Extension Program

What is the status of the B61 bombs? For obvious reasons, it is the United States that makes decisions involving the modernisation of these bombs. So far we have more questions than answers. The bomb, initially known as TX-61, was designed in 1963 in the famous Los Alamos National Laboratory, New Mexico. Batch production began five year later. Eleven versions have been developed over time, although the construction has not changed significantly. Two other devices based on the project were created. Currently, four Cold War variants are in service: Mod 3, Mod 4, Mod 7 and Mod 10 as well as one from the time of Bill Clinton's presidency – earth-penetrating Mod 11.[34]

Design	Type	Platform	Yield (kt)	Estimated numbers
EXISTING				
B61-3	Tactical	F-15E , F-16A/B/C/D , Tornado IDS	0,3 ; 1,5 ; 60 ; 170	200 in stockpile, ~90 deployed in Europe
B61-4	Tactical	F-15E , F-16A/B/C/D , Tornado IDS	0,3 ; 1,5 ; 10 ; 50	200 in stockpile, ~90 deployed in Europe
B61-7	Strategic	B-2A, B-52H	10 – 360	430 in stockpile, 215 active
B61-10	Tactical	F-15E , F-16A/B/C/D , Tornado IDS	0,3 ; 5 ; 10 ; 80	100 in inactive stockpile
B61-11	Strategic	B-2A	400	35
PLANNED				
B61-12	Tactical	B-2A, F-15E, F-16A/B/C/D, F-35, Tornado IDS	0,3 ; 1,5 ; 10 ; 50	~400

B61 Nuclear Bomb versions, source: *Federation of American Scientists* (2013)

Recently the United States revealed the LEP (*Life Extension Program*) based on a plan of consolidating four variants (tactical: 3, 4 and 10; strategic: 7) into a single version B61-12 multirole bomb with a variable yield (existing components would be reused or remanufactured to the extent possible). Ultimately, variant B61-12, with the same yield as the B61-4 (50 kilotons) would replace the 'European' version of the B61 (3 and 4). In 2013 U.S. defense officials confirmed that B61-12 would also replace powerful (400 kT) B61-11 and B83-1 strategic bomb with a variable yield up to 1,200 kT.[35] New bomb would offer a service life of 30 years.[36]

Current versions of B61 use the parachute to slow the bomb's descent speed but it means that an accuracy is dependent on a wind speed. In order to get a higher accuracy a parachute should not be used but then a crew might not have enough time to fly away from a detonation zone. To avoid such risk B61-12 would be equipped with TSA (*Tail Sub-Assembly*) GPS-guided kit (a project by Lockheed Martin, Raytheon and Boeing). It would allow to convert B61 bombs into precision munitions just like JDAM (*Joint Direct Attack Munition*) converts unguided bombs into 'smart' munitions with a high accuracy.[37] First tests have already been accomplished.[38]

New, enhanced version would be a major boost of the military capabilities and not just a standard refurbishment and overhaul. It would give NATO forces a very powerful military tool with lesser radioactive fallout and higher accuracy. It could be used by several types of strike aircrafts, such as *Tornado*, F-15E *Strike Eagle*, F-16A/B/C/D *Fighting Falcon*, F-35 *Lightning* II, B-52 *Stratofortress* and B-2A *Spirit*. Such tool would be more universal – in case of war it could be used to hit deeply buried or hardened facilities immune to conventional bombs. The main platform would be F-35 Lightning II. According to *„Der Spiegel"* the first enhanced bomb should be ready by 2020. Four year later all old B61s are expected to be replaced.[39] By that time F-35 *Lightning* II should be in service in European NATO's member states. In April 2013 Hans M. Kristensen revealed that integration, design and testing of B61 bombs with F-35s (Block 4A/4B) will start in 2015 and seven year later F-35A as nuclear DCA would be declared operationally ready.[40]

There is little chance of a quick and 'painless' introduction of the new variant; due to political, technical, and financial reasons, it is a demanding initiative. The costs of the B61 Life Extension Program are estimated at 10 billion dollars.[41] It is a lot in a time of austerity. Especially so in the case of a weapon of questionable military value and after President Obama promised not to develop new nuclear weapons.[42] There is one more issue: most of the American nuclear weapons design experts retired during the 1990s. The number of their successors is fairly limited because the development of nuclear weapons is not a promising branch of science.[43] What is more, according to U.S. policy, modernization programmes of nuclear systems cannot provide enhanced 'military capabilities' as compared to the initial variants. In fact B61-12 would have enhanced capabilities. Skeptics also point out that it would therefore harm arms control talks with Moscow.[44]

Growing Opposition

There is no shortage of those who oppose maintaining tactical nuclear weapons in Europe. One matter that needs to be considered is the unclear engagement procedures. What kind of modern conflict would justify their use? A war against Russia? A crisis similar to that in Libya? Combating terrorism? Such officials like U.S. general James Cartwright (former Vice Chairman of the Joint Chiefs of Staff, former commander of STRATCOM)[45] and Willy Claes (former Belgium's foreign minister, former NATO secretary general) do not hide their scepticism as to the military value of nuclear weapons in general (including strategic nuclear weapons). The latter said: 'The Cold War is over. It's time to adapt our nuclear policy to the new circumstances. The US tactical nuclear weapons in Europe have lost all military importance'.[46]

The sceptics claim that as far back as at the turn of 1950s and 1960s the usefulness of tactical nuclear weapons was deemed insignificant. Today, for political reasons, it seems virtually impossible to use nuclear weapons even of a low yield. The fundamental reason for their deployment, large groups of Soviet soldiers, is gone. What is more, the admission of new states to NATO resulted in practically all the B61 bombs being far from

NATO borders, especially from Russia. This fact raises a justified question about the sense of maintaining B61 bombs in Europe.

This attitude, characteristic of some Europeans, has caused the number of supporters of B61 modernisation to fall in the United States. 'America's European allies don't value U.S. tactical nuclear weapons' – wrote in the influential "Foreign Policy" Dr. Jeffrey Lewis, expert on proliferation issues – 'America's European allies are unwilling to spend $100 million on guns, guards, gates, and a dog-master. So the U.S. response is? To spend 100 times that -- $10 billion -- for a new bomb that, in Never Never Land, doesn't need guarding'.[47] The author alludes to the 2010 embarrassment when a group of Belgium pacifists entered Kleine Brogel Air Base and a hangar without much problem. The sceptics ask: what if terrorists were to steal a B61 from European bases?

The group of states that argue for a complete removal of tactical nuclear weapons from Europe is fairly large. Norway, for example, has always refused to host unconventional weapons within its territory and now calls for their complete withdrawal. In 2013 former Dutch prime minister (1982 – 1994) Ruud Lubbers, who surprisingly confirmed that the Netherlands hosts 22 B61 bombs at the Volkel Air Base, said that 'I would never have thought those silly things would still be there in 2013. I think they are an absolutely pointless part of a tradition in military thinking'.[48] Former Prime Minister Dries van Agt (1977 – 1982) supported him by saying: "It is absurd that they still are there'.[49] In February 2010 foreign ministers of NATO member states called for a progress in nuclear arms reduction, including 'sub-strategic' systems.[50]

The biggest political advocate of a complete withdrawal is Germany, which would be the first casualty of tactical nuclear weapons during the Cold War, just like Poland. According to the analysis of NATO in the 1950s, (*Carte Blanche* 1955 and *Lion Noire* 1957 exercises), in the case of aggression by the Warsaw Pact on Western Europe, even a limited use of nuclear weapons would render German territory uninhabitable due to both the explosion and radiation. This fear and the pacifist movement that has been growing since the 1970s have made Germans the biggest opponents of nuclear weapons in Europe.[51]

The list of German objectors is long. It includes such people as: former German Chancellor Helmut Schmidt, former President Richard von Weizsäcker, former Foreign Minister Hans-Dietrich Genscher and former Minister of Special Affairs and Economic Cooperation Egon Bahr. In 2009 they signed an open letter urging a drastic cuts in nuclear weapons, also in short-range (tactical) systems.[52] One of the most important advocates of this solution today is Guido Westerwelle, a Foreign Minister in the cabinet of Chancellor Angela Merkel. Right after his appointment in 2009, he called for Germany to become 'free of nuclear weapons'. He added: 'We will take President Obama at his word and enter talks with our allies so that the last of the nuclear weapons still stationed in Germany, relics of the Cold War, can finally be removed'.[53] The actions announced by Berlin won the approval of Belgium and the Netherlands as well as part of the German nation.[54]

Frank-Walter Steinmeier, Foreign Minister in the first government of Angela Merkel, was of a similar opinion. 'These weapons are militarily obsolete today' – stated Steinmeier.[55] It is no surprise that the left wing thinks the same. Former German Foreign Minister, left-wing Joschka Fischer also supported the idea. Die Linke's Gregor Gysi openly called for Merkel to withdraw Germany from NATO's doctrine of shared nuclear weapons. He said that the government should 'immediately demand the U.S. withdraw, and preferably destroy, the atomic weapons'.[56] He added that 'the idea that a departure from this policy would diminish German influence in NATO is Cold War thinking'.[57] The Greens leader, Jurgen Trittin called NATO's nuclear weapons a 'relic of the Cold War' and called for the government to stop hiding behind US's back.[58]

What is important is that Chancellor Merkel does not share this radical opinion and seems to be a supporter of maintaining the shared NATO unconventional weapons initiative. The point is not the military aspect but, to quote the Chancellor: securing an 'influence in the defense alliance, including in this highly sensitive area'.[59] Germany is believed to have withdrawn their demand during the NATO Summit in May 2012 and to have agreed to budget as much as 250 million Euro for maintenance of the *Tornado* aircrafts up to 2024. The sole purpose of

these resources was the modernisation of DCAs only.[60] Officials deny this, claiming that there were no promises and Berlin does not know the exact date of the retirement of its DCAs.[61] Were it to happen, Germany would have no DCA in the forthcoming years after the *Tornadoes* are retired. The question of the future of the B61 bombs stored on German territory remains unanswered. Taking the B61's Life Extension Program and the plans to deploy B61-12 in Western Europe, including Germany, into consideration, it would be hard to believe that Merkel's government is really against keeping tactical nuclear weapons in its territory. Were it to be true, it would mean that Germany is not an ally of the United States and the Americans are not providing support forces but occupying the country: ignoring and disrespecting the German stand on such an important issue. If the United States have initiated the B61's Life Extension Program it means that Berlin intends to keep tactical nuclear weapons in its territory regardless of the future of its DCAs and the calls for withdrawal play the same role as Barrack Obama's statements involving global nuclear disarmament: it is only propaganda meant to appease internal public opinion.

France, on the other hand, is for maintaining NATO's nuclear arsenals. During the Cold War, it established technologically and operationally independent thermonuclear forces. Today, Paris, historically on the border of NATO[62], is against the withdrawal of the nuclear forces from Europe and significant changes in the defence doctrine, unlike most other NATO member states in this part of the continent. French President Nicolas Sarkozy stated in 2008 that France's and NATO's nuclear deterrence capabilities were 'quite simply the nation's life insurance policy'.[63] Understandably, while France stays in opposition to Germany, it fears that the withdrawal of B61 bombs might increase the pressure on Paris to limit the extent to which its defence doctrine is based on strategic nuclear deterrence forces. Questioning the sense of NATO's nuclear weapons in any way would be at variance with French interests. Italy stresses a similar attitude, although less visible and from different reasons. According to Paolo Foradori, the objective of tactical nuclear weapons removal is viewed by many Italian officials 'with a degree of wariness and is certainly deemed to be insufficiently important to merit the risk of causing distress among NATO allies'.[64]

New NATO member states are also against unilateral reductions and in favour of maintaining the status quo.[65] This makes the statement that the whole of Europe wants the withdrawal of tactical nuclear weapons from NATO's arsenal untrue. Central and Eastern European states perceive B61 bombs as a significant part of the U.S. military presence in Europe. The smaller the number of Washington's military elements in Europe, the weaker the relations in time of crisis might be. These states openly exhibit their fear of authoritarian Russia, which increases anxiety with its aggressive policy. From their point of view it is better to have B61 bombs than not.[66] Reductions should be made after an agreement with the sabre-rattling Moscow which, as opposed to NATO, uses its tactical nuclear weapons to threaten its neighbours.[67] Any unilateral reductions on the part of NATO would be harmful and dangerous to its credibility and combat capabilities and they have to be firmly opposed.

The Future of Tactical Nuclear Weapons in Europe

The discussions over the future of tactical nuclear weapons in Europe have a long history. This issue comes up with renewed vigour each time a new NATO Strategic Concept is drafted. The 1999 Washington document deemed both strategic and tactical nuclear weapons an important tool of military deterrence. Although the Strategic Concept of 2010 does not mention DCAs, as opposed to the previous version, it clearly stresses that 'as long as there are nuclear weapons in the world, NATO will remain a nuclear Alliance' and although 'the circumstances in which any use of nuclear weapons might have to be contemplated are extremely remote' NATO's deterrence will be still based on both conventional and nuclear capabilities.[68]

The attachment to this type of weapon system stems also from the *Deterrence and Defence Posture Review*. It states clearly: 'Nuclear weapons are a core component of NATO's overall capabilities for deterrence and defence alongside conventional and missile defence forces. As long as nuclear weapons exist, NATO will remain a nuclear alliance'.[69] The document, however, lacks any references to tactical systems: the emphasis on the attachment does not infer the will to maintain DCAs and B61 bombs. It may be interpreted as a reference to the strategic

nuclear arsenals of the United States, the United Kingdom, or even France. It seems to be a mistake; tactical nuclear weapons should remain in NATO's arsenal of potential means of response. It is unknown what challenges await and what capabilities might be necessary. The more instruments are at NATO's disposal, the greater is the operational flexibility. Especially when it is beyond any doubt that B61s do not block or hinder the disarmament talks with Russia, which does modernise its own arsenals. Quite to the contrary, having effective tactical nuclear forces would provide a strong bargaining chip in the disarmament talks with Russia, which so far 'officially shows little interest in engaging on tactical nuclear weapons' disarmament talks (it is easier to exert pressure on Russia with B61 bombs than without them).[70] They also do not stand in the way of building a world free from nuclear weapons, as it will never become a reality, regardless of the B61 bombs' presence in Europe. For this reason, NATO member states should make the decision to keep them in service: carry out a thorough modernisation of the B61 bombs and introduce new DCAs. Remaining in the current state of impotence results in the fact that 'NATO currently is on a path of disarmament by default as regards its non-strategic nuclear weapons'.[71] It will only increase the already considerable disparity between the tactical nuclear arsenals of Russia and NATO.

The establishment and subsequent maintenance of efficient tactical nuclear forces, which is the right solution due to the above-mentioned argument of keeping a universal 'tool-box', requires a synergy of two factors: new and advanced DCAs and upgraded, enhanced B61s nuclear bombs. Even if European states retire all their DCAs, which is possible due to fiscal austerity and financial constraints among NATO member states, it does not mean that B61 bombs, still owned by the United States, will be automatically withdrawn. Although Barack Obama had a world free from nuclear weapons as one of his election slogans, his administration's stance is clear:: the decision on the future of European tactical arsenals cannot be made unilaterally as it requires the consent of all 28 NATO member states. The plans to modernise the B61 to variant 12 and the intended deployment in Western Europe as a replacement of older versions may be interpreted as a further consent of the NATO member states to continue a nuclear burden sharing policy as regards

tactical weapons. If the European NATO states voiced their objections and firmly demanded a withdrawal of non-strategic nuclear weapons from their soil, Washington would not be able to ignore the pressure.

Assuming that NATO keeps its tactical nuclear capabilities, what form would it have? One of the ideas under consideration is to relocate B61 bombs to one or two bases in Europe and leave only practice bombs in the others. Jeff Lewis writes: 'Belgian pilots could pretend to drop nuclear weapons in training exercises, just like Belgian security guards pretend to guard them. Consolidation would, of course, demonstrate that the United States doesn't actually need forward-deployed nuclear weapons in any of these countries. The country could then quietly cancel the expensive replacement program and save the $10 billion. That means, of course, that over time, the B61s will come home. My guess is that no one will notice'.[72] The idea to replace the real B61 bombs with 'dummies' and withdraw them over time could be considered ironic, yet the scenario involving training bombs and consolidation seems reasonable and feasible. Even more so when there is a considerable probability of Germany and Belgium retiring their DCAs. In such a case, B61s would be stored in, for example, Turkey and Italy's Aviano Air Base, and in case of war they would be delivered by allied jets: F-16 *Fighting Falcon* multirole fighters or – in the future - by F-35 *Lightning* II jets.[73] This way, selected NATO member states tasked with the delivery of nuclear bombs, would provide 'nuclear services' for other members just like some member states provide the Baltic states (Lithuania, Latvia, Estonia) protection of their airspace (*Baltic Air Policing*). Nuclear delivery duties could be undertaken in rotations to spread the financial burden.

There is one more interesting idea. It involves establishing a multinational 'nuclear' strike wing similar to NATO AWACS airborne early warning and control detachment. This would enable other member states, including new ones, to participate. Perhaps such a wing would use American aircraft with pilots from other NATO member states: Germany, Belgium, the Netherlands, or Poland, for example. The Aviano Air Base in Italy is suggested as the most probable stationing location.[74] Both solutions would be a response to fiscal austerity and a practical implementation of the *Smart Defence* concept, advocated and

promoted by the NATO Secretary General Anders Fogh Rasmussen. Both would let NATO retain its tactical nuclear capabilities. Both require an open support of the Allies.

There is, however, little chance of a quick decision on both the issue of European DCAs and B61 bombs (their number, variant, and deployment). A quick solution would be possible if the system was first of all a military tool. In practice, it is less a thermonuclear deterrence tool, at least in peacetime, and more a political instrument, which makes any concrete decisions difficult to make. This character of the weapons was confirmed in the 1999 Strategic Concept: 'The fundamental purpose of the nuclear forces of the Allies is political'.[75] The political influence of tactical nuclear weapons pertains to the internal (among NATO member states), national (in individual states, especially those with populations opposing nuclear weapons, as in Germany), and external levels (relations with Russia). Therefore it should not be surprise there is a visible absence of a clear and coherent NATO policy on the role of tactical nuclear weapon.

B61 bombs, regardless of the variant, deployment, and military value are first and foremost, a symbol of American involvement in the North Atlantic Treaty, which is of importance for new NATO member states which are deeply concerned about Russian threat. It is also a mechanism of maintaining relations, a symbol of solidarity, and a chance to maintain the special position of NATO. They also build NATO's credibility and cohesion. This is the way Turkey perceives this issue. It does not want changes because hosting elements of the nuclear umbrella in its territory, even though it may currently have a low military value, means prestige and the possibility of special relations with the United States. What is more, NATO's nuclear umbrella restrains the possible ambitions of Turkey to have such capabilities. France also does not seek changes for the reasons stated above; removing B61 bombs from Europe would mean weakening the French right to their own nuclear arsenal. Thus, it is better not to provide a precedence and keep the status quo. In practice, however, this decision-evading policy turns NATO's tactical nuclear weapons doctrine into a paperweight as a result of a self-disarmament.

Bibliography

Becker M., Nassauer O., *Nuclear Arsenal: US To Turn Old Bombs Into All-Purpose Weapons*, "Der Spiegel Online – International", 06/11/2013, [www.spiegel.de].

Bildt C., Sikorsky R., *Next, the Tactical Nukes*, "New York Times", 01/02/2010, [www.nytimes.com].

Borger J., *Obama accused of nuclear U-turn as guided weapons plan emerges*, "The Guardian", 21/04/2013, [www.guardian.co.uk].

Chalmers M., Lunn S., *NATO's Tactical Nuclear Dilemma*, Royal United Services Institute (RUSI), March 2010.

Chalmers M., Somerville A. [ed.], *If the Bombs Go. European Perspectives on NATO's Nuclear Debate*, Royal United Service Institute for Defence and Security Studies 2011.

Coffey L., *Dutch Parliament Votes to Ditch the Joint Strike Fighter*, "The Foundry", 13/07/2012, [www.blog.heritage.org].

Collina T.Z., *Cartwright Urges Nuclear Spending Cuts*, Arms Control Association, September 2012, [www.armscontrol.org].

Dempsey J., *German parties press U.S. to withdraw nuclear arms*, "The New York Times", 23/06/2008, [www.nytimes.com].

Dodge M., Spring B., *President Obama Should Not Unilaterally Reduce U.S. Nuclear Arsenal*, "The Foundry", 03/01/2012, [www.blog.heritage.org].

Duignan P., *NATO: Its Past, Present, and Future*, Stanford 2000.

Foradori P. (ed.), *Tactical Nuclear Weapons and Euro-Atlantic Security: The Future of NATO*, Routledge: New York 2013.

Kashmeri S.A., *NATO 2.0 – Reboot or Delete?*, Potomac Books: Washington DC 2011.

Kristensen H.M., *$1 Billion for a Nuclear Bomb Tail*, "FAS Strategic Security Blog", 28/11/2012, [www.blogs.fas.org].

Kristensen H.M., *America's Killing Machine: "Life Extension" of the B61-12 Nuclear Bomb*, Centre for Research on Globalization, 07/11/2013, [www.globalresearch.ca].

Kristensen H.M., *B61-12: Contract Signed for Improving Precision of Nuclear Bomb*, "FAS Strategic Security Blog", 28/11/2012, [www.blogs.fas.org].

Kristensen H.M., *Non-Strategic Nuclear Weapons*, Federation of American Scientists, May 2012.

Kristensen H.M., *US Navy Instruction Confirms Retirement of Nuclear Tomahawk Cruise Missile*, FAS Strategic Security Blog, 18/03/2013, [www.blogs.fas.org].

Kristensen H.M., *Status of U.S. Nuclear Weapons in Europe 2010*, Federation of American Scientists 2010, p.1, [www.fas.org].

Lewis J., *A Steal at $10 Billion*, "Foreign Policy", 05/09/2012, [www.foreignpolicy.com].

Lütticke M., Fighting for a nuke-free Germany, "Deutsche Welle", 11/08/2013, [www.dw.de].

Meier O., *NATO's new Strategic Concept and the future of tactical nuclear weapons*, "Nuclear Policy Paper", British American Security Information Council – Institute for Peace Research and Security Policy at the University of Hamburg, November 2010.

Meier O., *Reports of German Nuclear Pledge Denied*, Arms Control Association, October 2012, [www.armscontrol.org].

Nichols T., Stuart D., McCausland J.D. [ed.], *Tactical Nuclear Weapons and NATO*, U.S. Army War College – Strategic Studies Institute 2012.

Norris R.S., Kristensen H.M., *US Tactical Nuclear Weapons in Europe, 2011*, "Bulletin of the Atomic Scientists", without date, [www.nonukes.nl].

Perkovich G., Chalmers M., Pifer S., Schulte P., Tandler J., *Looking Beyond the Chicago Summit. Nuclear Weapons in Europe and the Future of NATO*, "The Carnegie Papers", Carnegie Endowment for International Peace, April 2012.

Pifer S., *NATO, Nuclear Weapons and Arms Control*, Brookings Institute 2011.

Rabechault M., *US To Spend Billions 'Modernizing" Nuclear Arsenal*, "Defense News", 06/11/2013, [www.defensenews.com].

Seay III E.E., *Countdown to Chaos?, Timelines and Implications of Procurement Decisions for NATO's Dual-Capable Aircraft*, "Nuclear Policy Paper" No. 14/2013.

Seay T., *Escalation by Default? The Future of NATO Nuclear Weapons in Europe*, "NATO Policy Brief", European Leadership Network, May 2012, p. 2, [www.europeanleadershipnetwork.org].

Skaarup H., *Ohio Warbird Survivors 2003: A Handbook on Where to Find Them*, Lincoln 2003.

Spring B., Dodge M., *U.S. Nuclear Warheads Face More Uncertainty as Scientists Retire*, "The Foundry", 26/04/2012, [www.blog.heritage.org].

Wieten J., *Former Dutch PMs facing possible charges for revealing nukes on Dutch soil*, "Shanghai Daily", 13/06/2013, [www.shanghaidaily.com].

Woolf A.F., *Nonstrategic Nuclear Weapons*, Congressional Research Service, 14/01/2010.

Young S., *Too Much, Too Late: The DOD's Assessment of the B61 Life Extension Program*, Union of Concerned Scientists, 05/11/2012, [www.allthingsnuclear.org].

B61-12 Life Extension Program Radar Drop Tests Completed Successfully, National Nuclear Security Administration, 29/08/2013, [www.nnsa.energy.gov].

F-35 Lightning II a game-changer. Interview with Randy Howard Director of F-35 Business Development activities for the Republic of Korea at Lockheed Martin Aeronautics, "Show Daily", 29/10/2013.

Five NATO States Want U.S. Nukes Out of Europe, Report Says, Nuclear Threat Initiative, 19/02/2010, [www.nti.org].

Exclusive: Belgium considers Lockheed F-35 to replace F-16s – source, "Reuters", 17/09/2013, [www.reuters.com].

Germany opts for a farewell to NATO nuclear weapons, "RT", 28/10/2009, [www.rt.com].

Germany Yet to Decide on Buying New Nuke-Ready Fighter Planes, Nuclear Threat Initiative, 14/09/2013, [www.nti.org].

Maintaining an Effective, Independent Nuclear Deterrent, Ministry of Defence, 12/12/2012.

New German government to seek removal of US nuclear weapons, "Deutsche Welle", 25/10/2009, [www.dw.de].

Nuclear Posture Review Report, Department of Defense, April 2010.

Speech by Nicolas Sarkozy, President of the French Republic. Presentation of "Le Terrible" Submarine in Cherbourg, on March 21, 2008, [www.diplomatie.gouv.fr].

Summary of Roundtable on "NATO's Future Nuclear Posture", Washington DC, 25/07/2013, [www.basicint.org].

Tactical Nukes in Europe a "Tiny Fraction" of Cold War Arsenal, Report Says, Nuclear Threat Initiative, 18/01/2011, [www.nti.org]

The Presidential Nuclear Initiatives (PNIs) on Tactical Nuclear Weapons at a Glance, Arms Control Association, August 2013, [www.armscontrol.org].

The Military Balance 2013, International Institute for Strategic Studies, London 2013.

Yankee Bombs Go Home: Foreign Minister Wants US Nukes out of Germany, "Der Spiegel", 10/04/2009, [www.spiegel.de].

[1] P. Duignan, *NATO: Its Past, Present, and Future*, Stanford 2000, p. 22. See also: S. Pifer, *NATO, Nuclear Weapons and Arms Control*, Brookings Institute 2011, p. 5-8.

[2] P. Schulte, *Tactical Nuclear Weapons in NATO and Beyond. A Historical and Thematic Examination*, [in:] T. Nichols, D. Stuart, J.D. McCausland [ed.], *Tactical Nuclear Weapons and NATO*, U.S. Army War College – Strategic Studies Institute 2012, p. 24.

[3] Later also aircrafts such as *Tornado, Jaguar* and *Sea Harrier* were armed with WE.177s.

[4] During this time the United Kingdom deployed its own strategic thermonuclear capabilities. British strategic detterence, able to survive the Soviet attack, was established in 1968 when submarines with UGM-27 *Polaris* were put in service.

[5] S.A. Kashmeri, *NATO 2.0 – Reboot or Delete?*, Potomac Books: Washington DC 2011, p. 42.

[6] 'An independent centre of nuclear decision-making enhances the overall deterrent effect of allied nuclear forces: separately controlled but mutually supporting nuclear forces create an enhanced overall deterrent effect; the UK deterrent is operationally independent, and the UK does not require US or NATO authorisation to use its deterrent - UK nuclear weapons remain under political control at all times; only the Prime Minister can authorise the firing of UK nuclear weapons'. See: *Maintaining an Effective, Independent Nuclear Deterrent*, Ministry of Defence, 12/12/2012. [www.gov.uk]

[7] R. Weitz, *The Historical Context*, [in:] T. Nichols, D. Stuart, J.D. McCausland [ed.], *op. cit.*, p. 8.

[8] H. Skaarup, *Ohio Warbird Survivors 2003: A Handbook on Where to Find Them*, Lincoln 2003, p. 126

[9] NATO (1999): *The Alliance's Strategic Concept*, paragraph 64.

[10] *The Presidential Nuclear Initiatives (PNIs) on Tactical Nuclear Weapons at a Glance*, Arms Control Association, August 2013, [www.armscontrol.org].

[11] A.F. Woolf, *Nonstrategic Nuclear Weapons*, Congressional Research Service, 14/01/2010, p. 8.

[12] T. Valasek, *Central Europe and NATO's Nuclear Deterrent*, [in:] M. Chalmers, A. Somerville [ed.], *If the Bombs Go. European Perspectives on NATO's Nuclear Debate*, Royal United Service Institute for Defence and Security Studies 2011, p 19 ; H.M. Kristensen, *US Navy Instruction Confirms Retirement of Nuclear Tomahawk Cruise Missile*, FAS Strategic Security Blog, 18/03/2013, [www.blogs.fas.org].

[13] The B61 is the oldest nuclear weapon in the U.S. military arsenal. It was first deployed in the 1960s.

[14] H.M. Kristensen, *Status of U.S. Nuclear Weapons in Europe 2010*, Federation of American Scientists 2010, p.1, [www.fas.org].

[15] H.M. Kristensen, *Non-Strategic Nuclear Weapons*, Federation of American Scientists, May 2012, p. 16 ; G. Perkovich, M. Chalmers, S. Pifer, P. Schulte, J. Tandler, *Looking Beyond the Chicago Summit. Nuclear Weapons in Europe and the Future of NATO*, "The Carnegie Papers", Carnegie Endowment for International Peace, April 2012, p. 6.

[16] H.M. Kristensen, *Non-Strategic …*, p. 16-18.

[17] See more: J. Clearwater, *Canadian Nuclear Weapons: The Untold Story of Canada's Cold War Arsenal*, Toronto 1998.

[18] R.S. Norris, H.M. Kristensen, *US Tactical Nuclear Weapons in Europe, 2011*, "Bulletin of the Atomic Scientists", without date, [www.nonukes.nl]. About DCA see also: G. Perkovich, M. Chalmers, S. Pifer, P. Schulte, J. Tandler, *op. cit.*, p. 13-20.

[19] E.E. Seay III, *Countdown to Chaos?, Timelines and Implications of Procurement Decisions for NATO's Dual-Capable Aircraft*, "Nuclear Policy Paper" No. 14/2013, p. 2. It is worth to also mention US Navy, which in the 1990s. withdrew from service A-6 *Intruder* and A-7 *Corsair* strike aircrafts. Both were nuclear capable. Currently the only nuclear capable strike aircraft in US Navy is F/A-18 *Hornet* and AV-8B *Harrier* II in the US Marine Corps.

[20] *Nuclear Posture Review Report*, Department of Defense, April 2010, p. ix and 27.

[21] In the U.S. armed forces the F-35 *Lightning* II will replace the A-10 *Thunderbolt* II, F-16 *Fighting Falcon* for the US Air Force; the F/A-18 *Hornet* for the US Navy; AV-8B *Harrier* II for the US Marine Corps. *F-35 Lightning II a game-changer. Interview with Randy Howard Director of F-35 Business Development activities for the Republic of Korea at Lockheed Martin Aeronautics*, "Show Daily", 29/10/2013, p. 8.

[22] T. Seay, *Escalation by Default? The Future of NATO Nuclear Weapons in Europe*, "NATO Policy Brief", European Leadership Network, May 2012, p. 2, [www.europeanleadershipnetwork.org].

[23] *The Military Balance 2013*, International Institute for Strategic Studies, London 2013, p. 139.

[24] *Germany Yet to Decide on Buying New Nuke-Ready Fighter Planes*, Nuclear Threat Initiative, 14/09/2013, [www.nti.org].

[25] M. Chalmers, S. Lunn, *NATO's Tactical Nuclear Dilemma*, Royal United Services Institute (RUSI), March 2010, p. 25.

[26] More about Turkish role in: M. Kibaroglu, *Turkey* [in:] P. Foradori (ed.), *Tactical Nuclear Weapons and Euro-Atlantic Security: The Future of NATO*, Routledge: New York 2013, p. 92-104.

[27] H.M. Kristensen, *Status of U.S. …*, p. 20.

[28] *Tactical Nukes in Europe a "Tiny Fraction" of Cold War Arsenal, Report Says*, Nuclear Threat Initiative, 18/01/2011, [www.nti.org]. Cf. also: M. Muys, *US Tactical Nuclear Weapons at Kleine Brogel in the Context of Contemporary International Developments*, Flemish Peace Institute, 22/09/2010, [www.nonproliferation.edu].

[29] *Exclusive: Belgium considers Lockheed F-35 to replace F-16s – source*, "Reuters", 17/09/2013, [www.reuters.com].

[30] More about Dutch role in: K. Koster, *The Netherlands* [in:] P. Foradori (ed.), *op. cit.*, p. 74-91.

[31] L. Coffey, *Dutch Parliament Votes to Ditch the Joint Strike Fighter*, "The Foundry", 13/07/2012, [www.blog.heritage.org].

[32] More about Italian role in: P. Foradori, *Italy* [in:] P. Foradori (ed.), *op. cit.*, p. 61-73.

[33] *The Military…,* p. 131.

[34] For more details see: *The B61 (Mk-61) Bomb. Intermediate yield strategic and tactical thermonuclear bomb*, Nuclear Weapon Archive, 09/01/2007, [www.nuclearweaponarchive.org].

[35] H.M. Kristensen, *America's Killing Machine: "Life Extension" of the B61-12 Nuclear Bomb*, Centre for Research on Globalization, 07/11/2013, [www.globalresearch.ca].

[36] H.M. Kristensen, *B61-12: Contract Signed for Improving Precision of Nuclear Bomb*, "FAS Strategic Security Blog", 28/11/2012, [www.blogs.fas.org].

[37] Ibidem. See also T. Seay, *op. cit.*, p. 3;

[38] *B61-12 Life Extension Program Radar Drop Tests Completed Successfully*, National Nuclear Security Administration, 29/08/2013, [www.nnsa.energy.gov].

[39] M. Becker, O. Nassauer, *Nuclear Arsenal: US To Turn Old Bombs Into All-Purpose Weapons*, "Der Spiegel Online – International", 06/11/2013, [www.spiegel.de].

[40] H.M. Kristensen, *$1 Billion for a Nuclear Bomb Tail*, "FAS Strategic Security Blog", 28/11/2012, [www.blogs.fas.org].

[41] S. Young, *Too Much, Too Late: The DOD's Assessment of the B61 Life Extension Program*, Union of Concerned Scientists, 05/11/2012, [www.allthingsnuclear.org].

[42] J. Borger, *Obama accused of nuclear U-turn as guided weapons plan emerges*, "The Guardian", 21/04/2013, [www.guardian.co.uk].

[43] B. Spring, M. Dodge, *U.S. Nuclear Warheads Face More Uncertainty as Scientists Retire*, "The Foundry", 26/04/2012, [www.blog.heritage.org].

[44] M. Rabechault, *US To Spend Billions 'Modernizing" Nuclear Arsenal*, "Defense News", 06/11/2013, [www.defensenews.com].

[45] T.Z. Collina, *Cartwright Urges Nuclear Spending Cuts*, Arms Control Association, September 2012, [www.armscontrol.org].

[46] The letter was signed also by former Belgian Prime Ministers Jean-Luc Dehaene and Guy Verhofstadt and former Foreign Minister Louis Michel. See more: *Five NATO States Want U.S. Nukes Out of Europe*, Report Says, Nuclear Threat Initiative, 19/02/2010, [www.nti.org].

[47] J. Lewis, *A Steal at $10 Billion*, "Foreign Policy", 05/09/2012, [www.foreignpolicy.com].

[48] *22 American nuclear bombs are stored in the Netherlands: media*, "Dutch News", 10/06/2013, [www.dutchnews.nl].

[49] J. Wieten, *Former Dutch PMs facing possible charges for revealing nukes on Dutch soil*, "Shanghai Daily", 13/06/2013, [www.shanghaidaily.com].

[50] This letter, signed by Steven Vanackere (Belgium), Guido Westerwelle (Germany), Jean Asselborn (Luxembourg), Maxime Verhagen (the Netherlands), and Jonas Gahr Store (Norway), was addressed to NATO Secretary General Anders Fogh Rasmussen.

[51] See for example: P. Schulte, *op. cit.*, p. 27-28.

[52] H. Schmidt, R. von Weizsäcker, E. Bahr, H.D. Genscher, *For a Nuclear Weapons-Free World*, Nuclear Age Peace Foundation, 13/01/2009, [www.wagingpeace.org]. See also G. Perkovich, M. Chalmers, S. Pifer, P. Schulte, J. Tandler, *op. cit*., p. 15-16.

[53] *New German government to seek removal of US nuclear weapons*, "Deutsche Welle", 25/10/2009, [www.dw.de].

[54] M. Lütticke, Fighting for a nuke-free Germany, "Deutsche Welle", 11/08/2013, [www.dw.de].

[55] *Yankee Bombs Go Home: Foreign Minister Wants US Nukes out of Germany*, "Der Spiegel", 10/04/2009, [www.spiegel.de].

[56] J. Dempsey, *German parties press U.S. to withdraw nuclear arms*, "The New York Times", 23/06/2008, [www.nytimes.com].

[57] *Germany opts for a farewell to NATO nuclear weapons*, "RT", 28/10/2009, [www.rt.com].

[58] Ibidem.

[59] *Yankee Bombs…*

[60] *US nukes to stay in Germany – media*, "RT", 06/09/2013, [www.rt.com].

[61] O. Meier, *Reports of German Nuclear Pledge Denied*, Arms Control Association, October 2012, [www.armscontrol.org].

[62] Defense ministers of all NATO member states, except France, meet regularly in the Nuclear Planning Group (NPG) which "acts as the senior body on nuclear matters in the Alliance and discusses specific policy issues associated with nuclear forces".

[63] *Speech by Nicolas Sarkozy, President of the French Republic. Presentation of "Le Terrible" Submarine in Cherbourg*, on March 21, 2008, [www.diplomatie.gouv.fr].

[64] P. Foradori, *Italy* [in:] P. Foradori (ed.), *op. cit.*, p. 67.

[65] In February 2010 Carl Bildt (Foreign Minister of Sweden), and Radek Sikorski (Foreign Minister of Poland) published an op-ep in*"The New York Times"* pressing for a new agreement between the United States and Russia on further reductions of strategic nuclear weapons (…) As part of efforts to further reduce nuclear weapons in general, as well as to build confidence in a better order of security in Europe, we today call on the leaders of the United States and Russia to commit themselves to early measures to greatly reduce so-called tactical nuclear weapons in Europe". C. Bildt, R. Sikorsky, *Next, the Tactical Nukes*, "New York Times", 01/02/2010, [www.nytimes.com].

[66] See also: P. Schulte, *op. cit.*, p. 29-30.

[67] Several times Russia threatened to deploy *Iskander* theatre ballistic missiles in the Baltic exclave of Kaliningrad.

[68] NATO (2010): The Alliance's Strategic Concept, preface and paragraph 17. See also: O. Meier, *NATO's new Strategic Concept and the future of tactical nuclear weapons*,

"Nuclear Policy Paper", British American Security Information Council – Institute for Peace Research and Security Policy at the University of Hamburg, November 2010.

[69] *Deterrence and Defence Posture Review*, 20/05/2012, paragraphs 8 and 9.

[70] *Summary of Roundtable on "NATO's Future Nuclear Posture"*, Washington DC, 25/07/2013, [www.basicint.org].

[71] S. Pifer, *NATO, op. cit.*, p. 3.

[72] J. Lewis, op. cit. See also: M. Dodge, B. Spring, *President Obama Should Not Unilaterally Reduce U.S. Nuclear Arsenal*, "The Foundry", 03/01/2012, [www.blog.heritage.org].

[73] See also: M. Chalmers, S. Lunn, *op. cit.*, p. 18.

[74] S. Pifer, *op. cit*., p. 23. Five alternative DCA postures, including the transfer of all B61 bombs and keeping all NATO DCA forces in the US have been presented in: G. Perkovich, M. Chalmers, S. Pifer, P. Schulte, J. Tandler, *op. cit*., p. 17-19.

[75] NATO (1999): *The Alliance's Strategic Concept*, paragraph 62 ; G. Perkovich, M. Chalmers, S. Pifer, P. Schulte, J. Tandler, *op. cit*., p. 9.

The birth of Operational art

By Lieutenant colonel Ove Papilla

To divide war into different levels is not a new phenomenon. It has been in practice for a long time, when the wars of Peloponnesian was carried out by 431 till 404 b.c. there was a difference between the level that gave the order for the war and a level that carried out the war. Initially the leadership divided war between tactics and strategy. Tactics was the art of winning the battle, while strategy was to use all available assets, not only military, to win the whole war. This simple division was reasonable, because war was often directed at single point where a battle took place. They could in a series or even as a single event decide the whole war. When the armies clashed, the space was limited and the armies where often densely packed. The possibilities to make maneuvers were rather limited since the commander only had one army to give orders to. The orders were given beforehand and while the battle was going on the possibilities to change given orders were also limited because of the big noise of the battle and the weak communication opportunities. The practice of larger armies and army corps where still things for the future.

As war developed in dimension and complexity, there was a need to make new definitions. One could wage war in different countries or regions and one had to be able to lead larger and more complex forces. War was not only decided by single battles, it could take more drawn out series of battles, sometimes in areas large distances apart. War became divided into series of battles, not all of them in the same region. This expansion of warfare had its roots somewhere in the past. At what time was the older type of warfare exchanged for a newer type? The purpose of this article is to show different opinions on operational art, and point out the differences and what they mean.
The writers have different opinions on the time of the birth of operational art. Martin van Creveld is a known military writer who has published a number of books. Claus Telp has written a whole book on

the subject and James J. Schneider is a Professor Emeritus of Military Theory at the School of Advanced Military Studies, U.S. Army Command and General Staff College. Telp and Martin van Creveld on different reasons believe that operational art was born during the age of Napoleon, while Schneider believe that operational art was born during the age of the American civil war.

The aim of this text is to analyse the different texts and define when operational art was born and give the reasons to why it was born. Defining when and why operational art was born is the start in making a definition on operational art. What is it and what concepts does it involve?

Telps analysis

The first writer I use Claus Telp. He works at the Royal Military Academy in Sandhurst. The book is called: *The Evolution of operational art 1740-1813*. Telp investigates two different periods, the first on being the age of Fredrick of Prussia, the second period being the age of Napoleon.

Telp uses two different models for his analysis. The first one is the two-level model:

"Strategy" is the art of war at the strategic level, concerned with political decisions such as definition of the war aim, the mobilization of manpower and material, the planning and conduct of campaigns and the determination of the purpose as well as the context of battle. "Tactics" is the art of war at the tactical level, concerned with fighting a battle in pursuit of the strategic purpose.[1]

According to Telp, the three-level of model of analysis are as follows:

Strategy is the art of war at the strategic level, concerned with political decisions such as the definition of the war aim, the mobilization of manpower and material, the determination of strategic objectives such as the destruction of the enemy army and the allocation of forces to the theatres of war. The strategist uses strategic instruments

usually armies. "Operational art" is the operational art at the operational level, concerned with the conduct of campaigns at with the means provided by strategy, in pursuit of the strategic objective in one theatre of war. The operational artist uses operational instruments, army corps and or all arms-divisions and their complementary staff organization. "Tactics is the art of war at the tactical level, concerned with fighting a battle in pursuit of either the operational or the strategic objective. The tactician uses tactical instruments, formations between corps and battalions[2]

Nothing new in the definitions, they suits many of today's definitions of the different levels of war. The thing lacking is the definition of "art". What is "art"? In science you have to describe a method and how you use your method to make your conclusions. This is not necessary in "art". In "art" you must use your own experience and your judgement to make the decision. From this we find that you must have an experienced commander that takes the decisions during a war, obviously he must have the proper operational instruments to carry out his orders, but it is not only the operational instruments that are required, the "art" of the commander is an obvious part of operational art.

Telp opens his book by stating that operational art was born in the period between the campaigns of Frederick the Great and the end of the Napoleonic wars. The reasons Telp gives are:

- The interplay between military and non-military factors such as the social, economic and political developments
- The interplay between the military theory and practice
- The interplay between developments in military theory and practice in France and in Prussia.

Telp continues by stating that no one has made a real attempt to the close interrelationship between military and non-military factors. Telp

also states that the studies he have read often describes the final product rather than focusing on the evolutionary development.[3]

Telp wants to use his text in doing what he believes other writers have not done, namely to describe the roots of operational art in the age of Frederick the Great and Napoleon and thereby carefully describing the interrelationship between military and non-military factors.

In his analysis Telp uses both models. The first one is used in the chapter about Frederick the Great. Telp argues that in the age of Frederick the armies used only strategy and tactics. In the strategic level decisions were made on where the armies would meet in battle and on the tactical level the armies were deployed for battle and fought. Since the armies later started to use divisions and army corps and with these trying to outflank and encircle each other, the transition from marching to combat became more fluid as the approach marches from the divisions or corps from several directions towards the battlefield often were transformed into flank attacks.

In the period 1740-1791 that Telp investigates he claims that the social structure with the close ties between the nobility and the king supressed the longer term military output. Mobilization was another factor. The emperor didn't want to give the commoners any reason to armed uprising, and therefore he was adverse to send out the order. The order in the army was also weakened by many desertions and the short marches that were needed to keep the men in the ranks.[4]

In the period the advances was also slow which made it hard to surprise the enemy. The occasions when the enemy was ready to engage in battle he was in a strong position or with superior numbers and made the emperor attack frontally. The logistical question also hampered the German emperor. The supply depended on access to major roads and waterways which often were blocked by fortresses.[5]

The emperor made several attempts to overcome the limitations. He advanced in parallel columns and tried to increase the self-sufficiency in supply. These improvisations did not offer permanent solutions since army organisation remained unchanged.[6]

At the tactical level the enemy often could get away at the last moment due to long deploying times. If the battle started, the attritional nature could mean that the enemy could make an orderly retreat. [7]

In later campaigns Napoleon also had help from the updated French telegraphy system which made it easier for him to lead his army and govern his empire from his field headquarters. Another useful help was the fact that anyone could rise to the rank of Field Marshal, even if he had started as an ordinary conscript. Also helping was the rewards that were given out by Napoleon. Troops could now be sent out on and be trusted to return, which made it easier for Napoleon to engage it marches with speed and flexibility. In the Prussian army the situation was the complete opposite, they could not engage in forced marches and foraging since stragglers or foragers might not return.[8]

The second period that Telp investigates 1792-1806, the means to enggage in battle to seek decisive victory was better. The government of revolutionary France could order mobilization in another scale than the king could have done during the seven years' war. The mobilization was also more complete and included manpower, human resources, material and technology. The outcome was the creation of operational instruments. The use of manpower and material created mass armies, which were broken down into divisions and corps. The use of human resources by turning to education and meritocracy gave the French forces an educated officer's corps that was needed to work the operational instruments. There was also a spiritual enthusiasm that created an initial surge of enthusiasm.[9]

The mobilization was not a complete success. Parts of the population protested and claimed that the war effort would cause social and

economic damage. The protests grew and created a time for a military coup. The strategy of annihilation was going to be implemented by use of operational art. The enemy was going to be outmaneuvered and cornered as a precondition for his destruction. The use of operational instruments with the divisions, corps and staff system together with a new mode of supply helped to overcome many of the things that had worked in a negative manner in Frederick's conquest for a decisive battle. This new mode created many casualties, but now one could ruthlessly use speed and flexibility and with mass conscription this was not big problem as before, manpower losses could be tolerated.

However, the aim of achieving decisive battle could not be achieved. The representatives, lack of battle worthiness, lack of professionalism and unity of command, supply matters, poor reconnaissance, denied the French the crowning achievement of decisive victory in battle.[10]

The next period examined by Telp was the battle of Jena. Napoleon made use of operational art to appease the French by rapid and decisive victories. He did not use mass conscription to its full extent, he instead used it in consideration to the public opinion. The mobilisation also took advantage of human resources. He had an officer corps that was open to talent and ambition. It was a result of the meritocratic practice in France and it was not only directed to the officers, it also included rank and file. The positive outlook from all men created a situation that meat that forced marches and living of the country did not create a situation with desertion. Napoleon also used diplomacy, economics, and education for his strategic purposes, which improved the conditions for the use of operational art.[11]

Telp describes the huge difference in logistics between the French and Prussian armies. He points out the big difference where the Prussians were hampered by their reliance on rear supply once they had entered the theatre. One of the differences between the armies, according to Telp, was that the French army had 300 supply vehicles while the Prussian one had 1398 bred wagons, 116 mobile ovens, 1380 flour

wagons and 240 miscellaneous vehicles. The baggage train in the Prussian army was also huge. One example that Telp describes was the fact that a Prussian regiment had 13 wagons 293 horses and 173 non-combatants. The Prussian army became slower due to all this and if we add the fact that the discipline in the Prussian army where men could not be sent off to forage because they might not return. Another fact that hampered logistics was that Prussia had bad finances and therefore could not afford to buy food in the theatre. [12]

Regarding the army corps Telp states a number of reasons to why they were more effective than the divisions. The most obvious one is of course the combat strength. A bigger organisation leads to more combat strength. But it was not only the bigger organisation that added combat strength. The corps had their own artillery and cavalry in their own organisation. A corps could just by its strength decide the outcome of a battle.[13]

All this meant that the system in France was ahead of any other army. Without any political interference and with the use of the staff system, the army corps and the French supply system the French could destroy the Prussian army with its use of operational manoeuvre, battle and pursuit. [14]

Next period examined was the Prussian reforms. The introduction of operational art in France finally made the Prussians seek for reform. The crushing defeats of the Prussian army made this inevitable. There were a number of factors involved in the reforms, both civilian and military components. There was an ambition for meritocracy and a mass army in which the operational instruments could be used. A better education of officers was introduced, but the aim of creating a mass army was opposed by a number of groups. Royal advisers feared losing influence, provincial nobility feared that the central government would lose influence and the tax privileges would be decreased. Noble officers did not want the meritocratic principle. Craftsmen opposed the abolition of the guild monopoly and ordinary men was not interested in soldiering.

The king and nobility were against the Landsturm because they thought that they could use their arms against them.[15]

However, the officers got more trained and could use the staff system to lead the formations using operational art. The aim of the liberation was not to liberate the Prussian population. The aim was to permit the royal family to function in a new world. The state had to be united by a number of factors, such as common administration, common laws and taxes. Furthermore, personal liberty and equal rights and duties for all people would make the monarchy prosper.[16]

Another factor that hampered the reformers was the peace treaty that meant that Prussia had to cede half of her territory and population and pay an indemnity of 141 million francs. The army also had to be reduced to 42 00 thousand men.[17]

The reformers made big contributions in creating a staff system and a better officer's corps, but did not create an operational theory like the French had. The most probable reason according to Telp was that the reformers had very little time, they wanted to raise the army's battle worthiness and to make contingency plans.[18]

The last period examined by Telp was the campaigns of 1813. Telp states that complicated to make comparisons between French and Prussian operational art since the Prussians were mixed with allied units. However, Telp states that the Prussian corps and their coordination by the staffs and a flexible mode of supply, made the commander Blucher for the first time able to execute Prussian operational art. The Prussian operational art was different from the French. While the French had a more aggressive outlook, the Prussians could sometimes avoid battle because they wanted to sum up personnel until they were numerically superior.[19]

The Prussian army lost against France in Leipzig but still the Prussians and the Russians agreed to continue to fight. In another battle at Bautzen

that was reached after the defeat at Leipzig France gained a slight tactical victory but did not succeed to crush Prussia and Russia. The battle of Bautzen was intended to show the world that Prussia and Russia would continue to fight and finally it made Austria join the coalition against France. This time diplomacy and strategy was united on the Prussian and Russian side.[20]

On the French side many of the officers had been lost during the war against Russia. The new officer's corps was not up to the standard that the officers of 1806 had. Poor officers led to higher rates of desertion, lower marching rates and less tactical efficiency. The morale was also decreasing in the French army. After the defeat of Prussia and Russia at Leipzig, Napoleon lost 42 000 men by desertion in ten days. [21]

The French corps system had also declined, not least by the new recruits that were not accustomed to the hardships of campaigning. Many of them fell into the wayside during marching and left the corps commanders with two options. The first one was to decline forced marches and the second one was to arrive at the battle field with depleted numbers of men.[22]

The Prussian side had almost copied the French corps organisation; the difference was that a Prussian corps had a greater number of cavalry. The French staff system had deteriorated during the campaign in Russia. There were only a small number of experienced staff officers present. The operational capability of the corps was dependent on smooth staff work.[23]

With both sides now looking to crush the enemy by superior manoeuvre, the chance of doing this was remote. On the tactical level the use of all-arms tactics also created a stalemate. The symmetry restored the attritional nature of battle.[24]

Telp concludes his text by stating that the development had three stages:

1. Revolutionary France experimented with operational art with limited success.

2. Napoleon used operational art with remarkable success against an opponent that was clinging to old outdated modes of organisation and warfare.

3. The operational art of Napoleon was successfully challenged by Prussia.

Martin van Crevelds analysis

The next text is from Martin van Creveld. He is a well-known military writer who has published a number of books. The text in this case is from the anthology: *The Evolution of Operational Art*.[25] In the beginning of his text he states that a logical reason for the two different parts of warfare, the tactical and the strategic, was the lack of a means for information to travel faster than a horse. This meant that the commander could only prepare himself by studying books, to send spies and interviewing travellers. The commander though, needed more information. He wanted to know the disposition of the enemy troops and its whereabouts. He would also want information on capabilities and most of all his intentions. If we again deal with the time for information to travel we find that the commander in the best case could get the information from a traveller, in worst case he would get in in direct confrontation with the enemy. A method would then be to send out spies, but again the time for information to travel was still a hindrance, the time to travel would in many cases get the information outdated. Without a fast way of moving information one had to seek out the enemy forces and meet then at a single point in a battle, this is why the division between tactics and strategy was logic. Van Creveld does not state any technological reasons, as other writers do, for the birth of operational art; instead he focuses on other developments. According to Martin van Creveld there were three different factors which enabled Napoleon to execute operational art:

- The system with army corps
- The imperial staff
- The directed telescope

Van Creveld claims that the system with army cops was decisive because the corps could act independently and they were exchangeable with each other. They could also look after themselves for a time. The organisation of the corps fluctuated according to the situation. They could comprise of some 25, 000 to 30, 000 men. Napoleon would often change the organisation to confuse the enemy or to meet some special requirement. The corps also was a key factor to keeping the army apart before the decisive battle. It was essential to keep the army in such a state that the enemy would be trapped in napoleons cordon. By keeping the army apart the enemy didn't get the information on what Napoleon was going to carry out. Napoleon also kept a part ready to engage an enveloping or outflanking force. The distance from another corps should not be more than one day. It was also important that the army could reach a crash concentration within 48 to 72 hours. Self-sufficiency at corps level and mutual support was very important factors for Napoleon.[26]

The imperial headquarters was able to process the information needed for the operations to be carried out. Even if the manner not always was orderly, the information got processed. The directed telescope[27] provided the link between the emperor and the staff, providing information about the enemy and the surrounding environment. It also made the emperor more independent of his staff by giving him information that was not processed by the staff. The directed telescope consisted of two parts. The first one was the *adjutants generaux*, senior officers with the rank of colonel or brigadier. Their task was to compile reports on the different corps. The other group was younger officers that were used for simpler, but important tasks as making statements on roads, bridges, and fortresses.[28]

On attack Napoleon often used the *le battalion carré* (the battalion of square). The formation disposed the army corps in a diamond-shaped rectangular formation, with an advance guard preceded by a cavalry screen. It was riskier than other formations but its boldness gave the commander a better grip of the initiative. Van Creveld claims that Napoleon had to create his corps without any forerunners, which mean that we can't judge him with the concepts of our time.[29]

James J. Schneider's analysis

Another view on the practice of Napoleon can be found in James J. Schneider's[30] text about operational art: *The Loose Marble - and the Origins of Operational Art*.[31] According to Schneider Napoleon did not practice operational art. Even if his corps could be deployed divided they were all directed at a single point when the battle started, the strategy of a single point. Schneider also discusses the lateral distribution of forces. According to Schneider the lateral distribution of forces in the cordon system was outdated by Napoleons use of divisions that could converge on a single point. By making a greater number of divisions attack at a single point, the use of divisions in the cordon system was outnumbered. The system with the army corps is also discussed by Schneider. According to him the army corps was just a natural continuation of the system with divisions. The army corps still had to concentrate on one single point, they were never intended to be independent chess pieces to carry out any independent actions.

According to Schneider, the roots of operational art can instead be found in the American Civil War. Schneider discusses this in his text. He gives a number of factors that made operational art born in the age of the American Civil War:[32]

- The employment of several independent field armies distributed in the same theater of operations;

- The employment of quasi-army group headquarters to control them;
- A logistical structure to support distributed operations;
- The integrated design of a distributed campaign plan;
- The conduct of distributed operations;
- The strategic employment of cavalry;
- The deep strike;
- The conduct of joint operations;
- The execution of distributed free maneuver;
- The continuous front;
- The distributed battlefield;
- The exercise of field command by officers of "operational" vision.

Schneider discusses all this after he has presented the factors above. The first one being the *field armies* is discussed, arguing that Napoleon in fact had temporal field armies in his campaign in Russia, but they were never were intended to act independently. In the American Civil War the armies were spread over large areas and they had independent tasks. The commanders were all subordinate to Washington, this made it hard to concentrate all these armies into a concentration on the battlefield. This was taken care of when army groups were employed. They would have the command over a certain amount of the armies. The next thing discussed is the *distributed logistics*. By making the army rely more on

highly mobile independent attachments, this also made it possible to distribute the forces over larger distances. The next thing discussed is the *distributed campaign*. To Schneider the start of operational art was the campaign by General Grant in 1864. In a letter General Grant told General Sherman that all the federal army was to concentrate at one center. The campaign had several major parts where all the forces would be concentrated on a single goal from different directions. Schneider continues by discussing the *distributed operations*. In classical warfare the forces were united before the decisive battle. Now the armies were spread over larger distances, which made it harder for the enemy. He had to plan for operations both in width and in depth.[33]

Schneider discusses the *strategy of a single point*. According to him Napoleon had both army divisions and army corps, but they were all directed at arriving at the single point were the battle would take place. Next thing discussed is the *strategic cavalry*. According to Schneider, the employment of deep pursuit and exploitation forces the way for the succeeding operations. Before the civil war the cavalry was used in tactical formations, often in a pursuit role. In the civil war cavalry was used for the first time in formations that supported the army. Cavalry was also used to carry out deep-strike techniques. They were directed at lines of communications and bases of operations. The technique of deep-strike was not only carried out by cavalry. In General Sherman's so-called "march through Georgia" a deep-strike was carried out by infantry.[34]

The next thing discussed by Schneider is the *joint operation*. The employment of two or more armed services is an element of operational art. The employment of the Navy on several occasions is a sign of this. Schneider also discusses the *distributed maneuver*. It was no longer necessary to carry out the final end of a maneuver with a battle of annihilation. One could use the maneuver to move the opponent's forces out of its position. Schneider discusses *the continuous front*. The industrial revolution swept away about 2500 years of classical military art. Two innovations made this happen. The first one was the railroad. It ensured

that modern warfare would have a uniquely distributed structure. At the outbreak of the American Civil War the US had laid more railroads than any other country. The railroads would determine how America would go to war. In every chief military department was a primary railroad junction. This became the focal point for departmental mobilization.[35]

Schneider discusses a number of things that made war take a new direction. The industrial revolution provided among other things two essential things for the armies: the railroad and the telegraph. The railroad provided the means to distribute large number of troops into an area; it also provided the means for logistical support of the troops in the area. The telegraph made it possible to connect between staffs and the troops in the field, it was even possible for the politicians to connect to the troops in a way that was impossible before. If we connect these two to the American Civil War we find that they were essential. To spread out armies over great distances would be dangerous without the railroad that could move these armies faster than before, and without the telegraph it would be hard to lead the armies spread over larger distances. Two other things from the industrial revolution also proved change in the way war was carried out. The first one being the rifled musket that made the use of dense columns impossible, one had to use smaller formations. The second one being the machine gun, it was introduced, in its early stages, and later in WW1 it would be one of the deciding weapons. A thing that Schneider discusses is the command of officers with operational vision. It is essential part of operational art. In science you must describe a method and the way the method is used to arrive at your conclusions. Art is different. It does not require a method, you must use your own experience to arrive at a conclusion.

The second innovation was the telegraph. It provided the forces with the element of conducting operations with instantaneous communications. The distributed nature of the railway lines and the telegraph made the use of the American forces been spread out over large distances. Even with greater distances the quasiarmy groups could communicate. Schneider also discusses the *distributed battlefield*. The battlefield was

expanded, the ratio of troops to the space decreased. One of the main reasons for this was the introduction of the rifled musket. It had an increased lethality that was at least ten times that of the Napoleonic counterpart. It had better range, accuracy and penetration. This meant that on the battlefield the initial ranges were driven apart. One could no longer advance in dense columns. Even with the smaller columns it was not possible to advance the whole beaten zone in one rush. One had to divide it into smaller distances and a much older invention came to use: the spade. The battlefield was expanded in space, but also in time. The defense became stronger since one had greater time to develop fortifications.[36]

The last thing discussed by Schneider is the exercise of field *command by officers of "operational" vision.* Schneider discusses General Grant. According to Schneider general Grant had a gift of an historic imagination. He could take in and evaluate the whole field of war and form an opinion of how to form a correct opinion of every suggested and possible campaign, their logical order and sequence, their relative value, and the interdependence of the one upon the other. General Lee on the other hand that was the past president of West Point's Napoleon Club was perhaps more gripped with the historic value of Napoleon.[37]

According to Schneider it would take until the Second World War and the maneuvers of the armies for the operational art to come to its full fruition.

Discussion and conclusions

There is a large difference between the three texts. While Telp uses a much larger space and claims to show that operational art was born in the age of Napoleon by examining a large number of factors. Van Creveld uses a smaller part of factors to make his case. The result of both texts is still the same. The art of war was born in the age of Napoleon. The difference is the use of factors in the texts. The third text

has a completely different view. According to Schneider operational art was born in the age of the American Civil War.

By examining different parts of the text we can gain additional insights. We start with the army corps. Telp and van Creveld write that it was a part of the birth of operational art, while Schneider writes that the army corps was just a continuation of the divisional system. According to Schneider the most important part was instead the focus on a single point, regardless of how big forces one had. The battle of a single point was still in use after the introduction of the army corps.

The army corps was invented during the age of Napoleon. The decision to integrate all existing units into army corps was made by him. The decision was further made the standard organisation in France in the years 1802 until 1804 by military reforms.

But how are we going to look at it? There are two different views on this. The first one being that the army corps was as Schneider claims just a natural continuation of the division that was invented by de Broglie. The other explanation is that the army corps was one of the basic parts of the birth of operational art. It gave a miniature army a leadership by a general and later a Marshal. This view is part of the texts by Telp and van Creveld.

The introduction of army corps gave Napoleon several advantages. They could fight longer, they could be distributed over a larger front, which increased the possibility to surprise and deceive the enemy. The broader front also meant that it was easier to outflank the enemy. Even if the divisions could do the same things they were hampered by their relative weakness.

According to Russell F. Weigley, the army corps had a number of advantages. Weigley begins by stating that an army corps could have a greater number of arms and therefore be able to engage in combat at another scale than the division could do. It was in fact a miniature army

with all types of arms and even corps artillery within the organisation. Still, the divisions had their own artillery, but the French had decided that cavalry and infantry worked best separately. An army corps had no fixed organisation, it would be decided according to the actual circumstances. The corps could include from 9000 to 20 000 men and it could also be created during a campaign and thereby it could be used to confuse enemy intelligence.[38]

If we look at the army corps and the strategy of a single point we can see that there was no difference. The strategy of a single point was still in use when the army corps was born. The things that were different were the ability to engage in heavy combat without any help for a number of hours.

The future of the army corps to be independent armies was to an extent connected to the industrial revolution. The industrial revolution made the populations grow quicker, which made it easier to form larger armies. The industrial revolution also made it possible to mobilize and spread out the forces with the help of the railroad. Even if it was possible to mobilise large forces they had to be lead. One part of the solution was the telegraph which made it possible to lead forces over greater distances without time losses. The industrial revolution also provided the means to equip, and sustain the armies. If we look at the number of the forces we can see that in the age of Napoleon, an army could be made up of about 685 000 men (the campaign against Russia). In 1870 Prussia invaded France with an army of 1200 000 men. One result was that the battlefield grew from a few kilometres to several hundred of kilometres in France 1871. The inventions made by the industrial revolution made all this possible.

What about the imperial staff? Van Creveld claims that this is a part of the birth of operational art. The staffs were introduced by General Pierre de Bourcet in the 1780s. He was in fact the father of the general staff. In Napoleons hands, the staff got bigger and more efficient. The staff consisted of three larger parts. The first one was the Maison. It was

divided into four areas. The parts were a cabinet, a secretariat, a statistical bureau and a topographical bureau. It was the part of the staff where all intelligence report came in and was transformed into a suitable form for the emperor. The État Major was the part that received the daily and periodical reports from the different corps. Its chief was Berthier who helped Napoleon to work out his next move, and translate into a detailed order. The corps commander could expect to receive two messages, one from Napoleon and one from Berthier. The third part was the administrative headquarters. It was responsible for reinforcements, prisoners, the wounded and the administration of the theatre of war. Even if Napoleon didn't like the administrators, he felt that they were needed. The work of the staff contributed highly to the success of Napoleon. It was a capstone that brought the whole imperial army together.[39]

What about the directed telescope? Van Creveld claims that this is an important part of the birth of operational art. The directed telescope consisted of two parts. The first one consisted of twelve colonels or brigadiers, and the other groups were a group of captains. All these could run through all the information that came from lower levels and provide the emperor with information that was not handled during the way. The difference between the two groups was that the higher officers were sent on mission that required independent judgement like the state of the army corps and its commanders, while the other group of younger officers would make judgements on smaller things like the state of roads or bridges. By using this directed telescope the emperor could save time and make him less dependent on the general staff. If we think about the problem of fast information, there was no means to provide it in a fast way, the fastest thing was a horse, the directed telescope could bring information faster to the emperor and thereby making him obtain the information he needed at the time he needed it. If we compare this with an organisation that don't have this advantage, the answer is that Napoleon was probably more updated on the situation than any of his opponents. The system was also a thought out process to bring information faster to the chief, an ongoing problem since there was no

technological means to bring information faster, the means had to be practical ones which this indeed was. What van Creveld doesn't mention is that the telegraph was introduced during the age of Napoleon. In its early stages there was only one line between Paris and Lille, but later the telegraph was used by Napoleon to give orders to his corps and to rule his empire from his field staff. Orders during a campaign were yet to come in the American Civil War, but the invention of the telegraph was made during the time of Napoleon. [40]

Let us now discuss Schneider's claims. He starts by claiming that the strategy of a single point was an important part of Napoleons warfare. According to Schneider this practice had been an important part of warfare for 2000 years. Napoleon used several army corps in distributed maneuver that ultimately would lead to operational art. Schneider claims that "in the final analysis, however, Napoleon must be viewed as a practitioner of a warfare that ultimately would become virtually outmoded within a generation of his death"[41] Some of the things that Napoleon invented survived, for instance the corps system, the staff, the opening of the officers corps to all men and the way command was conducted by individual corps commanders. The next thing Schneider discusses is the lateral distribution of forces. According to Schneider the hallmark of operational art is the lateral distribution of forces. In the age of Napoleon the movement of forces in single dense masses obviated the coordination of other forces.

Let's now move on to Claus Telp. Telp has written a whole book on the subject. He aims to show that operational art was not the child of technological progress, but a result of three dynamic interrelationships. The first one being the interplay between military and non-military factors such as social, economic and political developments. The second one being the interplay between the military theory and practice. The third one being the interplay between development in military theory in France and in Prussia. Telp uses two periods that are examined by a method that Telp himself has invented.

According to Telp there was a fluent transition from campaign manouver to battlefield manouever where divisions and later corps arrived at the battlefield from different locations and joined combat as individual tactical formations. This made the division line between strategy and tactics blurred and created a continuum between strategy and tactics, which according to Telp suggests the introduction of the operational level.[42]

When Napoleon took control he used his power to further enhance the use of operational art. He could not only enhance the operational instruments, he also could enhance their use by integrating diplomacy, domestic policies and military strategy. He also had to consider the domestic situation he had to deliver rapid and inexpensive victories, which were so important to his soldiers.[43]

Telp mentions the telegraph introduced in France in 1794. It was rather useless in the beginning, but would prove its worth in the coming decade when it became one of the crucial means of communication.[44]

Telp discusses the introduction of mass armies and staffs. He states that:

Another operational consequence of mass mobilization was that armies had to be broken into divisions and later into corps in order to make them manageable, thus vindicating Saxe`s notion that big armies could not be controlled. In order to control these semi-independent bodies of troops, a staff system became necessary.[45]

Even if the French, and many other countries had divisions before, the corps with their individual commanders and their ability to engage in heavy battle was a development that was a result that came from Napoleon himself. The commanders of the corps also had greater independence and greater responsibilities than almost any other before them.

The imperial staff was another contribution form Napoleon. It was expanded and made more efficient. It was complemented by the directed

telescope which made it possible to acquire information faster for Napoleon. There were other new inventions, but this one pointed out by van Creveld was essential for acquiring data on the enemy faster.

The factors presented by Schneider were just adding to the birth of operational art. The industrial revolution complemented by the factors presented by Schneider made it possible to form larger armies, to mobilize and spread them over greater distances. It also made it possible to use the telegraphs to lead the forces without any time losses. The factors presented by Telp are also true and they don't interfere with the ones presented by van Creveld. They only add more details, but Telp has the army corps, the staffs and the supply system as important factors:

French army corps and staffs was ahead of revolutionary armies as well as the Prussian army. French army corps and staffs as well as the French supply system were ideally suited for operational art.[46]

In the Prussian army the situation was in the early stages almost opposite to the French situation with large logistics, no army corps and no staffs. It was only after the reformation in the Prussian forces that they almost copied the French corps system and improved officers training.

Telp also states the interplay between military factors and civilian factors on numerous occasions, this is only one example:

Napoleon enjoyed the services of a professional officer corps that which was open to talent an ambition, liberated from the ideological ballast from the revolutionary era. This was the officers corps required for leading mixed formations, making the staff system work and conducting all-arms combat. Here, the impact of non-military characteristics, in the form of the meritocratic character of Napoleons social order was obvious.

The revolution in the officer corps was just one thing that added to the strength of Napoleon, but it would probably not have been possible

without the revolution and in a later stage Napoleons upbringing to an emperor.

The general conscription in France was copied in a number of countries and made the armies grow. We can compare the armies of the Napoleonic period with the ones that was in place when the American Civil War was carried out. In the American Civil War about 3 million men took part, two million on the federal side and a little bit more than one million on the confederate side.[47] In the age of Napoleon the largest size of the army were around 685 000.[48]

Reading about the birth of operational art we can find a number of deciding conditions:

1. Size of armies changed in the age of Napoleon. Mass conscription which began in 1793 added a large amount of soldiers to the army. This practice was copied in many countries and made the armies grow. Before mass conscription of ordinary men armies where professional, and loyal to the king, when war broke out in France, the men and women of the nation had an obligation to defend its country against foreign enemies that wanted to restore monarchy. Prussia did not made any reforms in the beginning, but after their crushing defeat by Napoleon in Jena and Auerstedt in 1806, a reform committee was introduced.[49] They wanted to reform the whole army and make it a truly people's army. However, they were not successful in all factors. Although they, amongst other things, introduced an officers corps that was not based on belonging to nobility. They also wanted to introduce an army based on compulsory military service, but they were hampered by the influence of Napoleon and poor economics.'

2. The introduction of divisions that which had all combat arms in their own organisation. The leadership was easier for the commanders since they could use their own divisions for combat without any help from the main army. The introduction of the army corps was yet another contribution for more independent units.

3. Leadership. The expanded armies could not be led by one person. The armies had to be divided into smaller parts, the army corps and the armies were a logical result of this process. It seems impossible to lead an army of more than 1 million men from one staff, the army obviously had to be divided into smaller parts. The factors presented by Schneider of the employment of several independent field armies distributed in the same theater of operations, the employment of quasi-army group headquarters to control them, logistical structure to support distributed operations, the integrated design of a distributed campaign plan, and the conduct of distributed operations was mostly due to the fact of growing armies. Without growing armies, the need to do anything of this would not be required.

4. Industrial revolution. The railroad[50] and the telegraph[51] two important factors. The railroad to mobilize, to spread and for logistical support of the armies. The telegraph for communication to lead armies spread over greater distances. The ability to produce new weapons also important. Larger guns, better rifles and the machine gun important inventions.

5. Intelligence. Since the telegraph was introduced it was easier to get information about the enemy. Previously intelligence had a speed of a running horse, now it could be sent over large distances instantly. The system that van Creveld discusses with an expanded staff for bringing in intelligence

to the commander is a beginning of the development of the intelligence branch.

6. The staff system invented by Napoleon. It was a small staff, but it would be followed by larger staffs during the coming years. Staffs are necessary to lead and coordinate bigger forces often in several operations which cannot be commanded by only one person.

7. In the discussion from Schneider we find that he describes leadership by men of operational vision. This is one of the main ingredients in operational art. In science you have to describe a method and how you use the method to get a result. This is not necessary in operational art, in art there is no need to describe a method, and you must use your own experience to make the decision.

8. A more professional officer's corps, which was described by Telp. Earlier you had to be a part of nobility to be an officer. But when the French revolution took place the officer's corps became open to anyone that had the right qualifications.

9. Manoeuvre was made a part of the battle. Before Manoeuvre had been a separate part which took place before the battle. During the age of Napoleon manoeuvre was an integrated part of the battle.

Reading the texts about the birth of operational art we find that the birth of operational art was in the age of Napoleon. During his age a number of inventions were made that gave birth to operational art. Mass conscription made the armies bigger. They were divided into army corps with own commanders that could fight independently for at least 24 hours. The staff and the telegraph were introduced in France. The manoeuvre was made a part of the battle by the French army. One of

Napoleons favourite practices was to the strategy of indirect approach. In practice it meant to use one or two army corps to pin down the enemy's front and then use the bulk of the army to make a march round the enemy and fall on the enemy's rear and prevent his retreat.[52]

The years following the age of Napoleon a lot of inventions were made that changed the way war was carried out. In the American Civil War some of the inventions were tested, for instance armies, the telegraph (which was operative during the age of Napoleon and improved during the American Civil War were a military telegraph service was established in 1861) and the railroad. Other inventions included better guns and rifles. The forces also got bigger so the solution was to form armies which could be spread over large distances, leadership would use the telegraph to lead the bigger forces in campaigns. Leadership on the battlefield was still an invention for the future. Intelligence was also improved by the use of the telegraph, it was now possible to get intelligence faster, earlier it had to travel by the speed of a running horse.

The text by Telp is the most reliable one. It describes details in the development in a most comprehensive way. The length of this text is too short to describe all the details that Telp discusses in his book, but the most major ones described above is all part of it. Telp is most certainly right about the political implications. It was politics that directed what could be done by the military and the political leadership needed the support of ordinary people if a mass army was a goal. Telp also describes the resistance by different groups when Prussia tried to reform its army and make it bigger. Even if the reformers succeeded in a lot of their goals, the bigger army was met with a lot of opposition from different groups in the Prussian society. Prussia was at the time also hampered by a peace treaty with France that made Prussia cede half of her territory and population, limit army strength and accept French garrisons in key towns.

One thing lacking in all the texts is a definition of "art". It is the creative imagination of the commander that uses his own experiences and the

operational instruments to create his version of operational art. He must use his ability to take a complex problem and turn it to something that is clearer and more logic, some of this is intuitive and based on previous experiences. Clearly there have been a lot of people in military history with an operational vision, writing that we can't rule out Napoleon who had a lot of previous experience, moreover he could use a number of inventions that were made in France to his advantage, and he clearly had an operational vision when he went into battle. Why would his name be so big in military history otherwise?

Bibliography

Claus Telp, *The Evolution of Operational Art 1740-1813*, Frank Cass, Abingdon, 2005.

James J. Schneider, *The Loose Marble - and the Origins of Operational Art*, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA517707 (2014-08-03)

John Andreas Olsen and Martin van Creveld, *The Evolution of Operational Art*, Oxford University Press, Oxford 2011.

Gordon A. Craig, *The Politics of the Prussian Army 1640-1945*, Oxford University Press, Oxford, 1964.

Russell F. Weigley, *The Age of Battles*, Indiana University Press, Bloomington, 2004.

David G. Chandler, *Historical Perspectives of Operational Art*, *Napoleon, Operational Art, and the Jena Campaign*, in *Historical Perspectives of the Operational Art*, Center of Military History, United States Army, Washington D.C., 2007.

http://en.wikipedia.org/wiki/American_Civil_War (2014-08-04)

http://en.wikipedia.org/wiki/Napoleon%27s_invasion_of_Russia#cite_note-Riehn.2C_p.50-2 (2014-08-04)

http://www.sdrm.org/history/timeline/ (2014-08-05)

http://historywired.si.edu/detail.cfm?ID=324 (2014-08-05)

http://www.napolun.com/mirror/napoleonistyka.atspace.com/Napoleon_tactics.htm#napoleonstrategy1 (2014-08-07)

1. Claus Telp, *The Evolution of Operational Art 1740-1813*, Frank Cass, 2005, p. 2.
2. Ibid.
3. Ibid.
4. Ibid., p. 31.
5. Ibid., p. 32.
6. Ibid.
7. Ibid., p. 56.
8. Ibid., p. 66-67.
9. Ibid.
10. Ibid., p. 57.
11. Ibid., p. 96-97, 69.
12. Ibid., p. 88.
13. Ibid., p. 91.
14. Ibid.
15. Ibid., p. 100.
16. Ibid., p. 118-119.
17. Ibid., p. 101.
18. Ibid., p. 113.

19. Ibid., p. 140-141.
20. Ibid., p. 123.
21. Ibid., p. 125
22. Ibid., p. 127.
23. Ibid., p. 128
24. Ibid.
25. John Andreas Olsen and Martin van Creveld, *The Evolution of Operational Art*, Oxford University Press, 2011.
26. Ibid., p. 30.
27. Not only van Creveld comments this. Se for example in *Historical Perspectives of Operational Art*, *Napoleon, Operational Art, and the Jena Campaign,* the writings of David G. Chandler, p. 30.
28. John Andreas Olsen and Martin van Creveld, p. 30.
29. Ibid, p. 31.
30. James J. Schneider is Professor Emeritus of Military Theory at the School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, where he has taught for 25 years. Schneider served in Vietnam with the First Infantry Division and received his Ph.D. in history from the University of Kansas.
31. James J. Schneider, *The Loose Marble - and the Origins of Operational Art*, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA517707 (2014-08-03)
32. Ibid, p. 90.

33. Ibid, p. 92.
34. Ibid., p. 93.
35. Ibid., p. 94.
36. Ibid., p. 95-96.
37. Ibid., p. 97-98.
38. Russell F. Weigley, *The Age of Battles*, Indiana University Press, 2004, p. 362.
39. Schneider, p.86.
40. Ibid., p. 66.
41. Ibid.
42. Telp, p. 142.
43. Ibid., p. 143.
44. Ibid., p. 39-40.
45. Ibid., p. 41.
46. Telp, p. 97.
47. For an overview http://en.wikipedia.org/wiki/American_Civil_War (2014-08-04)
48. http://en.wikipedia.org/wiki/Napoleon%27s_invasion_of_Russia#cite_note-Riehn.2C_p.50-2 (2014-08-04)
49. Se for example Gordon A. Craig, *The Politics of the Prussian Army 1640-1945*, Oxford University Press, 1964.

50. The invention was made during the first years of the 19th century. For more on the timeline of the invention of the railroad see http://www.sdrm.org/history/timeline/ (2014-08-05)

51. For more of the invention see http://historywired.si.edu/detail.cfm?ID=324 (2014-08-05)

52. http://www.napolun.com/mirror/napoleonistyka.atspace.com/Napoleon_tactics.htm#napoleonstrategy1 (2014-08-07)