THE EVOLUTION OF MILITARY STAFFS AND THE POSSIBLE EFFECTS OF ARTIFICIAL INTELLIGENCE

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Abstract: *The military staffs are vital parts of military organizations dealing with the numerous details required for the successful conduct of either the peace-time daily routine tasks or the war-time missions. In NATO’s view the staffs are the bodies of specialists whose main task is to provide advice for the commanders on problems at hand as well as to materialize a bold plan acting upon the commanders’ intent and guidance. Staffs capable of meeting these requirements do not have a long history, although different kind of advisory bodies of selected personnel were accompanied the military leaders throughout the history. The military staff of today can be considered as a step on the evolutionary ladder of staffs, on which the emerging technologies will reveal new steps to be taken. One of the most important technology that will affect, or revolutionize even, the internal work processes and the constitution of a military staff is the artificial intelligence. This paper describes the technological and social changes that led to the emergence of the current NATO staff organization and gives some hints about the possible future effects of artificial intelligence on the staff system.*

Keywords: military staff, artificial intelligence

1. Introduction

The military organizations have two fundamental parts: the staff and the subordinates. Either in peace or in war the subordinates are usually and ideally not acting on their own: their activities are carefully planned and coordinated by the staff of the organization. The staff does not act upon its own judgement either, its activities are guided by the commander of the organization. The commander’s vision and intent drive the staff’s development of plans and orders, and those orders enable the subordinates’ coordinated efforts.

The current military staffs are organized similarly throughout NATO to enhance interoperability and cooperation, albeit most national staff systems maintained unique attributes. The NATO doctrine offers a well-structured framework for staff

organizations while stating that “[t]he commander should organize its staff, as deemed necessary to optimize its ability to plan, conduct and support the operation successfully” [1]. While in the past the ability to plan and conduct the operation was a function of the skills and personalities of the staff members and the commander, the ground-breaking innovations of the present are likely to change the staff of the future.

This paper uses qualitative research methods, such as analysis of the existing literature regarding the topic, and studies about the emerging Artificial Intelligence. The first part aims to provide a short overview on the historical process which created the Western type of military staffs. The main hypothesis is that the evolution of the military staff is an ongoing process

driven by technological and social advances, and it has not terminated yet. The second part of this paper therefore provides arguments to this ongoing evolution. (*This paper is part of a research supported by the ÚNKP-20-3-I-NKE-55 New National Excellence Program of The Ministry for Innovation and Technology from the Source of The National Research, Development And Innovation Fund.*)

2. Historical overview

The origins of the current staff system adopted by NATO has not got a long history. The first staff, which may be called “staff” according to our modern interpretation, was the Prussian General Staff of the 19th century. All the Prussian staff members had to be specially trained and qualified, and the knowledge and zeal of functional experts were greatly capitalized on during pre-war planning activities. But the staff itself was not a Prussian invention, it was only a successful adaptation of a previously engineered system. The roots of the staff can be traced back even to the obscure memories remained from the ancient civilizations of the Middle East.

2.1. Ancient times

Ancient authors state that military leaders did not solely relied on their own judgement, but asked for the opinion of their personal friends, subordinates and special advisors when formulating a campaign or battle plan. This common tool, which most likely existed in all major civilizations, was called war council, or council of war.

The very first mentions of the councils of war come from the Egyptian New Kingdom era, 15th century BC. Pharaoh Thutmose III waged number of wars, and on at least one occasion a royal scribe recorded the entire campaign, and the account was engraved into stone. In this account there are mentions of war council headed by the Pharaoh involving his generals [2].

The Egyptian and Assyrian states in the 2nd

and 1st millennium BC respectively revolutionized the warfare by introducing and integrating the scribes – people capable of writing – into the daily life of the armies. This way the personnel and material accounts were kept up-to-date, the leaders were aware of the personnel strength, the payment and supply requirements and shortfalls of their armies. With exact figures in their possession these ancient militaries were able to preposition stocks and supplies in the vicinity of the projected operational areas. Through the emergence of siege engines and sophisticated methods of degrading enemy fortifications in this era conducting siege became an important profession, and evidence even suggests the existence of intelligence specialists [3].

The ancient Greeks and Macedonians did not make any revolutionary change in the existing system of running an army. Several works were written about the tactics and about the conduct of war, and the ancient Romans and Greeks paid more and more attention to the personal qualities one required to be a good general. The 1st century AD Greek writer Onasander made a treatise on the role and requirements of a good general, in which he stresses the importance of war councils, “*since it is not safe that the opinion of one single man, on his sole judgement, should be adopted*” [4]. This view closely resembles NATO’s policy on the staff’s advice to the commander.

The pinnacle of the ancient Greco-Roman military sciences is unambiguously the works of Flavius Vegetius Renatus, the four books of *Epitoma Rei Militaris* (Epitome of Military Sciences). In this work he summarizes the main aspects of Roman warfare: the training, the tactics, and the leadership. While speaking of the leadership he describes how a legion was led, who were the main officeholders and what their tasks were. According to Vegetius besides the commanders of the legion and its subunits there were two officers, whose responsibilities are

mirroring some of those from modern day staffs. The first one was the *praefectus castrorum*, whose primary responsibilities were the reconnaissance of camp sites, the building and fortification of the camp, organizing the medical services and the basic supply and transportation roles. The other officer was called *praefectus fabrorum*, whose main responsibility was the supervision of the craftsmen accompanied the legion, the organizing the repairs and maintenance of equipment, and taking care of the siege engines [5].

Although some historians and philologists argue that Vegetius made false assumptions, and the functions he links to certain officers did not exist in the same timeframe, he provided evidence for the existence of different staff functions in the ancient times. There were officers charged with special functions, such as reconnaissance, maintenance, supply, transportation and engineer duties, and these officers may even have had some say in operational matters, if a war council was convened. The ancient militaries evidently identified more or less the same functions as the modern staff system have.

2.2. Moving away from the Romans

The European military science of the middle ages was built upon the Roman legacy. Vegetius' work was widely circulated, in the Renaissance era, it was translated to several major languages, and with the invention of the printing press it was printed in great numbers during the 16th century AD. With the decline of the feudal armies the mercenary bands were born, that came to dominate the battlefields for centuries. The mercenary bands were often owned by someone with minimal or non-existing military experience. The owner employed a professional soldier, who was able to conduct the necessary duties, thus born the rank of lieutenant. The lieutenant served also as a kind of chief of staff, directing the reconnaissance and operational duties, while the logistical problems were usually handled by the

quartermaster. By this time the works of Vegetius became one of the unofficial manuals of mercenary leaders.

At the apex of mercenary warfare one Bavarian commander, Leonhard Fronsperger described the organization and application of a common Landsknecht mercenary band. In his book titled *Kriegsbuch* he identified several special functionaries, such as paymaster, quartermaster, surgeon, adjutant, artillery officer and a siege expert. While the distribution of military duties remained analogous to those outlined by Vegetius, recent innovations, such as the gunpowder and artillery pieces, shaped the officer corps with the addition of these specialists, as the leaders now had another aspect of warfare they may have needed assistance with [3].

The Thirty Years War raging between 1618 and 1648 was the source of several changes in Europe's militaries. Most importantly the rulers acknowledged that standing armies are more reliable than the mercenaries, thus a wide-range military reform came, during which the formerly unavoidable mercenary bands diminished. The other important change brought by the war was the organizational reform which started by the never-before-seen successes of the small Swedish army.

Sweden at that time had a conscript system that allowed her to have a small, but well-trained and highly motivated force in her possession. Augmented with Dutch, English, Irish and Scottish mercenaries, the Swedish regiments became very effective tools in the hands of a capable commander, and the Swedish king, Gustavus Adolphus II was a capable one. His successes in applying the Swedish military power made the other continental powers envious and curious, so during and after the Thirty Years War almost every European state modelled its army on the Swedish one. The main characteristic of the Swedish army was that its regiments had a uniform staff, and the staff positions are reflected by the ones of the higher echelon. For example,

the regiment staffs had their quartermasters, the army staff had a general-quartermaster responsible for coordinating all the quartermasters' work. Another important innovation was separating the reconnaissance function from the supply or operational functions, creating the position of chief of scouts in the army staff [3].

2.3. What have the French given us?

Up to the 18th century AD the military training and education of an officer was not a requirement, there were even no schools to train military leaders or staff officers. This changed when in 1764 the French opened school for staff officers headed by a Pierre de Bourcet. The school itself became a victim of the financial crisis of the late French Kingdom, but its mentality did not vanish. De Bourcet was charged with organizing a general staff responsible for the coordination of military affairs at the national level. The innovative Prussian king opened his own school for noble gentlemen modelling on the French school in 1765, applying partly French teachers and mainly French manuals during the classes [3].

The French Revolution of 1789 brought a change to the way of war, deemed by some a revolution in military affairs. The smaller standing armies were replaced by large national armies manned by ill-trained conscripts. This increase in manpower demanded the increase of supplies, which required better coordinated activities. This requirement was recognized by the Revolutionary leadership, and in 1792 a general staff (*États-Major*) was introduced to the French army. This system was changed and fine-tuned constantly during the following years to become an efficient organizing authority in support of the generals leading the troops. The French introduced the position of the chief of staff. This way the commander could deal with the important issues only, while the bureaucratic work could be left to the chief of staff. The French staff was divided into four staff bureaus, each of them having its unique field of expertise, albeit the

functions of these bureaus do not reflect the staff section function of present days. More surprisingly, however important the staff duties were, the French failed to introduce staff officer education [6].

After Napoleon's army crushed the Prussian army in 1806, the Prussians began a reorganization of their armed forces, and they used the French staff system as a role model. The emerging and continuously evolving Prussian and later German General Staff and army staffs had only two things in common: the chief of staff and the division into four parts. Regardless these similarities the Prussian system was superior in many ways. The most important of all was the mandatory education and series of exams which an officer had to take before admission into the General Staff, so belonging to this body became a prestige. The special military education enabled higher level of effectiveness, which in the late 19th Century conflicts enabled the Prussian arms to crush every opposing force. This alarmed the nations worldwide, and everybody tried to find the cause of these successes, sooner or later everybody identified the General Staff as the potential source of victories.

The French were badly defeated in 1871 by the Prussians, and during the course of the following decades they adopted a German-like staff system as part of the rebuilding of their armed forces. Once again, after 120 years of pause they began to emphasize the importance of the education of staff officers. By 1900 they had a new, functionally divided bureau system, in which the first bureau dealt with the administrative and logistic issues, the second one with the intelligence, the third with the operations. After the lessons learned in the first two years of the First World War they had to split the first bureau, thus creating the fourth bureau dealing with the logistic issues, leaving the first with the administration only. When the United States entered the war in 1917, they adopted this new French system for their

expeditionary forces, and in 1921 it became their standard for all unit staffs [3].

This Franco-American system later found its way into the NATO and proliferated, even the English adopted it, though reluctantly, in 1982. The four sections system has expanded since its creation. The fifth section/bureau was first born as the civil-military cooperation section, which was necessary during the French and American fights in Algeria and Vietnam. Improvements in technology caused the addition of the sixth, the signal section. A later reorganization in the beginning of the 2000s added the plans, training and finance sections, which became fifth, seventh and eighth respectively, causing the civil-military cooperation moving to the ninth place. This is how the main staff functions of today's NATO staff system came to existence. There are also several advisors in addition to the staff, who are often civilian experts, and even some military functions could not fit into the 9 functions, so they are treated without numbering, such as the provost marshal [1].

3. Emerging artificial intelligence

The research of artificial intelligence started soon after the emergence of electronic computers. In the 1950s the researchers of the United States-based RAND Corporation – the later Nobel-prize winner Herbert A. Simon being one of them – created an algorithm, which they called General Problem Solver. This algorithm was able to solve well-formulated problems, and Simon self-confidently said that *“there are now in the world machines that think, that learn and that create. Moreover, their ability to do these things is going to increase rapidly until – in a visible future – the range of problems they can handle will be coextensive with the range to which the human mind has been applied”* [7].

The events did not prove this statement, this kind of artificial intelligence capable of solving complex real-world problems has not been invented yet. As the existing

algorithms are getting more efficient and new ones are going to be discovered the possibility of a scientific breakthrough is not entirely negligible.

There are already a great number of applications for AI in the military domain. Offensive and defensive weapon systems alike were developed in the last decades of the 20th century, most of them were semi-autonomous, which means that there is a human taking the final decision. Some of these systems are capable of autonomous action, but for safety reasons these functions are seldom used. While many experts and sci-fi authors envisioned the use of AI in various fighting machines, drones or robots, the AI clearly has potential as the main revolutionary factor in the history of military staffs.

There have been several AI-driven software in use by the United States Armed Forces, the most widely known are the DART and JADE systems. These enabled strategic and operational level logistic planning during the first and second Gulf Wars respectively. These early software were enormous help solving in just hours those problems which previously took days or even months for the human experts. The image-recognition and object-detection technology applying Project Maven is still in use and helped processing intelligence data in the fight against ISIS [8].

The aforementioned software solutions are the examples of what integration of current AI assets will be like: human operators supervising highly intelligent applications that can solve certain problems faster than any human being could. Applied as planning support or execution support tool AI will speed up the decision-making process of the military staff, and possibly change the staff manning requirements. Current AI solutions require specific hardware with special maintenance, the software need special inputs, and changing specific rules requires knowledge of programming. Taking these into consideration education of computer

sciences will surely play a greater part in staff officer education of the future.

The ultimate goal can be having a planning system, that is capable of devising plans all alone if all relevant data is available, but it seems to be far away still. It requires a general artificial intelligence, which can think as a human being, albeit creating AI that is mimicking the exact functionality of the human brain is not desirable. The decision-making process of the human mind is full of flaws, basing the decisions mainly on heuristics. A real artificial intelligence should be able to think more rationally – depending on the available information.

4. Conclusions

The evolution of military staffs is an ongoing process started several millennia ago. The staff is an everchanging entity that has been altered by the emerging new technologies such as the gunpowder or the communication breakthroughs. Even the notion of what can be considered a staff has changed throughout the history. Artificial intelligence will surely have its impact on the military staff. As the knowledge of writing and proper education became a must for a staff officer in the 18th century, certain level of computer knowledge will be required for the staff officer of the 21st century.

AI-driven applications reduce the time required for decision-making, generating a race for speed among competing national militaries.

More sophisticated AI may surpass the role of being merely a tool for human operator. By achieving a kind of consciousness future AI may receive a partner status in the staff, giving advices instead of just executing routine tasks, participating instead of obeying.

The emergence of AI nevertheless rises the questions of trust and morality. It morally raises the question whether it is ethical to use machine-originated solutions for killing non-machine enemies.

Regarding trust questions one may wonder to what extent a machine can be trusted in developing military solutions? Is our AI failsafe? Can we protect our AI from being penetrated by enemy agents or hackers? What if an altered AI provides solutions suitable for the enemy without being recognized?

These concerns are applicable for the other, non-staff related military AI assets, such as autonomous weapon systems or autonomous vehicle systems as well. The military staff of the very near future has to face these issues, and one can only wish that they will be able to find the correct solution.

References List

- [1] NATO. Allied Joint Doctrine for the Conduct of Operations, Brussels: NATO Standardization Office; 2019.
- [2] Shaw I. Egyptian Warfare and Weapons. Princes Risborough: Shire Publications; 1991.
- [3] Hittle JD. The Military Staff. 3rd edition. Harrisburg: The Stackpole Company; 1961.
- [4] Onasander. The General. In: Aeneas Tacticus, Asclepiodotus, Onasander, Cambridge: Harvard University Press; 1948. pp. 341-527.
- [5] Vegetius. Epitome of Military Science. Liverpool: Liverpool University Press; 2001.
- [6] Thiébault P. An Explanation of the Duties of the Several États-Majors in the French Army. West Chester: The Nafziger Collection; 2010.
- [7] Griesmyer DW. Artificial Intelligence: Algorithms, Operational Environments and Hyperbole [Internet]. US Army Command and General Staff College, 2018 [2021.03.22]. Available from: <https://apps.dtic.mil/sti/citations/AD1071083>
- [8] Morgan FE et al. Military Applications of Artificial Intelligence. Santa Monica: RAND Corporation; 2020.