THE PRACTICAL LIMITS OF DIGITALIZATION IN MILITARY AIR DEFENCE

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Abstract: Digitalization involves a collective technological progress and a transformation process. Digitalization in the military environment has acquired new perspectives.

The level of digitalization of different armies across Europe is not very well known but can be intuited. New current concepts such as AI - artificial intelligence, Internet of Things - IoT, blockchain, big data, Machine learning, augmented reality, virtual reality, extended reality, mixed reality, quantum computing, will be included in the existing military ones (e.g., C4I2SR). Even if the technological advance has increased in the military, the limits of digitalization are referring to the human factor.

Reaching the limits of digitalization in the sphere of air defense forces us to design a non-digital backup plan.

Keywords: digitalization, air defence, human factor

1. INTRODUCTION

Digitalization involves, on one hand, a collective technological progress and on the other hand a transformation process. Digitalization in the military environment has become again a concept of today especially after the outbreak of the war by the Russian Federation in Ukraine.

The current or recent critical situations: the war triggered by the Russian Federation in Ukraine, the COVID 19 pandemic, the semiconductor crisis or the energy crisis make it difficult for this process, which has a slow evolution anyway. In addition, the human factor who always opposes to change and with bounded rationality [3], imposes certain practical limits on this transformation.

2. DIGITALIZATION IN MILITARY AIR DEFENCE

It is not known exactly at what level of digitalization the armies of the EU Member States are located. On the one hand, because military information of any kind is protected by setting classification levels for them, on the other hand, the knowledge of this information by potential adversaries constitutes a vulnerability that can turn into a risk. It is known that digitalization entered the army through the financial (calculation of salaries), passed on to logistics (acquisitions) and reached information (intelligence) or training of troops (training and military education).

According to Eurostat data, as of 2021, in terms of basic or higher digital skills, the Netherlands (the Netherlands by 2020) is best situated with a percentage of almost 80%.

Of the states that are considered to have strong armies, France has 62%, Italy 46%, and Turkey only 30%. Romania ranks last, after Bulgaria (31%), with only 28% of the country's population having basic or higher digital skills.
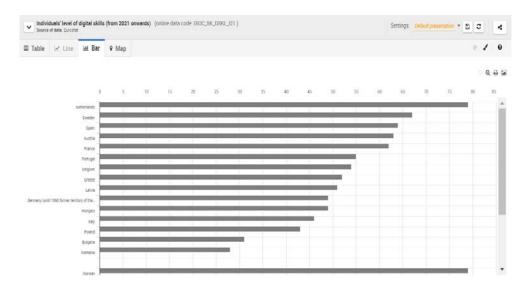

FIG. 1 Percentage of population with basic or higher digital skills in EU/non-EU Member States

The percentages are like a certain extent when we talk about the level of digitization at which the armies of the Member States of the European Union are situated.

New current concepts more common in the civil environment, such as AI - artificial intelligence, Internet of Things - IoT, blockchain, big data, Machine learning, augmented reality, virtual reality, extended reality, mixed reality, quantum computing, will have to be included in the existing military ones (e.g., C4I2SR - command, control, communications, computers, information and intelligence, surveillance, and reconnaissance).

We can already talk about big data in the military environment and its characteristics: increasing volume, variety, and speed of transmission, as well as increasingly precarious accuracy, make the decision-making process increasingly complex. The solution lies in obtaining "actionable" intelligence products by running specific algorithms, why not on "quantum computing" platforms.

In the field of air defense, there is a need for increasingly sophisticated equipment given that the development of the weapon-counter-weapon pair has reached unsuspected and even still fully unknown limits. Radiolocation has increasingly needed to display information in the most real time and if possible, an early warning. We need to protect our means of detection by "covering" with jamming and make our own means of electronic warfare invisible. Next, military pilots will be trained on ultra-modern sixth-generation aircraft. UAVs and UCAVs will gradually replace the model of classical air combat, a tendency which is already confirmed in the war in Ukraine, with the successful use of the well-known Turkish-made combat drones "Bayraktar TB2". In the field of air defense, in addition to modern, state-of-the-art missile systems, ballistic missile defense systems will also be used, and it is known that the current classical military confrontation zone will expand into outer space.

3. THE PRACTICAL LIMITS OF DIGITALIZATION IN MILITARY AIR DEFENCE

Even if the technological advance has reached an elevated level in the military environment, the limits can be seen at the human factor. If the operators of those advanced systems are not well trained or not at all trained, the state-of-the-art technology is no longer useful. A recent example concerns the capture by the Ukrainian army of a command point of the most modern Russian electronic warfare system "1RL257 Krasukha-4", abandoned near Kyiv most probably by untrained soldiers. That Electronic Warfare equipment is intended to neutralize satellites in low Earth orbit and AWACS aircraft, having a range of from 150 to 300 kilometers.

We can achieve higher levels of digitalization in the military, but this must be done together with training the operators of those new systems or devices. Also, if you train the operators before buying and operationalizing all amount of new equipment, they will have problems adapting to procedures, techniques, and tactics which they will be use soon.

Another vulnerability also comes from the human factor. And military personnel are increasingly using social media, according to the global trend. In addition, by activating location services using certain applications for the development of the level of physical training, sensitive information of a military nature is made available free of charge to anyone interested. The solution lies in the education and counter-intelligence training of the military in order not to generate for their own forces a disadvantage even of strategic level to the opponent.

4. CONCLUSIONS

The digitalization process in the field of air defence and, in general, in the military environment will have to continue at the fastest possible pace. This technological transformation should take place, as far as possible, before states outside the EU and NATO, and especially before the potential opponents of the two international organizations.

At European level, there is a need for better cooperation at the level of the Armed Forces of the Member States. In the field of data sharing, the rules for standardization and digital interoperability will have to be implemented and only after this will it be possible to speak of a common European and/or transatlantic data space in the field of defence. Europe's new vision of green and digital will also have to be applied in the military, even if excessive bureaucracy and aversion to the new are still elements that define the military environment. The current or recent critical situations: the war triggered by the Russian Federation in Ukraine, the COVID 19 pandemic, the semiconductor crisis, the energy crisis as well as the increasingly anticipated economic crisis only strengthen this conviction.

Obviously, additional funds will have to be allocated to continue the process of digitization of the armed forces, some of which can be recovered from the reduction of procurement costs, the costs of securing equipment and personnel in a functioning European military information space.

On the other hand, reaching the limits of digitalization in the sphere of air defense forces us to design a backup plan. Super digitized military infrastructure is a critical infrastructure and especially an HVT (high-value target) for potential adversaries. The return to the classic, outdated, non-digital means of action must be able to be done quickly in order not to be permanently removed from the fray. Next, military pilots will

have to know how to fly using only the aircraft on board and on the ground, the ground troops will continue to fight without the support of advanced technology. Even if we are equipped with modern air defense systems, the specialists of SBAD (surface-based air defense) must know how to continue to use classic non-digital systems. In radar, although it seems impossible to ever return to aerial surveillance strictly with visual or electron-optical means and this possibility will have to be considered.

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