BLOCKCHAIN – A TOOL IN DEFENSE MANAGEMENT RESOURCES

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Abstract:
    Blockchain technology is not an easy concept to understand. Neither was the internet at first. However, this cannot stand in our way of overlooking the implications and opportunities this technology can provide us. Digital technologies have transformed warfare. Today, warfighters use connected devices to coordinate air strikes on the battlefield. Drones are controlled from thousands of miles away. Commanders watch real-time video streams of the battle space. Logistics and the broader supply chain are regulated and managed by complex digital technologies.Blockchain technology will provide an advantage in intelligence, weapons life cycle, personnel management and information warfare. Blockchain technology has the potential to fundamentally alter our way of life and the way we conduct military operations, both operationally and logistically.

    Key words: blockchain, technology, warfare, logistics.

1.   Technological advancement - a must be in modern warfare

    The purpose of war is simple: victory. However, the means to achieve this goal are a bit more complicated. Victory requires strategic advantages such as attacking cities or destroying enemy troops and, consequently, defending one's own cities and retaining one's own troops. This requires technology and the keep of advancement of technology.

    Gunpowder was mistakenly invented by the Chinese as they tried to mix elixirs of immortality and became famous in history around 800 A.D. and later led to the end of the longest-lived empire in history. Due to the fortifications in its capital, Constantinople, the Byzantine Empire was invincible. The three layers of walls made Constantinople the most fortified fortress. No siege equipment in the world at that time could break through these walls. However, the Turks, led by Mohamed II, brought 8-meter cannons and, with the help of gunpowder, fired massive cannonballs at the walls, demolishing them. This marked the end of the Byzantine Empire and the medieval defensive style of fortified castles.

    August 1914 marked the end of a relatively peaceful century in Europe, marked by many scientific discoveries and industrialization.

    World War I reflect the tendency to apply the concepts of mass production in armaments and in technology in war in general, a process that began 50 years ago in the American Civil War.

    The First World War transformed the maneuver tactics specifics of the armed conflicts characteristic, for example, of the Napoleonic Wars into trench wars due to the use of new discoveries such as the machine gun, the airplane or the tank.

    This war was the first war of the new industrial society, which controlled mass production and used the advantages of standardized parts.

    During the Second World War, the importance of airstrikes became very clear. In order to force Japan to surrender without the need for a ground attack, the United States sought to develop deterrent technologies. Thus, the Enola Gay bomber dropped an atomic bomb, killing more than 100,000 civilians and injuring many thousands and leading to the capitulation of Japan.

GPS has transformed the world into a massive and easily navigable map. Between 1989 and 1994, the US Department of Defense developed the American version of the Navstar GPS system. GPS has evolved into the ultimate navigational tool. When the soldier with the GPS receiver comes into contact with enemy troops, he can send the GPS coordinates to his companions. The ability to locate the hidden enemy changed the face of the war once more. The Gulf War best exemplified this shift, as it gave Iraqis the advantage of fighting on their own ground in the desert, being annihilated by GPS, and Americans being able to move freely, even at night or during sandstorms. Furthermore, they were always aware of the enemy's precise location and positioning.

The twentieth century was a revolutionary century for military history, in which the art of war was completely changed several times. The First World War opened the era of industrial warfare, the second of total war, and the Cold War of proxy wars, or delegation wars, and the 21st century can be described as the century of hybrid or non-linear warfare.

Some theorists use the term hybrid warfare to describe non-state groups acquisition of advanced technologies (whether engaged in guerrilla warfare or terrorism). These technologies, which were originally designed for state forces, were able to provide non-state actors with increased firepower as well as freedom of maneuver: portable anti-tank and anti-aircraft missiles, and night-vision binoculars.

By the end of the twentieth century, the great military powers (USA, USSR / Russia, France, Great Britain, etc.) enjoyed an undeniable technological superiority over the other countries or non-state groups they faced.

The lack of major relative conflicts in recent decades has meant that not all new military systems have been tested in real terms. Thus, the real effectiveness of the systems used by NATO, Russia and China is unknown. Although the Patriot and S-400 air defense systems are considered to be the most modern defense systems, many experts question this reputation.

There is a real possibility that these systems will not be at all effective in the event of a major conflict: the Patriot system was used only in the war with Iraq, and the results were not at all up to the test results. Russia's S-300 and S-400 systems used in Syria have also been ineffective against Israeli airstrikes.

The Nagorno-Karabakh conflict has brought some news that could become a feature of future armed conflicts. Among them is the use of new technologies: drones. Azerbaijan has heavily used Turkish and Israeli drones against Armenia, and their effectiveness has been remarkable.

The wars of the future will take place not only on the battlefield, but also in the areas of trade, finance, energy and information. However, the military aspect of the conflicts will remain predominant, which will also undergo important changes.

Although the end result of a war is not based only on technology, and none of these weapons are infallible, technology certainly increases the chances of victory on the battlefield.

2. The wars of innovation in a new era of geopolitical competitiveness

The biggest competitors in innovation, waging a hidden war through this fight for new technologies, are the U.S.A. and China.

If during the Cold War, the United States was a leader in technology in recent years through massive investments in robotics, artificial intelligence and microelectronics, China has made impressive efforts to take the lead.

If Washington has tended to look at all these efforts in military terms, Beijing is playing a more sophisticated game in which it uses technological innovations to achieve its goals without resorting to war.

A real issue for the U.S.A. is that it lacks a vision of the technologies that matter in this highly competitive environment and how to facilitate their development - and the private sector alone cannot meet the country's security needs. The U.S.A. must understand that a broader range of technologies is required, including those with direct military applications (supersonic aircraft, quantum computing, and artificial intelligence) as well as those traditionally developed in civilian research.

In the first decades of the Cold War, the U.S.A. invested billions of dollars in scientific infrastructure. In 1946, the Atomic Energy Commission was set up to coordinate war laboratories that produced the first nuclear weapons. The Department of Defense was founded in 1947, and the National Science Foundation in 1950. After Russia launched the Sputnik satellite in 1957, the U.S.A. created NASA and a technology research center of the future that would become the Agency for Advanced Research Projects. In 1964, 17% of the federal budget was spent on research and development. The goal was to create a technological foundation defined by conventional and nuclear defense capabilities. This is how supersonic planes, nuclear submarines and guided missiles were built. The private sector capitalizes on intellectual property by transforming capabilities into products and products further into companies. This is how G.P.S. technologies, lithium batteries, touch screens, voice recognition came about.

While the U.S.A. government has invested less and less in both state and private research, the Chinese market has taken the lead in the world, prompting the U.S.A. to think about overseas customers.

Civil technologies were becoming increasingly important to national security, but it was the private sector, not the government, that was developing them at a rapid pace. China has evolved over the last two decades from a country that relied on intellectual theft and imitation to a geopolitical adversary capable of innovation. This was due to his long-term thinking. China's investment in technology has increased from less than 5% in 2000 to 23% in 2020.

China's rise has been made possible by its strategy of merging the military and civilian sectors - a coordinated effort of cooperation between the defense industry and the private sector. The state provides support through grants, data, government-guaranteed loans or training programs.

Washington has monitored China's technological progress through military glasses. S.U.A. has been concerned about technological advances and has monitored them to the extent that they contribute to defense capabilities. But China's challenge for technological supremacy is not just about the benefits on the battlefield - the target has a broader horizon, which is to change the battlefield itself.

Chinese companies have woven a global network of applications through which they collect private information about users - payment history, searches and location. China is thus gathering valuable data about foreign nationals so that it knows how to attract a Westerner who is indebted to spy on Beijing.

China's huge appetite for data extends to the most intimate information in the world - namely DNA. In a pandemic, genetic sequencing company BGI - set up as a government-funded research group - has set up field with 50 coronavirus testing labs worldwide. However, biotechnology can become a tool for biological weapons that could target ethnic groups. And different countries will accept different degrees of risk and have different ethical positions on acceptable genetic manipulation.

Undoubtedly, commercial technologies such as 5G, AI, quantum computing and biotechnology have military applications, only China wants to achieve the vision of a competitive world in which no bullets are needed.

The economy is constantly evolving, new technologies, new ideas, new discoveries appear.

Until now, the military sector has been the source of many improvements that are used today in real life: gps, lithium batteries. Maybe it's time for the military to use something born of the civilian sector.

One such unique technology developed by the civil sector is blockchain technology.

3. Blockchain – a tool in defense management resources?

Blockchain is one of the most significant inventions in the field of technology in recent decades. It is often confused with the cryptocurrency Bitcoin, but the benefits of blockchain technology can be found in many industries and unrelated to virtual currencies. Blockchain is technology, and cryptocurrencies are the first application created based on that technology. A similar confusion existed in the 1990s between the Internet and e-mail.

A blockchain is essentially a digital ledger of transactions that is duplicated and distributed across the entire network of computer systems. In other words, it is a method of storing data that makes it difficult or impossible to change, hack, or cheat the system.

Blockchain technology has gained popularity in recent years, not only for the innovation it represents, but also for its broad applicability. The blockchain has an impact on every sector it touches, from supply chain to human resources. Scenarios for using technology can be identified in any industry, and asking where we can use blockchain is similar to asking where we can use computers in 1990.

A blockchain means organizing and storing information according to a predefined logic. Instead of the data being accounted for and stored in a central server database, it is encrypted and a copy is stored on each node connected to the network. This disruptive technology is recognized as a possible revolution in the way the Internet works and opens up endless possibilities. Blockchain is based on distributed databases that are shared among equals.

The key word when it comes to blockchain is trust. Blockchain is a technology that divides power from a single entity to many entities, thus ensuring a high level of trust, because any decision related to transactions, changes, must be agreed by several entities. A single entity cannot have much influence.

Blockchain technology makes data private, permanent and verifiable. The recording of data and transactions is public, but encryption protects them from prying eyes and alteration. Regardless of the benefits of using blockchain technology, it is often associated exclusively with cryptocurrencies.

The non-modifiable aspect of blockchain makes it a candidate to store the absolute truth that cannot be disputed. Additionally, the distributed nature of blockchain allows all participants of blockchain to have equal control on the system without any single party control.

The Blockchain technology has been recognized as a technological innovation that is projected to be even more powerful than the Internet. This concept has significant potential for complex logistics applications in commercial, public and military environments.

Blockchain technology will undoubtedly alter the way we live and work. It has the potential to give us more control over our healthcare and well-being, to provide greater insight into the origins and quality of the food and products we eat and buy, to execute financial transactions faster while remaining more transparent and private, and to conduct business with greater efficiency and less risk.

Although there was some skepticism about blockchain technology's potential, it is now dissipating. It is used by financial institutions to improve the efficiency of their back-office systems. However, there are numerous other applications for blockchain technology.

3.1. Blockchain adoption in the civil sector

Blockchain technology has the potential to change countless industries: logistics, supply chain, identity, financial management, deployment, track and trace, banking (i.e., through currency

trading and meeting Know Your Customer (KYC)/ Anti-Money Laundering (AML) requirements), additive manufacturing, and many others. The technology has proven itself disruptive to counterterrorism, cyber-intrusion, defense, intelligence, and global monetary policy, in addition to currency valuation and manipulation.

In terms of the business environment, more and more companies are turning to blockchain-based solutions to streamline internal processes and operations. However, the regulations are different in each state, and when it comes to cryptocurrencies, some states have banned them altogether, others have accepted them with open arms. Strict regulations are only on this area of cryptocurrencies, not on the blockchain technology that underlies them. These strict regulations are due to the negative publicity given to cryptocurrencies, namely, overnight enrichment, fraud. States such as Algeria and Indonesia have drastically banned cryptocurrencies, while El Salvador has become the first country to officially adopt Bitcoin as a legal means of payment. In the European Union, cryptocurrencies are largely unregulated, while Switzerland is in an almost complete state of regulation.

Blockchain technology started to be used in the public sector for the first time in 2012, in Estonia. The European Commission started funding blockchain projects for the first time in 2013. The EU argues that blockchain can impact the foundations of large parts of the EU economy.

In Romania, there is an interest in this evolution, but with a dose of reluctance. From the perspective of the local market, technology has aroused interest in a multitude of areas, the banking sector being the most active, followed by the public sector in areas where the benefits of use are obvious: Ministry of Finance - tracking tax documents, National Health Insurance House - Health Card, Romanian Auto Registry - supervision of vehicle maintenance activities.

Blockchain startups use this open-source technology to register ownership of land, combat digital piracy of content, authenticate and register the origin of works of art, register voters, securely store files, and digitally record identification and verification, and these are just a few examples.

Blockchain is implemented in almost all areas of activity: cryptocurrencies, supply chain and logistics, intellectual property management, food safety, health data management, fundraising and investments with Security chip offerings.

3.2.   Blockchain adoption in the military sector

3.2.1. Players in the adoption and use of the blockchain

The use of technology in the digital age in the field of defense and security plays a role in supporting national defense and security. Military institutions, for example, have positioned information technology as a weapon that enhances the organization's power and unity. Consistent with the characteristics of military organizations, which always require speed and accuracy of information before making a decision, the program is strongly supported by the use of digital technology. The impact of information technology on military strategy has been significant. Every day, countries compete to adopt blockchain capabilities in the military because it provides a competitive advantage over the opponent and is viewed as a sign of military superiority.

High-tech startups and financial institutions are not the only players in the field of blockchain, the defense ministries of countries such as the U.S.A., Russia, China and even N.A.T.O. have shown great interest in blockchain technology in recent years and are beginning to study how to take advantage of this new technology and the goal is to increase military power.

According to the US Department of Defense, blockchain will likely change the way the military and special operations forces operate. Therfore many countries have launched initiatives to implement blockchain technology in military applications and all are major actors: Russia, China, the U.S.A., but also the EU, France, Japan, South Korea, Thailand and Israel.

The N.A.T.O. also intends to use blockchain-based solutions in the military. However, NATO intends to use blockchain more broadly in military logistics, procurement, and finance.

The Russian Federation is attempting to "blockchain" its military communications in order to make them nearly impossible to intercept or hack.

The South Korean arms procurement department aspires to make military administration more transparent and fairer.

Also, UK, Australia, and other countries have also seriously begun to explore the use of blockchain for defense.

3.2.2. Blockchain – a tool in defense management resources.?

To understand the range of blockchain technologies for tactical support challenges, the military should closely examine the potential of blockchain solutions to the challenges associated with transit visibility, data integrity, additive manufacturing, reporting, operational contracting, and logistic estimation.

The blockchain would be especially useful in defense. Because of its decentralized nature, this technology has several advantages. First, the blockchain's distributed structure ensures its availability. It also reduces the cost of this technology. Second, its strength, security, and immutability make it ideal for data storage and a valuable asset in many military applications. This is why, in the aerospace and defense industries, blockchain is regarded as one of the top emerging technologies that should be promoted in order to boost the industry's growth and efficiency.

In terms of logistics, military logistics and supply chains currently bring together hundreds of military and private sector actors. Because of collaborations with developers, start-ups, and industry players, this environment is becoming increasingly complex. As a result, with so many participants, friction points are unavoidable. This results in unnecessary costs, inaccuracies, or failure points. However, blockchain technology has the potential to address these issues. It has several advantages in military logistics, including faster delivery speed, traceability, security, and low costs. One of the most significant applications of blockchain in supply chains is to make them more transparent, secure, and efficient. To begin with, identity verification is critical in the defense sector when critical weapons and systems are at stake. The traceability of defense industry parts and materials is also critical. Blockchain technology can assist in determining the origin of weapons from production to delivery while also preventing counterfeiting. The blockchain's date-marked nature allows users to easily track previous transactions. Finally, defense companies could combine blockchain technology with other technologies such as artificial intelligence, quantum computing, and extended reality to stimulate data exchange and analysis.

There are currently no methods for determining whether intentionally modified components were introduced into fighting technique somewhere along the supply chain. A smart contract, a blockchain feature, can detect and expose system weapon changes before they cause harm, and it can immediately create a blacklist of malicious or negligent subcontractors. It is far easier to defeat weapon systems on the assembly line than it is on the battlefield. Adoption of smart contract technology in military supply chains could be the first small step toward securing the defense industry from supply chain attacks.

Integrating blockchain technology into every stage of the manufacturing process, including design, prototyping, testing, and production, would ensure a secure supply chain. As a result, the blockchain may be able to provide the Army with the solution it requires to secure the entire digital wire for the supply or manufacturing chain. The goods could be scanned at each stage, providing logistics teams with a map of product routes. Instead, the private key used by a supply chain partner will allow you to identify that partner using blockchain. Sensitive information, such as the type of goods, origin, and destination, may be encrypted and only visible to authorized participants. Some businesses have already chosen blockchain for this purpose. If a component fails, the blockchain

allows for the discovery of its chain entry and path. Furthermore, as defense systems increasingly rely on commercially available components for their software systems, there is growing concern that these components may contain deliberate vulnerabilities that an adversary could exploit at any time. The blockchain could be the answer, establishing the provenance of every processor, circuit board, and software component from "cradle to cockpit."

Blockchain technologies not only allow for greater visibility into the supply chain, but can also improve food safety and health care on the battlefield. Tracking the food supply chain can prevent food-related outbreaks and help address the significant issue of traceability of critical goods like pharmaceuticals. Military personnel must also know at each planning level what resources are available, in transit or available upon request. In other words, what is needed is an almost real-time overview of the material, goods, and equipment. Financial losses and waste are a problem both in the defense industry and during operations.

Another area in which blockchain can be used is likely to be biometric identification where multiple security protocols work together to generate a unique identifier that can be indexed on a blockchain There will be no data stored on the chain, but it will allow the user to prove they are who they claim to be.

Regarding human resource management, blockchain can be used by the candidates and they can give recruiters access to all of their previous positions and work experience, as well as their qualifications, accreditations, on-the-job training, and schooling, and they can be confident that everything has been thoroughly reviewed and confirmed. Blockchains may also make the jobs of recruiters easier by allowing them to create a candidate profile based on employee records, allowing for a better cultural fit and preventing data from being erased. The blockchain tehnology can be used to make reward points and achievements valuable in the real world and improve employee performance. When an employee learns a new subject, completes a new task, or completes a curriculum, that information may be recorded as a transaction in the blockchain. Employers can also use blockchain to keep track of their employees' qualifications and certifications. This method will be more efficient than using paper or scanning each employee's statistics. Employers can also use blockchain to determine when an employee's qualification will expire. In such cases, the employer can create an automated procedure that regularly evaluates all employees' credentials.

Blockchain technology can provide armies with advantages such as: prevention against cyberattacks of other nations or terrorist groups, defense of critical weapon systems, automated systems management, validation of orders and information on the battlefield or supply chain management and logistics. Even many experts believe that its use will be more powerful if combined with artificial intelligence. Some studies indicate that more than 80% of the companies that work in the defense industry plan to integrate this technology into their different processes.

The blockchain capabilities in logistics may have become a key factor for the military. In the field of logistics and procurement, the blockchain can be used to control and register the goods and services used in by military, while in the field of finance, it can be used to verify and register all financial transactions, and thus improve the efficiency of the organization.

Blockchain technology can make purchasing data more transparent and auditable. Technology can also help combat individual breakdowns in digital infrastructure. For example, using a blockchain application known as smart contracts in satellite control systems would make it harder for them to be disrupted by a malicious actor.

Innovation is driven by the potential to solve existing problems in new ways. The development of blockchain technology provides increased data confidence and data availability that can help shape future logistics and military planning. Sharing data via a blockchain can increase confidence in detailed accounts, improve seamless communication, reduce data variation, and mitigate frictional points when the transfer of information needs to be timely and possible.

Blockchain technologies can support the challenges of food safety and health care on the battlefield, build health data sharing platforms for increased security and efficiency, track the food supply chain to better prevent outbreaks of food and to improve the monitoring of critical and temperature sensitive issues.

As the value and risk of tactical data management increase, the military should consider implementing blockchain in information technology support architectures and modernizing information technology enterprises.

In a secure environment, the blockchain has the potential for military application at every level of planning and in all classes of supply.

At the tactical level, leaders can have more confidence in knowing what resources are available, in transit, or available upon request. Smart contracts could provide supply staff with near real-time visibility into materials, parts, supplies, and equipment, as well as more accurate ordering. Having more confidence in pre-positioned materials, capability moves and conditions improves the visibility of the operational planning needed for success. Material traceability can be improved and it can shape the battlefield for successful conditions. Further details would be available on goods in transit for delivery schedules and warehousing planning. Distribution points may also increase the visibility of the batch or parts that could be obtained immediately for high priority items.

Strategically, there may be greater fidelity in communications network infrastructure, budgetary forecasting, and tracking of allocated resources to align with operational plans.

4. Conclusion

Blockchain technology is not an easy concept to understand. Neither was the internet at first. However, this cannot stand in our way of overlooking the implications and opportunities this technology can provide us.

Digital technologies have transformed warfare. Today, warfighters use connected devices to coordinate air strikes on the battlefield. Drones are controlled from thousands of miles away. Commanders watch real-time video streams of the battle space. Logistics and the broader supply chain are regulated and managed by complex digital technologies.

Blockchain technology will provide an advantage in intelligence, weapons life cycle, personnel management and information warfare.

Blockchain technology has the potential to fundamentally alter our way of life and the way we conduct military operations, both operationally and logistically. Because of its decentralized and transparent nature, it has the potential to improve military officials' decisions while also improving military deployment outcomes. Blockchain technology development provides increased data confidence and data availability, which can help shape future military logistics and planning. As we have seen, many countries plan to use it for secure databases, logistics, and 3D printing.

So, is blockchain in the military an evolution or a revolution? An evolution would simply change the way current military instruments are used, while a revolution would dramatically change the instruments themselves. At present, the evidence suggests an evolution, but not yet a change in the scale of the revolution in military affairs. Blockchain will make communications more secure and facilitate military logistics. From now on, the blockchain will strengthen and make the armed forces more efficient. In the long run, the blockchain in the military will be a revolution if it is well implemented and there are many more military applications, in addition to the fact that it is used wisely and at affordable costs. Slowly but surely, the blockchain is becoming a game changer for the security and effectiveness of current military instruments, especially if the major military players begin to implement it on a large scale.

To witness a revolution, the blockchain will have to be implemented in most - if not all - defense sectors. To achieve this, and to understand the range of blockchain technologies for tactical

support challenges, the military should closely examine the potential of blockchain solutions to the challenges associated with in-transit visibility, data integrity, additive manufacturing, large 3D printing, reporting, operational contracting and logistical estimation, among others.

The real impact of this developing technology will be revealed in the future. Blockchain technology has already had a significant impact on economies and industries around the world, and it remains to be seen how, if, and how much this new technology will influence the military system.

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