

# TECHNOLOGICAL INNOVATION AND FUTURE CHALLENGES IN STATE SECURITY

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## **Abstract**

Technology encompasses the practical application of scientific knowledge to meet human needs and enhance various aspects of life. It involves the creation and utilization of technical tools across disciplines like engineering, industrial arts, and applied and pure sciences. Innovation, on the other hand, refers to the development of new products, ideas, or methods. It involves incorporating novel steps and approaches to introduce these innovations into the market or public sphere. Technological development involves the creation, advancement, and widespread adoption of new technologies or processes. Thomas Edison, a renowned inventor, played a significant role in promoting technological development through his numerous patents and establishment of the world's first industrial research laboratory. The use of automation and technological advancements has simplified physical tasks but has also increased the complexity of mental and cognitive abilities required by industrial operators. Presenting technological developments through visual formats can aid in better understanding. Throughout history, technological advancements have influenced warfare and international security, with recent developments like nuclear technology and unmanned vehicles impacting deterrence and reducing casualties. The accelerating pace of technological change poses challenges and opportunities for state security, requiring analysis and potential solutions to address security implications and emerging risks.

**Keywords:** Technology, Innovation, Technological Development, State Security, Future of State Security, New Technological Innovation, Command Control and Communication

## **Introduction**

Technology can be defined as the practical application of scientific knowledge to address human needs and improve various aspects of life. According to Collins dictionary, 'technology is the field of knowledge concerned with creating and utilizing technical tools, and how they relate to society, life, and the environment. It draws on various disciplines such as engineering, industrial arts, applied science, and pure science.'<sup>1</sup>Technology can refer to a collection of methods and practices, which includes the development of machinery and techniques that become increasingly complex over time, in terms of their structure, procedures, and operations.'<sup>2</sup> On the other hand, innovation is more than a buzzword or exhortation. "Innovation refers to the creation or development of a new product, idea, or method for doing something.'<sup>3</sup>"

Innovation can be defined as the process of adding extra steps or incorporating new methods for developing and introducing new products or services into the marketplace or public sphere. Technological development encompasses the creation, advancement, and widespread adoption of new technologies or processes, including invention, innovation, and diffusion. A technological innovation refers to a novel or enhanced product or process that has distinctly different technological features.

American great inventor and scientist Thomas Edison, singly or jointly, held a world record of 1093 patents. 'He also created the world's first industrial research laboratory. Edison pushed for technological development. Technological development encompasses all aspects of the creation and improvement of inventions and innovations. The process of development involves transforming an idea or concept into a tangible and practical product that can be used'<sup>4</sup>Automation and technological advancements have simplified the physical tasks of industrial operators but have simultaneously made their jobs more challenging and intricate in terms of mental and cognitive abilities. It is important to keep in mind that presenting experimental or theoretical results in an image format instead of as numerical results can make technological developments easier to comprehend quickly.'<sup>5</sup>

Throughout history, the development of new technology has played a crucial role in warfare and international security. This trend continues today, with nuclear technology leading to the concept of deterrence through mutually assured destruction. Recent advancements in technology, such as unmanned vehicles and precise weapons, have minimized casualties and collateral damage, reducing the risk of shifts in public opinion. These advancements emphasize the importance of accurate detection, surveillance, and

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intelligence. However, the pace of technological change is accelerating, and this article aims to analyze how this transformation will impact state security in the present and future, including the security challenges that come with technological innovation and potential solutions.

### **Technology**

However, technology may refer either to simple tools like a glass or a hammer, or to more complex machines, automations and mechanisms, like a car, train, aircraft, submarine, smart phone, space satellites or nuclear reactor. It may define as the continually developing result of accumulated knowledge and application in all techniques, skills, methods, and processes used in industrial production and scientific research. The most primitive and uncomplicated form of technology involves the acquisition of knowledge that leads to the utilization of fundamental tools for a specific objective. "Throughout history, technological advancements have brought about significant changes in society. The earliest known technologies include stone tools and the control of fire, both of which emerged during prehistoric times and contributed to the growth of the human brain and development of language during the Ice Age. Later, the invention of the wheel during the Bronze Age enabled greater travel and the creation of more complex machinery. In more recent times, technologies such as the printing press, telephone, and internet have lowered barriers to communication and brought about the knowledge economy."<sup>6</sup> As we know that, technology contributes to economic progress and improves human prosperity. Again, it can also have negative impacts like pollution or resource diminution, or may cause social problems like technological unemployment due to automation or extensive use of Artificial Intelligence (AI) or more Internet of Things (IoT). As a result, there are ongoing idealistic and political debates about the role and use of technology.

Technological advancements have brought about various benefits to human society, such as higher living standards, enhanced comfort, industrial growth, and advancements in medicine. However, they also have the potential to disturb established social structures, cause pollution to the environment, and result in harm to certain individuals or communities. Computer technology is also a type of machine. Advancements in computer science have impacted almost every aspect of human life in some way. The way people live has been altered by computer and communication technology. "In the past, education was primarily delivered in a traditional classroom setting, where an instructor would teach in person. Nowadays, it is possible to finish courses and earn degrees through remote online learning without ever having to attend a physical school. Additionally, non-degree education, such as continuing education, exam preparation, and professional training, has become more readily available through new technologies for e-Learning and m-Learning."<sup>7</sup> Again, Technology is creating new opportunities and responsibilities for society and civilization. The opportunities include increased productivity and progress, while the responsibilities include ensuring that no worker or family is negatively affected by progress.<sup>8</sup>

### **Innovation**

Innovation involves putting ideas into practice to create new or improved goods or services. However, the term innovation generally pertains to something novel, like an invention, or the act of creating and introducing new things. In the field of technology, an innovation is typically a new product, but it can also involve a fresh approach to doing something or even a different perspective. Innovation lies at the heart of providing enhanced prospects for individuals to improve and enhance their lives by gaining access to the internet.<sup>9</sup> Today innovation is a necessity for any organization to sustain in competitive world. It is essential for organizations to empower their employees and cultivate a culture of upskilling, which involves fostering employee capabilities and employability by promoting the knowledge, skills, and attitude required to enhance job performance.<sup>10</sup> Quick adaption to lead change, constructive feedback, open communication to encourage innovation and sustainable growth of organization are the competitive tools in modern corporate culture. 67<sup>th</sup> Session of the UN Commission on the Status of Women on 08 Mar 2023, declared that, 'the use of innovation and technological advancements in education can play a crucial role in achieving gender equality and empowering women and girls in the digital age.' Innovators are often seen as unconventional, groundbreaking individuals who challenge the norm. Encouraging learning and innovation is closely linked, and teaching employees new methods to carry out their responsibilities can foster innovation.

### **Technological Development**

Technical Development may be define as invention, discovery, composition, creation, enhancement, technology, advancement, process, device, article, machine, material, software, system or any other information, including any development protectable by patent, copyright, or other protection under the law.<sup>11</sup> Technological development refers to the creation and advancement of new technologies, including processes, as well as their introduction to the market for commercial use or as open source software through research and development. The continual improvement of technologies and the diffusion of technologies throughout industry or society is a

continuous process. Technological development involves improving and creating new technologies. Technological innovation, on the other hand, is a process in which an organization recognizes the significance of technology as a means of innovation to gain a competitive advantage in the market. The focus is sometimes solely on developing technology for technology's sake, but in most cases, successful products and services are not based on a single unique technology. Rather, it is the combination, integration, and interaction of various technologies that make them successful. Furthermore, many of the technological innovations throughout history have been the result of chance.

### State Security

American sociologist, political scientist, and historian Charles Tilly said that, “war made the state, and the state made war”<sup>12</sup>. Is this statement relevant presently and will it be applicable in the future? The significant investments in defense technology during peacetime have had a considerable influence on the nature of warfare, leading to the emergence of new strategic forms. This is evident in the development of technologies, such as the smartphone, that have been derived from defense research by the USA. The example of the smartphone is a clear illustration of how technology and warfare have shaped the state and the world we live in today. Actually state security is the security for the people, property, and information crucial to the State. “Both state security and human security may be the objectives of national policy and regional cooperation. As in theory, national security creates favorable environment that is conducive to the pursuit of human security. National security refers to the measures taken by nation states to protect their sovereignty and interests against internal and external threats. It provides a stable environment for countries to pursue their long-term development goals without being hindered by conflicts or unexpected events. This helps countries to allocate their resources to more productive sectors instead of spending a significant portion on military equipment and defense. National development presents possibilities to enhance the living conditions of people and their lives. By balancing the pursuit of state and human security, a favorable environment can be created where both can reinforce and advance each other.”<sup>13</sup>

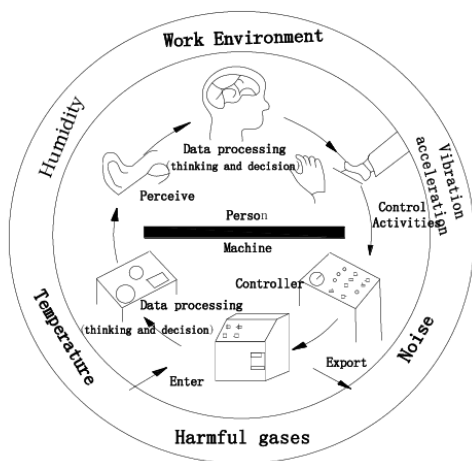


Fig 1: Man, environment and machine relation<sup>14</sup>

British political scientist Barry Buzan said in his book, “According to the US and other major powers, nuclear deterrence is dependent on the expected capabilities of weapons and is therefore affected by technological advancements. This means that the government must invest in defense research to keep the deterrent credible and responsive to technological changes.”<sup>15</sup> American jurist, statesman, and revolutionary leader Samuel Huntington in his book ‘The soldier and the State’ has described how the United States could manage an immense military establishment in a time of peace without jeopardizing the sanctity of its democracy. The fourth Industrial Revolution builds on the digital revolution, which began in the 1960s, but differs from it in that it entails ‘a much more omnipresent and mobile internet, smaller and more powerful sensors that have become cheaper, powerful artificial intelligence (AI) and machine learning.’<sup>16</sup>

### Future of State Security

The Fourth Industrial Revolution (4IR) has the potential to revolutionize industries and the world as a whole. Thus, technological innovation has been and will continue to be a critical factor influencing international security.<sup>17</sup> Additionally, climate change will have significant impacts on water and food supplies, as well as increase the risk of resource scarcity and migration, which could lead to international conflict. Climate change and resource scarcity will play a significant role in geopolitics and shape the international security landscape in the near future. The United Nations has projected that the world's population will reach 8.5 billion by 2030 and 11.2 billion by 2100, with the highest number of youth in history in less developed countries, while developed countries face an aging population.<sup>18</sup> Demographic shifts, including youth and aging populations, migration, and global demographics, are among the top drivers of international security.

The current governance framework has been questioned due to the handling of the refugee crises and the challenges faced by today's world. According to the surveyed leaders, this poses threats to international stability. Asymmetric and hybrid threats are also significant factors in today's international security landscape. However, the past should not necessarily define the future. By identifying the driving forces behind international security and understanding the associated risks, leaders can take action to avoid or mitigate their impact. Given the rapidly changing global security landscape, innovation in response strategies and collaborative platforms are critical tools for preparing and improving outcomes.<sup>19</sup> The interplay between technology, security, geo-strategy, socio-economic factors, and other forces is intricate and complicated. Figure 2 below illustrates the various forces that are shaping the international security landscape.

### **New Technological Innovation will Change the World**

China's investment in research and development has seen a significant increase of 20% per year since 1999, resulting in an annual expenditure of US\$233 billion, which accounts for 20% of the world's research and development spending. In the year 2017, China held a 48% share in Artificial Intelligence (AI) venture funding, and the government in Beijing aims to become the global innovation center for AI by 2030. According to a report by Price Waterhouse Cooper, 38% of jobs in the United States are at high risk of being automated by the early 2030s, primarily routine jobs like those of forklift drivers, factory workers, and retail cashiers.<sup>20</sup> The Bank of England has estimated that the UK may lose up to 15 million jobs due to the increasing use of advanced robots, which will lead to a widening of the gap between the rich and the poor. The jobs that are at the highest risk are those that are low-paid and require low levels of skill, which happen to be the same jobs that have helped the UK and the US to attain record levels of employment since the financial crisis in 2008.<sup>21</sup> So far, those in the higher socioeconomic classes with managerial and professional roles have been able to shield themselves from the negative impacts of automation. The Wall Street Journal has stated that machines are capable of simulating empathy by tracking biological signals like blood pressure during interactions between artificial intelligence systems and human beings.<sup>22</sup>

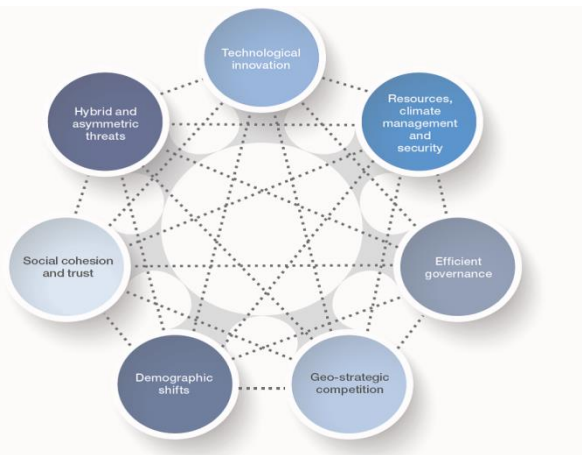


Fig 2: Forces and their relation which are shaping the international security landscape<sup>23</sup>

Researchers in California are exploring the use of AI and machine technology to solve the severe labor shortages in the fruit-picking industry. This involves creating machines that can identify which fruits are ripe for harvesting and do so without causing any harm to

the produce during the picking, processing, or distribution phases. Professor Harari's prediction for humans in the workplace is miserable. The 21<sup>st</sup> century may bring about the emergence of a large not-working class who have no economic, political, or artistic significance and make no contribution to the success, influence, or prestige of society.<sup>24</sup> The widespread implementation of AI could result in the elimination of numerous jobs throughout various economic classes. This could result in a significant increase in unemployment, potentially causing instability and violence. Additionally, the number of jobs created by computers would not be enough to compensate for the jobs lost.

What are the political and strategy implications of this profound economic change in terms of war and the state? According to Professor Wolf, "The state's ability to cope with the challenges ahead may be influenced by three factors: the speed and intensity of the transformation that is expected to occur, whether the problem is a temporary one or likely to persist, and whether the state has sufficient resources to alleviate the most negative consequences of these changes".<sup>25</sup> The environmental crisis and AI revolution are progressing quickly and are expected to remain a significant aspect of the economy, politics, and security concerns. In light of these changes, what will the nature of warfare look like in the future?

Unrestricted Warfare highlights the fact that technologies with potential weapon applications are becoming more integrated into our daily lives. Unrestricted warfare is neither a revolution in military thought nor an executable doctrine for future warfare, but a collection of tactics, techniques, and procedures; that have been used throughout history and will continue to be used by future adversaries.<sup>26</sup> Terrorism is academically understood as the quest of non-state actors to cause fear beyond the immediate victims of their action to reach political goals. Anthony Richards defines terrorism as "Terrorism is the act of using violence or the threat of violence to create a psychological effect that extends beyond the immediate victims or target of the attack, for a political purpose."<sup>27</sup> The impact of the 9/11 terrorist attacks has led to a significant transformation of unrestricted warfare. It raises questions about how both state and non-state actors have utilized common technologies to challenge the authority of powerful nation-states.

The power of media weapons, such as social media, may surpass that of atomic bombs. In the future, it may be possible to create weapons using 3D printers, but this would require access to expensive computer-aided design software and a high-quality metal 3D printer that costs over US\$100,000. The line between civilian and military technologies has become increasingly blurred, with control and surveillance technologies being used for both purposes. The development of defense strategies and technological innovations will have a dynamic relationship that will be crucial in shaping the future. However, the use of plastic 3D printers to create guns has proven to be unreliable and dangerous, with a risk of explosion.

### **Command Control and Communication**

Effective communication systems are critical to military operations and the backbone of military communication is the Command and Control (C2) system. Over time, the definition of C2 has expanded to encompass all necessary aspects of communication in modern warfare. Today, C2 systems are referred to as C4ISR, which includes seven components: command, control, communications, computers (or C4), intelligence, surveillance, and reconnaissance (or ISR). However, with the growing threat of cyber security risks, a new component has been added to C4ISR - Cyber defense. This new addition makes it C5ISR. To ensure the success of C5ISR, there needs to be a proven and trusted partner supporting the Department of Defense at every level of this complex process. Integration services for sensors, radars, combat, and intelligence systems are essential, particularly for Sensor to Shooter (S2S) capabilities in highly contested environments.<sup>28</sup>



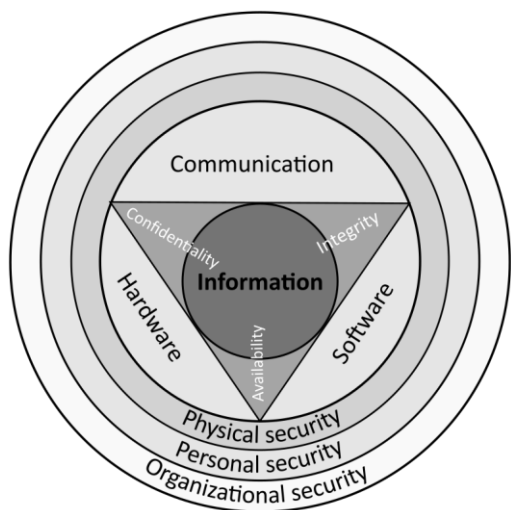


Fig 3: Information Security Circle<sup>29</sup>

It is essential to ensure that every member of the military, across all platforms and domains, has the necessary intelligence, situational awareness, and combat-ready systems to carry out various missions effectively, independently and in coordination with others. This management must occur from the top down. “At the same time we should organized, trained, and equipped of personnel and system for every instance at any level of conflict at the Command unit or on the superiority.”<sup>30</sup>Future War Scenario will be very complex issue, which need to handle with intellectual, wisdom and patient. Imagination of a three dimensional battle-field image and web of connectivity has been given in figure 4 below. In future both tactical and strategic commander need to be capable to understand and some extend may be expert in designing, integrating and testing critical communications infrastructure and managing Network Operations Centers (NOC) supporting communications missions; otherwise whole operation of the battle will be jeopardize.



Figure 4: Imagination of a three dimensional battle-field and web of connectivity<sup>31</sup>

### **Advance Technologies Changing the International Security landscape**

The fast evolution of technology is leading to rapid progress and acceleration in the rate of change. However, it's not just emerging technologies that are evolving; the COVID 19 outbreak has caused significant changes as well. As a result, engineers and IT professionals are recognizing that their role will need to adapt to the contactless world that will emerge tomorrow. In 2023, ‘artificial intelligence (AI) is expected to become more widespread due to advancements in natural language processing and machine learning. This will enable AI to better comprehend human language and perform more intricate tasks. The emergence of 5G is predicted to revolutionize our lifestyles and work practices. Therefore, it is crucial to stay updated with the latest technology trends and emerging technologies.’<sup>32</sup> To ensure job security in the future, we need to be aware of emerging technology trends and learn the necessary skills

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to stay competitive. Some of the significant technology trends on the horizon include Computing Power, Smarter Devices, Datafication, Artificial Intelligence and Machine Learning, Extended Reality, Digital Trust, 3D Printing, Genomics, New Energy Solutions, Robotic Process Automation, Edge Computing, Quantum Computing, Virtual Reality and Augmented Reality, Blockchain, Internet of Things (IoT), 5G, Cyber Security, Micro-LED technology, and K technology. By keeping up with these trends, we can prepare for the future and develop the skills necessary to succeed in the job market.

Governments, particularly military forces, have historically been the driving force behind technology trends, research, and development. For instance, the original meaning of the term engineer referred to military members who built war engines and developed strategies to breach enemy fortresses. World War II production needs led to the development of modern project and quality management techniques. The internet's origins can be traced back to the US DoD's Advanced Research Projects Agency (DARPA) ARPANET program, and GPS positioning came from the US military's NAVSTAR satellite navigation system.<sup>33</sup> While much technological advancement has also come from the private sector, government contracts have often given them a significant boost. Examples include AT&T Bell Labs' development of the transistor and integrated circuits, IBM and other companies' mainframe systems for business data processing, Digital Equipment Corporation and Data General's minicomputers, Intel's microprocessors, and Digital Research, Microsoft, and Apple's microcomputer operating systems. Although the government may not always keep up, it is frequently ahead in automation, offering opportunities to contribute to new innovations.<sup>34</sup> The international security landscape is being transformed by several advanced technologies including but not limited to Drones, Super and hyper-sonic speed, More Stealthy weapons, Artificial Intelligence (AI), Autonomous weapons, Additive manufacturing, Wearable devices, Renewable energy, Nanotechnology, Biological weapons, Bio-chemical weapons, and Cybersecurity.



Figure 5: Interfacing between human brain, sensor, machine and armament<sup>35</sup>

### **Emerging Technologies Transforming International Security**

The history of technological development is rich and diverse, with its origins in warfare and its evolution into peacetime applications, such as advancements in aviation that were spurred by World War I. It is challenging to anticipate which technologies will have the most significant military impact, as innovations initially developed for military purposes can have unexpected civilian benefits, and seemingly benign technologies can be weaponized. There is always the risk of a technological arms race emerging from an exceptional innovation. Therefore, world leaders must recognize and regulate technologies with ethical guidelines to prevent their misuse as weapons or their appropriation by malicious actors. Enhanced understanding, improved management, readiness, and collective leadership can benefit everyone. In the past, world leaders used nuclear technology wisely to establish deterrence through mutually assured destruction. Newer technological advancements, such as unmanned vehicles, precision mortars, and missiles, have helped minimize casualties and collateral damage, reducing the chances of adverse public opinion. However, this has put a greater emphasis on accurate intelligence.<sup>36</sup> There are few technologies that are changing the international security landscape:

- a. **Drones.** Drones are flying robots and their use is becoming increasingly common as the technology becomes more affordable. The USA is currently the leader in drone technology with over twelve thousand drones, but other countries, including Iran, Turkey, and North Korea, is also advancing in this area. Even narcotics gangs are using off-the-shelf quad-copter drones for spying and eliminating rivals.<sup>37</sup> There have been instances of civilians shooting down drones flown over their property.

**b. Autonomous weapons.** Autonomous weapons are the result of combining drone technology with artificial intelligence (AI). These weapons can select and engage targets without human involvement, which has been called the third revolution in warfare after gunpowder and nuclear weapons. We are still far from the humanoid-looking robots depicted in Hollywood films. Current technology is advanced enough for armed quad-copters to use facial recognition software to identify targets from a database and open fire. However, there are risks associated with automated weapons such as malfunction and the potential for hacking.

**c. Wearable devices.** Wearable devices are already allowing humans to carry heavy loads without difficulty, and can also be used for spying. There have been cases where individuals have used 3D printing to create shoes with hidden compartments for gathering information. These individuals have used their seductive looks to gain access to organizations and escape traditional detection mechanisms.

**d. Additive manufacturing.** Additive manufacturing, or 3D printing, is already being used by both the USA and Chinese defense forces in war games. It could revolutionize supply chains by enabling replacement parts to be manufactured in the field from digitally transmitted designs and locally available materials.<sup>38</sup> Modern militaries are even looking into printing food and prosthetics for injured soldiers. However, there are still issues to be addressed such as intellectual property, quality control, and liability. The technology could also lead to the proliferation of certain types of weapon systems and the development of new kinds of warheads. Overall, the production of military means and weapons is undergoing a revolutionary change.

**e. Renewable energy.** The ability to generate power locally could bring about significant changes to supply chains, just as the ability to print parts locally. The military is already at the forefront of developing solar technologies, such as dye-sensitized light-harvesting materials that can capture light energy outside the visible spectrum. Additionally, the use of nanomaterials embedded in clothing could potentially turn them into a source of energy. The development of renewable, portable, and instant energy sources could revolutionize future warfare.

**f. Nanotechnology.** Scientists can now manipulate particles at the nano-scale and are rapidly developing met materials that have unique properties. Although some potential applications still remain in the realm of science fiction, such as self-replicating and self-assembling technology, advances promise to make weaponry lighter, smarter, more precise, and agile. However, challenges remain, such as the significant amount of power required for nano-electronics and the difficulty in monitoring the proliferation of nano-weapons.

**g. Biological weapons.** With the rapid advancements in biotechnology, genetics, and genomics, new and highly lethal avenues for creating biological weapons are opening up. Advanced nations are already capable of altering cells and creating deadly viruses, airborne designer viruses, engineered superbugs, genetically modified plagues, and other lethal microorganisms.<sup>39</sup> The global norms against biological weapons are coming under pressure and questions as the capacity to create lethal biological weapons becomes more widespread.

**h. Bio-chemical weapons.** Although the Chemical Weapons Convention prohibits any use of chemicals, including non-lethal chemicals, in warfare, modern technological advances are making it increasingly difficult to regulate such weapons. Unmanned vehicles offer new and effective ways of delivering chemical agents on the battlefield. Advances in neurobiology and pharmaceuticals offer increasing possibilities to alter behavioral patterns and emotions, including cocktails of chemical drugs that may change neurological signals to create a warrior behavior.

**i. Brain reading robots.** Researchers at the Swiss Federal Institute of Technology Lausanne (EPFL) have developed a practical medical application that is both interesting and promising. By using a machine-learning algorithm, a robot arm, and a brain-computer interface, they have created a way for tetraplegic patients, who cannot move their upper or lower body, to interact with the world. In experiments, the robot arm performed simple tasks such as moving around an obstacle. The algorithm interpreted signals from the brain using an EEG cap and automatically detected when the arm made a move that the brain deemed incorrect, such as moving too close to the obstacle or going too fast. Over time, the algorithm can adapt to the individual's preferences and brain signals.<sup>40</sup> In the future this could lead to wheelchairs controlled by the brain or assistance machines for tetraplegic patients.

**j. Artificial neurons on silicon chips.** Currently, scientists have made a breakthrough in creating artificial neurons that mimic the electrical properties of neurons in the human nervous system. This was achieved by attaching artificial neurons onto silicon chips and studying their electrical properties. This new technology requires only 140 nano-watts of power, which is a billionth of what is needed to power a microprocessor. This low power requirement makes it an attractive option for medical implants, such as those used to treat heart failure and Alzheimer's disease.<sup>41</sup> Professor Alain Nogaret of the University of Bath in the UK called the work paradigm-changing as it provides a robust method to reproduce the electrical properties of real neurons in great detail.<sup>42</sup>



k. **Sand batteries.** It is often believed that technologies that can improve our future are complex, but some can be simple yet highly effective. A team of Finnish engineers has developed a technology that can turn sand into a massive battery. They placed 100 tons of sand into a steel container measuring 4 by 7 meters and heated it up using solar and wind energy. The heat generated can be used to warm nearby buildings through a local energy company. This technology is based on resistive heating, where a material is heated by electrical currents' friction. Sand and other non-super conductors can be warmed through this process, generating heat that can be stored and used as energy for extended periods.<sup>43</sup> So, sand battery may be use as low cost, instant and available energy source in future.

The Identification of Friend or Foe (IFF) technology has the potential to override current systems of oversight, dialogue, diplomacy, and control, interfering with one's ability to make well-informed and politically wise decisions. The rapid advancement of these technologies may destabilize fragile power balances, permanently altering the international security landscape, creating discrepancies between nations or causing confusion and disorder. The fear of what both allies and adversaries are developing and willing to use can devastate current systems of oversight, dialogue, diplomacy, and control, hampering one's ability to make sound decisions. Nowadays, there seems to be a new technology every day that could revolutionize the future, with emerging technologies changing the way we live, take care of our health, and help us avoid a climate crisis.<sup>44</sup> Two revolutionary images of emerging technologies which will change the way we live have been shown in figure 6 below.



Figure 6: Two revolutionary images of emerging technologies coming in future<sup>45</sup>

### **Cyber Security and Future Challenges**

Technology is amplifying transformations, including in the international security space, where we now have security risks that never existed before, like holes in software code and designer, viruses, automated and smart weapons and sensors, and the displacement of human labour by artificial intelligence, drones, under water vehicles, etc. Although cyber security has been around for a while, it is constantly evolving like other technologies due to the continuously emerging threats. The malicious hackers attempting to gain unauthorized access to data will not stop anytime soon and will always try to find ways to bypass even the most stringent security measures. Additionally, new technologies are being utilized to strengthen security. Therefore, cyber security will remain a trending technology as long as we have hackers, as it will continuously progress to safeguard against these malicious threats.

The reality of a cyber-arms race has emerged as states and individuals have taken their conflicts into the realm of cyberspace. As the number of devices connected to the internet reaches billions, the potential for vulnerabilities in cyber architecture to impact individuals, organizations, and systems is growing exponentially. Governments must either identify these vulnerabilities in advance, anticipating their potential use as part of an offensive capability or use them as instruments of deterrence. Hybrid threats, which can be executed through cyberspace, organized crime, or terrorist groups, are plentiful in today's interconnected world. Emerging technologies are evolving at a rapid pace, which challenges our capacity to understand and respond effectively. National policymakers may be disconnected from the industry and research centers where much innovation is occurring.

In order to address the new threats facing society, intelligence services require effective tools that can also address concerns regarding privacy. A decision must be made regarding whether it is worth enforcing a monopoly on control of encryption in order to ensure safety at all costs, or whether it is more realistic to accept the reality that strong encryption is easily accessible to anyone. As the global economy involves the cross-border flow of data, mass surveillance infrastructure is being established at an alarming rate due to rapid technological advancements. While it is easy to conduct pattern analysis for criminal activity, it raises certain ethical concerns. It is necessary to create

new agreements and regulations for how companies and governments collect and share information about their customers or citizens in order to ensure safety and security.

In the past, events in one place did not affect other places much. However, due to the 4IR, small groups or individuals can now cause significant destruction, thanks to new technologies and social media in a more interconnected world. Jean-Marie Guéhenno, CEO of the International Crisis Group, believes that today, an incident that occurs in one part of the world can have an immediate global impact.<sup>46</sup>In the present time, social media provides smaller groups or individuals with the means and motivation to launch violent attacks against more dominant adversaries. This issue requires a comprehensive response from states and armed forces that involves cooperative leadership. When considering the safety of global travel and mobility, the possibility of a cyber-attack<sup>47</sup> that targets aircraft controls, port management, support systems, or passenger screening processes is a significant concern that could have lasting consequences for the industry.

Currently, international security is impacting and being impacted by more sectors than ever before, as seen in the ongoing Russian war on Ukraine, affecting everything from infrastructure and information and communication technology (ICT) to economic services and the energy sector. The changing nature of Chinese growth is also expected to alter geopolitical priorities, creating new challenges for the global community. From a business perspective, international security is mostly viewed as a matter of tactical risk management rather than strategic collaboration. The energy sector is facing security risks such as sanctions, terrorism, and cyber-attacks, underscoring the need for decentralizing energy delivery and investing in renewable energy. Additionally, lower oil and gas prices are not only affecting energy markets, but also impacting the geo-economic balance of power, and vice versa.

### **Technology, Human Stress, and Way-out**

The negative effects of technology, such as stress and anxiety, are often overlooked despite its ubiquitous presence in our lives. Mobile phones, for instance, are now essential and used for various purposes like checking emails, shopping, social media, among others. The convenience that technology offers comes with a price. It has been observed that people have become overly dependent on their phones and exhibit symptoms similar to addiction when separated from them. The feelings of stress and anxiety caused by separation from phones are comparable to withdrawal symptoms experienced by addicts.<sup>48</sup> Additional research indicates that excessive use of smartphones and other multimedia technologies may have physical effects on our brains, altering their structure and function. This has been depicted humorously in a cartoon which portrays a child of the future with an oversized head, seemingly due to the impact of technology.

Currently, technology is becoming more immersive and requires more of our attention, which poses a risk of disrupting our overall well-being and balance. Technology has become the first thing we interact with in the morning and the last thing we engage with at night. This trend is being linked to a decline in mental health due to our "always-on" lifestyles. As a response to this issue, tech leaders are developing technology to improve our mental health and combat these negative effects.<sup>49</sup> Scientists have studied meditation and they found that regular meditation can decrease stress, increase inner peace and improve human relationships. 'Our desire for certainty and truth often creates a divide between ourselves and others, as our beliefs become a defining factor. Conversely, our desire for love and connection pulls us towards others, leading us to question our beliefs and consider different perspectives. Thus, we are left with a choice between holding onto our beliefs and distancing ourselves from others or opening ourselves up to love and connection by challenging our beliefs.'<sup>50</sup> Almighty Allah create human with moral values and ability to judge and decide between good and bad; whereas animal doesn't have those quality. We need to surrender to Creator Allah for inner peace of our soul. Allah say in holly Quran "Say, Nothing will happen to us except what Allah has dictated for us: He is our Protector: and in Allah let the believers put their trust."(Quran, 9:51). "With Him (Allah) are the keys of the unseen, the treasures that none knows but He. He knows whatever there is on the earth and in the sea. Not a leaf falls but with His knowledge: there is not a grain in the darkness (or depths) of the earth, nor anything fresh or dry (green or withered), but is (inscribed) in a record clear." (Quran, 6:59). "It is Allah Who causes the seed-grain and the date-stone to split and sprout. He causes the living to issue from the dead, and He is the one to cause the dead to issue from the living. That is Allah: then how are you deluded away from the truth?" (Quran, 6:95).

Our creator Allah has reminded us "See you the seed that you sow in the ground? Is it you that cause it to grow, or are We the Cause?" (Quran, 56:63-64). "See you the water which you drink? Do ye bring it down (in rain) from the cloud or do We?" (Quran, 20 56:68-69). Death is the final truth, which we all are waiting for! Allah declare that, 'The death from which you flee will surely meet you, then you will be sent back to (Allah), the All-Knower of the unseen and the seen, and He will tell you the things that you did.' (Quran, 62:8). So, what is our job? Allah say, "Time (the most important). Verily man is in loss. Except those; who have faith and do righteous deeds, and recommend one another to truth, and recommend one another to patience." (Quran, 103:1-3). "Call on Me (Allah); I will answer your prayer: but those who are too arrogant to serve Me will surely find themselves in Hell - in humiliation!" (Quran, 40:60). Calling on Allah

is both a prayer and also a great blessing. This very simple act of making a request is the key to attaining all physical and spiritual objectives. This is the only way to get inner peace and real happiness of human being.

The believers are responsible for merely maintaining their devotion to Allah and being good servants of Him. When this is the case, they will have nothing to fear. "O you who believe! Guard your own souls: If you follow (right) guidance, no hurt can come to you from those who stray; to Allah is your return, it is He that will show you the truth of all that you do." (Quran, 5:105) Unbelievers can never do harm to the righteous. All plans and plots made against the believers will be useless. This mystery is explained by Allah as "Mighty indeed were the plots which they made, but their plots were (well) within the sight of Allah, even though they were such as to shake the hills!" (Quran, 14:46). Allah say, "Those who reject Allah, hinder (men) from the Path of Allah, and resist the Messenger, after Guidance has been clearly shown to them, will not harm Allah in the least but He will make their deeds of no effect." (Quran, 47:32). On the other hand, Allah declare "...never give up hope of Allah's Soothing Mercy: truly, no one despairs of Allah's Soothing Mercy, except those who have no faith." (Quran, 12:87).



Fig 7: Human stress due to technology is a dangerous concern<sup>51</sup>

## **Conclusion**

Advanced, new and future technologies are and will rapidly transforming the world including the security landscape. Human factors like unpredictability and untrustworthiness have become a weak point in Cyber security. It will probably get more as we become more immersed in digital and quantum interconnectivity related with complicated and uncertain cyber-attack surface.<sup>52</sup> Again, advance, new and emerging technologies will be the sole drivers and factors as those will affect the future cyber threat landscape. So, their impact should not be underestimated or overlooked. Again, the versatile and uncertain nature of the future technology landscape, the complex trends and subsequent result, will need adoptability, flexibility and forward-looking responses; along with creative, innovative and constructive approaches. There will no single solution which can enable to respond to the wide array of advances occurring in the technology landscape; as well as to effectively manage the new dimension of threats in the future cyber domain. Allstate needs to prepare her to face future challenges, rising in the cyber threat landscape. All state needs to consider how best to adapt its national culture, civilian and military structures, organizations, agencies, resources to identify and take up innovation in the cyber domain in near future. All state needs to check, adjust, find solution; and set strategy and formulate planning by keeping few specific question in mind and focus on issues<sup>53</sup> like: whether current procurement processes and entire system are fit for the purpose to face the future challenges? Whether state is in a position to contribute to the progress and explanation of legal and regulatory standards for the use of advance and new technologies? Whether there is availability of adequate facility, testing, assurance, repair and maintenance mechanisms for the state of the use of new and up-and-coming technologies?

We know that, technological change is always based on both better and more technology. Again, without technology humanity has no future though we need to be more careful as we don't like to become so mechanized that we lose our human feelings, happiness and success. Every nation need to practice and develop modern defense management system, formulate sustainable strategy, implement purpose and capability-based planning, trained personnel with academic education and standard skill. Technological re-armament of the Armed Forces and the defense system is essential to develop formidable and useful Defense Forces. We need to apply the lessons learned from operations and the results from defense research activities. We need to share the structures, programs and projects for better understanding and harmony among the military and para-military forces. Again, we need to implement those within the allies and



partners states together. We need to develop and integrate the procedure, system, and resource jointly. We need to set vision, formulate strategy, implement planning and invest material, human, and intellectual resources judiciously and timely. We should keep on updating the concepts and doctrines for the development of whole system and force structure. Finally, we should give enough emphasis to maintain balance of employment between military and civilian defense components in the states to achieve optimum result.

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