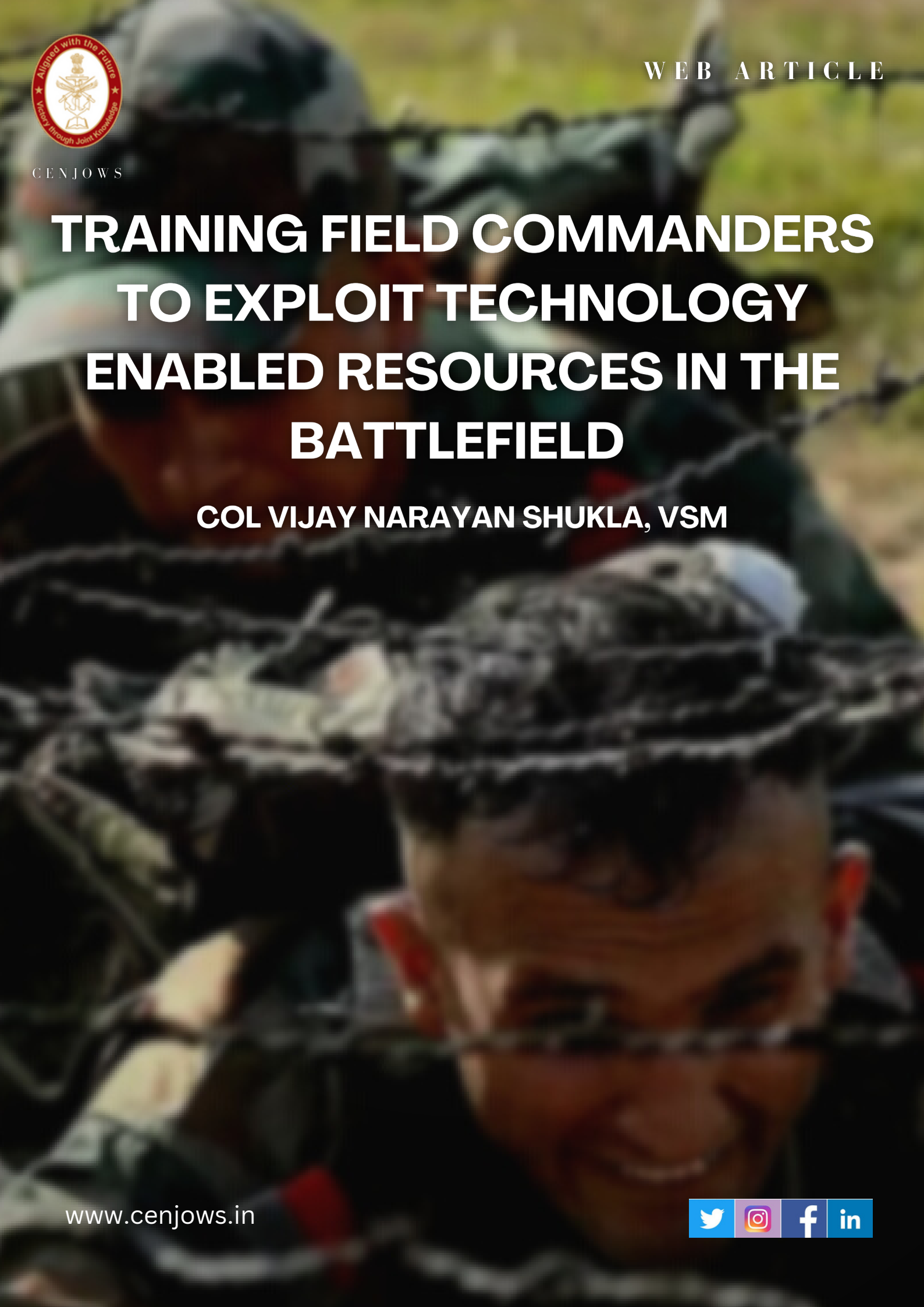

WEB ARTICLE

CENJOWS

TRAINING FIELD COMMANDERS TO EXPLOIT TECHNOLOGY ENABLED RESOURCES IN THE BATTLEFIELD

COL VIJAY NARAYAN SHUKLA, VSM

www.cenjows.in

CENTRE FOR JOINT WARFARE STUDIES

CENJOWS

TRAINING FIELD COMMANDERS TO EXPLOIT TECHNOLOGY ENABLED RESOURCES IN THE BATTLEFIELD

Col Vijay Narayan Shukla, VSM is a Senior Research Fellow with CENJOWS, New Delhi.

Introduction

Technology and warfare have an ancient relationship. Military technology has always shaped and defined how wars were fought. The speed of technological changes has mostly left soldiers lagging behind. Technology presents huge military opportunities and its related challenges in the sphere of warfare. Regular introduction of military technology is changing the nature of threats and is a key catalyst for change in doctrines and capabilities of the armed forces. India today is a global leader in information and communication technology and in other cutting edge domains such as space, which is required to be exploited by our armed forces to our advantage. As the technology plays an important role in the improvement of military operational and training processes and their outcomes, identification of existing and potential technologies and their early development is essential and induction into service is imperative and therefore the relationship between technology and operational training at all levels becomes bi-directional. It

is therefore essential that training on evolving technological developments having military significance be dovetailed in the training curriculum at various levels in the Indian Army to integrate and exploit technologically enabled resources in the battlefield.

Evolution of Technology and its Usage in the Two World Wars and the Cold War

The First World War saw a breadth and scale of technological innovation of unprecedented impact, driven by military needs/influences. It was the first modern mechanized industrial war in which material resources and manufacturing capability were as consequential as the skill of the troops on the battlefield. Heavy artillery, machine guns, tanks, motorized transport vehicles, high explosives, chemical weapons, airplanes, field radios and telephones, aerial reconnaissance cameras and rapidly advancing medical technology and science were just a few of the areas that reshaped twentieth century warfare.[1]

The major scientific and technological advances made during the Second World War include the atomic bomb, microwaves, space exploration, advances in medicine, cavity magnetron, radar technology. During the Cold War between the United States and the USSR, the nuclear technology, space technology, computers and penicillin were the major technological developments, which changed aspects of life in almost every way.[2]

Use of Emerging Technology in 2022 Russia Ukraine War

In recent times, technology has assumed altogether new and disruptive dimension. Russia Ukraine War is being seen as a test case for the wars of the future. The warfare is experiencing incremental and focused technological changes. Technology is being tweaked to enable greater access to and sharing of information, sensor based technologies are appearing in a variety of settings and operational data is being collected and used to train Artificial Intelligence systems.[3] In the past 12 months war in Ukraine, use of emerging technologies like hypersonics, drones, loitering munitions, electronic warfare, cyber weapons and disinformation have been witnessed.[4]

Battlefield Environment in Our Northern Command Theatre

Our Northern Command Theatre comprises of different types of battlefields, over varied terrain, where the Indian Army is constantly involved in conflict management against Chinese threats along the Line of Actual Control opposite Union Territory of Ladakh, with Pakistan along the AGPL in Siachin Glacier, Line of Control opposite Kargil, Dras, Kupwara, Baramula, Poonch, Rajouri, International Border opposite Jammu, Samba and Kathua and in the Counter Terrorist Operations in the various parts of the Union Territory of Jammu and Kashmir. Use of evolving military technology by China and Pakistan, at times in congruence and equipping of terrorists with latest technology by Pakistan, makes the battlefield environment more dynamic and operationally challenging. India's desire and future actions to reclaim its territory in possession of China and Pakistan may determine the contours of the future wars and its related operational challenges in the Northern Command Theatre. The innovative use of technology in operational training, planning and execution for the existing and future challenges in the Northern Command Theatre may assist in achieving the desired operational goals.

Current Training Methodology and Professional Military Education System of Field Commanders

Our field commanders have the most decisive roles to play in the existing conflict scenario and future conflicts/wars, in the Northern Command Theatre. They are essentially the tactical level commanders, to include Brigade/Sector Commanders, Battalion and Company Commanders, Platoon Commanders and their counterparts/equivalents in various arms and services of Indian Army and other services operationally deployed/engaged in these conflicts. The current training system of officers includes exposure in their arm/service specific courses and all arms command and staff courses at various Category A institutions. In case of Junior Commissioned Officers, these opportunities exist at the platoon level training courses, mostly in their arm/service. Most of these courses are designed to meet their terminal objectives and rarely include training and education on evolving military technology.

The Professional Military Education System exists in the Army for the eligible officers in the form of one to two year study leave, which may be availed as Normal Study Leave, Research Fellowship, Domain Specialisation and Empowerment Scheme. Presently, there is no provision for institutionalised Professional Military Education System by way of study leave for the Junior Commissioned Officers and Other Ranks in the Army.

Focus on Technology in National Education Policy 2020

As this essay is on proposed changes in training methodology (including Professional Military Education) of Field Commanders to empower them to integrate and exploit technology, it is essential that focus on technology in education in the National Education Policy 2020 be also examined. The National Education Policy 2020 has defined use of technology as an important area of focus. National Educational Alliance for Technology (NEAT) is planned to be created as an autonomous body to provide a platform for use of technology to enhance learning, assessment, planning and administration, with an aim to provide on a single portal various educational technology solutions that are tested for their robustness for improving the learning experience. Among many other roles, NEAT is aimed to envision strategic thrust areas in this domain and articulate new directions for research and innovation. In order to pay attention to emerging disruptive technologies - Artificial Intelligence, the National Research Foundation is proposed to initiate or expand research efforts in the technology, including fundamental research in the domain, development of the technology (including possible mega-projects) and assessment of its socio economic impact.[5] Therefore, while planning to train on evolving military technological subjects, use of latest technology in training is extremely essential and the existing and evolving national framework for these need to be exploited optimally.

Why Train Field Commanders on Evolving Technological Subjects

Given the explosive pace of technological development allied with the sheer creativity of tech-savvy users, it is certain that technology will impact the battlefield

in multiple ways, only some of which can be foreseen at the present time. Use of emerging technologies in ways that could reduce or transfer the cognitive load from humans to machines can lead to freeing up the human mind for higher levels of conceptual and creative thinking, thus enabling superior decision making. With evolution in military technology, our commanders will need to quickly manage remote information and keep control of high performance automated systems, integrating a certain form of autonomy including lethal autonomous weapon systems.

Today computers have largely surpassed humans in leveraging factual and procedural knowledge. Our trainings at all levels sometimes burdens trainees with such knowledge at the expense of developing their higher order competencies. If our training system does not adapt to these rapid and disruptive changes, it would place us at a perilous disadvantage in an increasingly competitive environment[6,7].

The battlefield environment has become fast paced, transparent and lethal necessitating our commanders to be adaptive to new challenges. As technologies create new opportunities in military decisionmaking processes, it is essential for the commanders to understand how emerging technologies will develop over time and what will they mean from an operational and organisational perspective in the new age warfare. Commanders need to enlarge their horizon to include the technological domain for exploiting it as an enabler. They need to be capable of exploiting technology and weapons across various domains to conduct effective multi domain operations. Understanding technology is also necessary for equipping the existing force, developing the future force and initiating required changes in our operational concepts and tactical practices and procedures. Technology Empowered Leadership in Army will have the potential to develop capability of our men to exploit existing technology and rapidly connect to emerging and newly inducted technology and weapons to help plan and execute effective operations. Our commanders also need to understand tri-services niche technologies and envision their use along with the structural changes required. It is therefore extremely essential that military training methodology and Professional Military Education of Field Commanders be suitably modified to empower them to integrate and exploit technology in the battlefield.

Emerging Technology which may Enable Physical and Virtual Resources in the Battlefield and Proposed Changes in Training Methodology on these for Field Commanders

Some of the technological takeaways from current Russia Ukraine war alongwith our experience in field in Northern Command Theatre should determine our identification of emerging technologies, which may enable physical and virtual resources in the battlefield. While doing this, we must keep in mind that battlefield and weapons in the future might not be as futuristic as we would like to imagine.

New technologies include Communication Technology (monitoring and the constant sharing of data), Robotisation of the Battlefield, Evolutions in Smartphone, Drones, Artificial Intelligence, Data Management Process**,** Remote Information Acquisition, Interconnected Deployed Systems, Information Processing, Autonomy of Technological Systems and other forms of software and hardware, which will not just change the scope of resources available in the battlefield, but provide innovative ways and means to integrate these in our military activities. Therefore, there is a need to include training on these evolving technological subjects in the various courses of the Indian Army at various training echelons to include Higher Command Course/Higher Defence Management Course, Senior Command Course, Junior Command Course, Company Commander level tradecraft specific courses of various arms and services, Young Officer's Courses, Platoon Commander's Course/Havildar to Naib Subedar Promotion Cadres as well as various Pre-Induction Training Programmes at Corps Battle Schools in Northern Command Theatre. Such training on technological evolutions is essential to allow decision makers of today and tomorrow to reduce fog of war. What and how field commanders need to learn for all use and integration of technology to improve multiple aspects of operational activities will require extensive research. However, such training needs to be supported and adopted, provided these interventions are rigorously and transparently evaluated in relevant contexts before they are scaled up. These aspects are further elaborated in succeeding paragraphs.

Training for Era of Transparent Warfare. The availability of open source information and intelligence is leading to an era of transparent warfare, which to

some extent reduces the conventional focus on Signal Intelligence, especially Communication Intelligence which involves interception of communications. There is a growing recognition that new technologies are making it difficult to avoid detection and monitoring by a wide array of individuals, states and groups. In future warfare, skilled individuals from any location in the world could join the battlefields virtually and support militaries on ground as online volunteers and may intercept communications of military units of adversaries and provide that information to the own military. This has recently been witnessed, where Ukrainian volunteers from across the world assisted their military by monitoring Russian military activities.[8] Therefore, our field commanders need to be exposed to the challenges posed by advances in communication technology, involving monitoring and the constant sharing of data, at every level of their training. Subsequently, these commanders need to ensure optimal training of own forces at battalion and company levels at regular intervals in counter communication technology and intelligence, to deny such information to the inimical elements working for the adversary. There is also the need to identify elements, who may provide us such information (which is reliable), when required and if possible train them and train with them at the level of selected officers.

Training for Robotisation of Battlefield. Robotisation of battlefield began at the start of the 21st century in Iraq and Afghanistan wars. It is unavoidable and Robots will gradually be introduced into the battlefield, as the use of unmanned robots (Unmanned Aerial Vehicles, Unmanned Surface Vehicles, Unmanned Underwater Vehicles and Unmanned Ground Vehicles) offers many advantages to the troops on ground. It avoids exposing own combatants and extends the area of perception and action of a military unit. In a sense, they are the “five deported senses” of the fighter, ie, his eyes (camera), his ears (reception), his mouth (transmission), his touch (actuator arm) and even his sense of smell and taste (detection of CBRN products). As tools placed at the disposal of the combatant, robots will allow him to control the battlefield by deporting effectors or sensors allowing a control of various dimensions and spaces of the battlefield and even electromagnetically. These will thus progressively shield the combatant in the contact zone, in order to move him away from the dangerous area and reduce the risks, or allow him to dive in with the maximum means at his disposal, thus significantly reducing the vulnerability of the combatants. The ability to act

remotely while preserving the lives of his men will allow the commanders to act and deploy his forces for manoeuvre. Robotic systems will thus become new tactical pawns that the commanders may use to prepare his action, to facilitate his progress, allowing him new effects on the enemy, the terrain, the occupation of space and on the rhythm of the action. Especially since these machines will eventually be more efficient, more precise and faster for specific tasks than a human being can be. This is currently evident in industrial manufacturing and assembly plants.[9] Presently, there is hardly any emphasis in Indian Army on understanding the relevance of robotics in the battlefield, due to lack of institutional emphasis. We need to pick up robotics success stories from foreign militaries as also own industrial manufacturing and assembly plants and encourage Professional Military Education in Robotics in Institutes of Eminence in India and abroad to innovate usage of such technology in Indian military context to achieve practical employment of robotics in day to day operational military functioning in the field. A time bound road map for such endeaveous is needed, with defining terminal objectives to be achieved at the end of every calendar year. It will be a good idea to provide an exposure to officers of all arms and services in such technology in foreign militaries and own industries, who could thereafter become the trainers at various military training echelons, to impart the essential exposure and training on numerous aspects of militarisation of robotics in the context of Indian military needs, especially in Northern Command Theatre.

Training for Era of Smartphone Warfare. The future wars will see soldiers on the ground, contributing to the narrative of the fighting under way via social media. Other footage may be captured by commercial satellites and drones. Providing up-to-the-minute footage is one way for militaries to counter disinformation. Military use of both Smartphones and commercial drones illustrates the dual use nature of technological development: technology developed for civilian use is then used in warfare. The combatants in Ukraine have extensively used smart phone and also employed commercial drones in reconnaissance.[10] Therefore, exposure to our commanders in advances in commercial Smartphone technologies, which may shape what shows up on the battlefield is extremely essential.

Training on Military Usage of Drones. The use of remote technologies and dual-

use technologies, such as drones is essential in any conflict to address asymmetry. Drones have numerous military uses from observation, reconnaissance, transportation, early warning and so on. Further, commercial drones become weapons when explosives are strapped on them. 'Drones and loitering munitions are critical in modern military arsenals and are taking on a new importance in current conflicts. Electronic counter measures against both commercial and military drones will likely keep pace with such developments. Ukraine has very effectively used these "homemade kamikaze drones" against Russian forces. In fact, Ukraine has also put out a general request for the donation of commercial drones (dubbed "dronations") and crowd funded for the purchase of military drones.'[11] Induction of drones in Indian Army has been initiated, mostly as part of Security Related Equipment and requisite training on these is being attempted. However, operationally, training on usage of drones is very essential for local forces that are then deployed and deploying small special operations teams. Our commanders therefore need to be regularly exposed to the advances in such remote and dual age technologies and continue to innovate their possible military use.

Preparations and Training for Era of Artificial Intelligence in Warfare. Automated management of routine, repetitive and time consuming procedures is emerging. In a headquarters, for example, reports management and automatic production of summaries adapted to the level of command would immediately make the chain of command more fluid. Artificial Intelligence could take the form of a dashboard to stimulate the reflection of the commander and his advisers by dynamically delivering relevant information and updated statements. During operational preparation, depending on the tactical situation, the leader must confront the possible modes of action he envisages with the reference to enemy situation and the possible enemy modes of action. Very often he does not have the material time to confront his action with several enemy modes of action and he only anticipates certain non compliant cases that he considers probable. Artificial intelligence could be more exhaustive in confronting more possible modes of action of the enemy and thus present a more complete analysis of possible options to the military leader, who could then decide accordingly.[12] A challenge for incorporating Artificial Intelligence into defence applications and weapon systems is the collecting of recent high quality operational data. Recent and current

conflicts are providing such training data for more militaries, which may be used to train the Artificial Intelligence systems. The war in Ukraine has added to the push for developing and investing in military Artificial Intelligence. Russia recently announced that it had formed a department specifically focused on developing weapons with Artificial Intelligence. The United States, arguably the world leader in military Artificial Intelligence, has already established the Chief Digital and Artificial Intelligence Office, which is intended to further the use of Artificial Intelligence across the US military. Germany has dedicated significant funds for Artificial Intelligence research. On 30 June 2022, the North Atlantic Treaty Organization announced a $1 billion Innovation Fund for early stage start ups and venture capital funds.[13] In the military context, advancing core Artificial Intelligence research, developing and deploying application based research and establishing research efforts to address challenges in military areas using Artificial Intelligence are essential. As the cost of Artificial Intelligence based prediction falls, Artificial Intelligence will be able to match or outperform and therefore be a valuable aid. The present training in Artificial Intelligence in Army is possibly limited to few Domain Specialisation and Research Fellowship as part of Professional Military Education. Non availability of operational data is the biggest impediment in initiating any kind of training and subsequent integration of Artificial Intelligence in the operational process in field, which needs a serious policy direction. As Ukraine has shown, even smaller countries are able to use and adapt new technologies, we need to take these seriously and start exposing our field commanders to these future operational requirements.

Training on Data Management Process. Mastery of new data management process from digitization of battlefield, in particular possible influx of operational data from the field and their synthesis will allow the commanders to be better informed, but more reactive in order to keep the initiative.[14] Data is also the key fuel for AI based technologies and it is critical to train on issues of privacy, laws and standards associated with data handling and data protection. It is also necessary to train on ethical issues surrounding the development and deployment of AI based technologies. Adequate training of field commanders, especially junior leaders in these will play a key role in these awareness raising efforts.[15]

Training on More Accurate and Faster Remote Information Acquisition. The

one who sees further and before the others is likely to dominate the military manoeuvre. This is what enables him to gain a tactical advantage, because the one who acts first with determination is most often the one who wins. The ability to see further and more accurately brings an undeniable advantage to the military leader, enabling him to react faster than his enemy. Technology will continue to enable a faster detection of threats on the battlefield as remote sensors or cameras evolve further. The capabilities of digital cameras is likely to evolve every three years, according to a ratio of “twice as far” or “twice as cheap” or “twice as small”. Cameras can now merge data from multiple sensors of different types. In this era of Enriched Information, all of this fused data can enrich the field of vision of the combatant by superimposing additional data that completes his knowledge of the tactical situation. Today, spaces are getting tighter and information can be transmitted in a few milliseconds to any point on the planet, provided that the sensor capturing the information is available. This is done through cyberspace which needs to be secured for military, so as to be sure of the veracity of the data to be used. This immediacy of information is a new parameter in the art of command. It forces the leader to make a quick analysis and to be reactive in his response.[16] The field commanders today lack the optimum capacity to process the information, if there is too much data to process. They need to be exposed to automatic processing of the data as soon as it is received by the systems and to extract only the relevant information. There may be situations when systems may also be unable to process such data. In such a scenario, a third party may be needed to assist in the analysis and decision making, which may also be a machine. The field commanders need to be in control of these decision aids and need to be regulary trained for it.

Training to Handle All Interconnected Deployed Systems. The digitisation of the battlefield stems from the constant trend towards the integration of electronic components in all future military equipment, which coupled with means of transmission, will allow for their interconnection and the dissemination of the information collected. It affects all systems deployed in the field (from weapons systems to military vehicles), right down to the disembarked combatant who, just like any civilian with a Smartphone, will be connected to the great digital web of the battlefield and therefore traceable and reachable. Just like every individual in the civil society, every actor on the battlefield is traceable and able to

communicate.[17] This may emerge as one of the major challenges for the field commanders to exploit the maximum from such digital proliferation in the battlefield. The possible technological breakdown at times through the successful enemy sabotage actions may bring the entire decision making and war fighting efforts to standstill. Regular maintenance and engineering inspections, checks, balances and interventions are essential to prevent such technological collapses. Therefore, the elements of training for the field commanders need to have management capabilities for such scenarios. Induction of more engineers in the military, who could be employed as the field commanders over a period of time will definitely increase the technological threshold levels of commanders in field. 'We need to prepare for an environment that is disconnected, denied, intermittent and/or with limited bandwidth (DDIL), where the enemy could be hundreds of miles away, behind screens and impacting both kinetic and non-kinetic capabilities.'[18]

Training for Information Processing. If data acquisition and transmission is possible, the information should nevertheless be processed. However, processing requires easily accessible hardware and software resources offering the necessary computing capacity to react as quickly as possible, particularly in order to be extremely reactive in situations where the analysis time is too short for a human to do it by himself. Embedded computer software can provide such capacity at the core of deployed systems, but this capability can also be moved to a secure cloud, which can be both a tactical cloud, ie, a cloud deployed on the battlefield in support of the manoeuvre, or to a further away, highly sovereign and secure cloud. This immediacy of information processing allows a hyper-reactivity of systems, foreshadowing the concept of "hyperwar" which may be redefined as a type of conflict where human decision-making is almost entirely absent from the observe-orient-decide-act (OODA) loop. Consequently, the time associated with an OODA cycle will be reduced to near instantaneous responses. The implications of these developments are many and game changing. For information processing, the volume of data produced increases exponentially and the accuracy and granularity of the data produced by sensors grows. This trend will become more and more pronounced over time. Military experts usually process observation data retrieved from the battlefield by satellites, reconnaissance aircraft, drones or sensors abandoned on the ground. However, as human resources are scarce and

the volume of data is constantly increasing, it will be necessary to delegate the processing of this amount of data to Artificial Intelligence algorithms in support of the human being, at the risk of not being able to process all of them without this technology. This requires defining which data can be subjected to artificial processing and up to what hierarchical level their processing can be automated.[19] Training for operational information processing usually is on the job affair, depending on the available software. It is essential to identify and define the relevant tags in such software to facilitate synthesis of information of similar nature and its retrieval when required. Depending on the specific operational requirement, commander alongwith his team will need to constantly refine such software and provide authentic input towards its data and regularly train individuals, responsible to operate such software.

Training for Disruption of Autonomy of Technological Systems. Autonomy of evolving technological systems will allow for omnipresence of action in the area, 24 hours a day, subject to energy sufficiency. It will allow the machines to adapt to the terrain and its unforeseen events in order to carry on the mission entrusted to them by the military commanders. Autonomous systems will allow them to react to complex situations by adapting their positioning strategy and even adapting the effects it produces on the battlefield. For example, it may be an automatic reorganisation of the swarm formation adopted by a group of robots to follow an advancing enemy, followed by the decision to block an axis of progression with smoke or obstacles to hinder enemy progression. The new fact is that if robots are tactical pawns at the disposal of the combatant and if they can have a certain form of autonomy in the execution of their action, they do not have and will never have the awareness of their action and the capacity of discernment which are characteristics of the human being.[20] For this stage to be reached in the context mentioned above, it is here that the field commanders need to be trained to identify the technological systems which gain autonomy and need human intervention and direction for effective control. In context of our Northern Command theatre, ‘there is still a lot of time, as it may be achieved only when sufficient technology has been inducted into the combat zone and some of it achieves the level of autonomy.’[21] 5G and Internet of Military Things need to be trial evaluated in Northern Command Theatre at an accelerated pace and field commanders need to be exposed to these.

Additions Recommended in Training at Military Training Establishments. Our training establishments need to play an active role not only in conducting research on disruptive technologies, but also in creating initial versions of instructional materials and courses in cutting edge domains and assessing their impact on specific areas such as professional education. Our training establishments need to offer online courses and Internship in these. Once the technology has attained a level of maturity, these training and skilling efforts may be scaled up. They may also offer targeted training in low expertise tasks for supporting the Artificial Intelligence value chain such as data annotation, image classification and speech transcription. As disruptive technologies emerge, the awareness is necessary to have informed public consent on matters related to these technologies and their potential disruptive effects and related issues need to be addressed. Our training establishments should include a discussion on disruptive technologies for which appropriate instructional and discussion materials needs to be prepared.[22]

Recommendations for Professional Military Education. The Professional Military Education Subjects to be sponsored by Headquarters Northern Command need to include technology related subjects for officers of the rank of Lieutenant Colonel and above for Research Fellowship at premier technology oriented institutes and Think Tanks, which could also be a team effort by a group of officers assigned to study a particular subject. Subjects related to military usage of evolutions in Space Technology, Commercial Satellite Imagery, Data Analytics and Management, Digital Payment and its Tracking, Cyber Forensics, Narco Analysis, Brain Mapping and Polygraph Techniques, Explosives, Technology for Rescue Missions - Under Surface Radars and so on may be considered for study and research.

Technology Specific War Games/SATs for Field Commanders. It will be a good idea to commence Technology Specific War Games/SATs for the field commanders in the Northern Command Theatre at the Brigade and Division levels to generate new ideas on technology driven battlefield for times to come. Use of Live, Virtual and Constructive (LVC) Training Simulators also needs to be explored.

Conclusion

There have been numerous scientific innovations which were done purely to meet the military needs, but were later transformed for non military uses. For any military to evolve over the years, the evolving technologies need to be tapped and militarized. The changing nature of warfare further warrants exploitation of military opportunities. Emerging technologies will continue to revolutionize the battlefield with respect to lethality to long range precision weapon systems, anonymous systems infused with Artificial Intelligence, Robotics and Unmanned Aircraft System. Availability of technology for real time situational awareness and battlefield transparency with Artificial Intelligence infused advanced decision making tools will also impact military decision making process. It is essential for commanders and soldiers to understand how emerging technologies will develop over time and what will they mean for an operational and organisational perspective in the new age warfare. To a large extent, the choices we make in investing, adapting and using certain technologies will shape our performance in the conflicts and the wars of the future. The leaders of tomorrow will have to adapt to the uses of new technologies, which will allow them to be better informed and more reactive to keep the initiative, carry their action further and delegate certain tasks to machines at their disposal. It is necessary for us to know how to use these technologies through training, but also to know how to keep control of the use of new systems integrating a certain form of autonomy. Some of these choices, such as the degree to which humans remain in control of Artificial Intelligence systems, will be critical.

DISCLAIMER

The paper is author's individual scholastic articulation and does not necessarily reflect the views of CENJOWS. The author was awarded Certificate of Appreciation by GOC-in-C Northern Command for this paper, submitted for the "Future Battlefield Need for Techno Commanders" Essay Competition in January 2023.

End Notes

[1]https://airandspace.si.edu/stories/editorial/technology-world-war-i#:~:text=Heavy%20artillery%2C%20machine%20guns%2C%20tanks,that%20reshaped%20twentieth%20century%20warfare.

[2]https://www.nationalww2museum.org/war/articles/scientific-and-technological-advances-world-war-ii

[3] https://www.cigionline.org/articles/russias-war-on-ukraine-is-a-test-case-for-future-conflict/

[4] https://www.brookings.edu/events/terminator-on-the-battlefield-emerging-and-evolving-tech-in-the-russia-ukraine-war/

[5] https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

[6] Ibid
[7] Ibid

[8] https://www.cigionline.org/articles/russias-war-on-ukraine-is-a-test-case-for-future-conflict/

[9] https://www.intechopen.com/chapters/77502.

[10] https://www.cigionline.org/articles/russias-war-on-ukraine-is-a-test-case-for-future-conflict/

[11] Ibid

[12] https://www.intechopen.com/chapters/77502

[13] https://www.cigionline.org/articles/russias-war-on-ukraine-is-a-test-case-for-future-conflict/

[14] https://www.intechopen.com/chapters/77502.

[15] https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

[16] https://www.intehcopen.com/chapters/77502.

[17] Ibid

[18]https://federalnewsnetwork.com/reporters-notebook-jason-miller/2022/06/marines-aim-to-solve-the-ddil-challenge/

[19] https://www.intehcopen.com/chapters/77502

[20] Ibid
[21] Ibid
[22] https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf