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Editor's Note

The most important Global event of last quarter has been the Russia's invasion of Ukraine and the world wide economic crisis created by this irrational decision of Vladimir Putin. Russia has consistently maintained that its Ukraine operation is progressing as planned. But reports from the ground seem to belie the claims. The invading Russian forces have been up against a stiff Ukrainian resistance- perhaps a lot more resolute and tactical than they had anticipated. By various accounts, Russian casualties number between 3,500 and 7,000. Putin's forces have also taken major losses in terms of military hardware. NATO chief Jens Stoltenberg has blamed Russian President Vladimir Putin of making a "big mistake" by invading Ukraine.

This issue has two articles on The War in Ukraine by Air Marshal Anil Trikha (Retd) and Maj Gen Nitin Gadkari. Article on " Architecture Exploration of NOC and SOC: A Way Forward for Military Organisations" by Gp Capt Deepesh Shahjee and Dr Nilesh Ware discusses the Network operations centre in the military organisations. The debatable subject of "Leadership: By Birth or Acquired?" Is analysed by Lt Col M K Gupta Ray and he points out that history suggests that most of the leaders are born out of situation as it provides the opportunity to exhibit the leadership quality. Maj Gen (Dr) Vijay P Pawar,has contributed part 3 of his series "Heroes Who Have Contributed To The National Security Of Our Nation". "Radiological Dispersal Devices (RDD): Threat Perception and Counter Measures" by Lt Col (Dr) Tushar Ghate concludes that events like 9/11 in US has made it essential for us to revisit our national plans to tackle asymmetrical acts of terrorism. In

coming years, with so called internationalization of terrorism, threat of use of unconventional methods like RDD is quiet eminent. Even though most of the nations ensuring strict control over storing, transporting and handling of radioactive materials, loop holes in poor nations and rogue countries can be easily exploited by terrorist organizations to gain access and use radiological material. Proactive intelligence, international coordination and effective situation handling capabilities required to be developed to address this looming threat. In the final article on "People's Armed Police : Paramilitary Force of China" by Maj Gen S H Mahajan, the author concludes that India must note that the People's Armed Police has taken an organizational leap forward as part of the larger reforms to China's armed forces. The result is a smaller PAP that is under the firmer grasp of central party leaders and better positioned structurally to accomplish its core missions which includes support to the PLA during war. This assumes greater importance due to the Chinese intrusions in Galwan (Ladakh) during Jun 2020.

Wishing Our Readers a Happy Gudi Padwa.

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THE WAR IN UKRAINE AND ITS CONSEQUENCES

BY AIR MARSHAL ANIL TRIKHA (RETD)

Introduction

At the time of writing this article on 20th Mar 2022, war in Ukraine is getting to be three weeks old. Russian forces appear to have surrounded several Ukrainian cities and are subjecting them to sustained bombardment to force their capitulation. According to Western sources they have not been able to advance at the anticipated pace, probably because of poor logistic planning and or underestimation of Ukrainian resistance. While attempts at brokering a cease fire has reportedly succeeded in closing the gap on some issues, middle ground on others remains elusive. West led by the United States has taken a number of punitive measures with the intent to force Russia down on its knees through economic collapse. Ukraine is also being supplied with large quantities of state of the art defensive weapons including anti-tank and Surface to Air Missiles to blunt the Russian offensive by imposing heavy costs on the invading Russian forces. Under sustained bombardment from the air, Ukraine has been pleading to have its airspace declared as a 'no fly zone'. However for fear of the conflict spilling over Ukraine's borders, the plea has not been accepted. In lieu Biden administration has announced its decision to supply Ukraine with longer range SAM systems. But danger of widening of the conflict remains because in an effort to interdict weapon supplies pouring into Ukraine, Russian strikes are edging closer and closer to NATOs border.

2. There is little doubt that Russian military's fire power has the potential to overwhelm Ukraine's defenses sooner or later. However even if Kyiv capitulates and Russia succeeds in installing a regime of choice, for Russia the victory of arms is likely to prove pyrrhic. Public sentiment in parts of Ukraine appears sufficiently aroused to make the task of occupation extremely expensive both in terms of human casualties as well as bleeding of resources

3. This opinion piece is not about advocacy of one party or the other. Russia had been nursing many grievances about the United States reneging

from its commitments. And given the increasing level of Western economic, political and military support to Ukraine, it was probably genuinely fearful of an unacceptable threat developing on its borders. On the other hand, if invasion were to be justified when a big power senses threat (whether real or imagined) from a smaller neighbor supported from the outside, it would lead to chaos in the international system. Action reaction in the dynamic is complex and a vast grey zone lies in between. Scrupulously remaining nonjudgmental, in part 1 this article will aim to sketch out the environment in which this conflict is taking place and the global nature of its consequences. In part 2 it will high light the critical nature of Indian military's dependence on Russian arms and how disruption of supplies both in short as well as medium term may impact India's military preparedness at a time when it is faced with two hostile neighbors.

Background

Popular perception had taken hold in the West that dissolution of Soviet Union which ended the Cold War was a turning point in history. Europe which had been a cockpit of conflict for millennia seemed to have finally achieved peace and it now appeared ready to harvest the peace dividend. It is therefore not surprising that there is so much angst in Western circles about how they have sleep walked into a situation wherein invasion across the borders of a European state threatens to roll back the pages of history.

Washington nibbling away at Russia's sphere of influence under the garb of promoting democracy, threats to unilaterally terminate Arms Control agreements and relentless expansion of NATO to Russia's doorstep being responsible for the downturn finds much resonance amongst neutral observers. Conscious of Russia's painful historical experience of invasions from the West, many Western thinkers, diplomats, and geopolitical gurus had warned that Russia will react violently if NATO threatens its backyard. However perceiving Russia to be too weak to resist what was thought to be the tide of history, it ignored warnings and proceeded to expand NATO's membership step by step from 18 to30 states. Promotion of colour revolutions in Georgia and Ukraine proved to be a step too far for Russia's tolerance and as expected it reacted violently. Georgia was the first to face its wrath. Its pro-Western President Mikheil Saakashvili tried to break out of Russia's sphere of influence. It gradually edged close to the West to the extent that in 2004 United States started training Georgian soldiers. That Georgia may be on the path to join NATO was unacceptable to Russia. Therefore in 2008, when Georgia took military action to subdue pro-Russian

rebels in South Ossetia, Russian tanks rolled through Ossetia and in five days were knocking at Georgian capital Tblisi's doors. South Ossetia and Abkhazia were recognized as independent republics.

Ukraine's crisis began in Nov 2013. Victor Yanukovych, the pro-Russian President of Ukraine's rejection of a deal for closer economic integration with the European Union sparked mass protests which were openly supported by the West. With Western influence on the rise, Russia could not risk losing control of its Black Sea naval base at Sevastopol in Crimea. It reacted by engineering seizure of Crimea and establishing a commanding presence in Donbass region of Eastern Ukraine.

Ukraine's rapid slide into the Western fold and its growing military capability with the assistance of Western arms and training set the scene for Russian military deployments to bring Ukraine to heel. With battle ready forces arrayed on Ukrainian borders, Russia set forth a number of conditions for the West to address its security concerns. Predictably most members of the alliance led by the United States dismissed the demands contemptuously - which then precipitated the much anticipated invasion of Ukraine. History is of course far more nuanced and complex but in the broadest terms it is Russia's sense of vulnerability at being hemmed in by hostile forces and US zeal to expand its area of influence in the cloak of democracy that lies at the bottom of the conflict.

With US pivot to Asia to counter China's aggressive moves, and with Europe being preoccupied with multiple internal challenges, NATO had been groping for a mission. Russian invasion of Ukraine has infused new purpose and the alliance now appears united in its resolve to inflict maximum military, economic and political cost on Russia. Saturation coverage of human suffering being caused by Russia's bombardment of civilian areas is arousing wide spread public anger and demand for assistance to beleaguered Ukrainians. Simultaneously Ukraine is being flooded with all manner of weapons including Anti tank and Anti Aircraft Missiles.

Information emanating from the theatre of conflict is sketchy and entirely from Western sources. Therefore it is difficult to assess attrition being suffered by Russian forces. However what is clear is that unless Russia suffers intolerable losses or some new geopolitical arrangement is agreed upon, which soothes its anxieties substantially, current Russian leadership is unlikely to alter course. West's commitment and rhetoric has also gone so far that stepping back would involve serious loss of face and credibility. United States which appeared to be drifting away from its NATO commitments to Western democracies under Trump administration, has led the way to weld Western resolve to inflict maximum possible pain on Russia. Biden administration suffered egg on its

face for the chaotic withdrawal from Afghanistan and is floundering under poor job approval ratings. Strong push back against Russia is one of the few issues on which there is bipartisan agreement in the United States. Therefore for fear of being seen weak on Russia, in the short term at least Biden administration is unlikely to offer any opportunity for Russia to get off the ramp.

As of the current moment, President Putin appears to be firmly in control and there appears to be little opposition or significant public disaffection with the war. The few public demonstrations that did take place were put down resolutely. However the scene could change rapidly and dramatically. As sanctions begin to bite deeply or casualties begin to mount, massive public anger could spill out on the streets. Under the circumstances possibility of a palace coup cannot be discounted. Emerging new leadership could sue for peace. Or starved of Russian commodities including gas and oil, soaring inflation or strategic attention being pulled away to another hotspot in the world could weaken Western resolve to press ahead with rigorous sanctions. Currently Russian gas and oil are exempt from sanctions. However if they were to be brought under total embargo, analysts predict that oil prices could spike as high as $ 200 / barrel with obviously serious consequences for global economy. A number of other outcomes are possible but in all Russia appears to emerge bruised and weaker than before. Looking from the outside, it is beginning to look like Russia's monumental strategic blunder.

China's Dilemma

On the other end of the screen, China is carefully watching developments unfold. It is Ukraine's largest trading partner. At such time as when United States was broadcasting to the world the nefarious nature of China's 'Belt and Road' project, Ukraine went ahead and signed up to it in 2020 – thus signaling an intimate degree of political accord. Bringing Ukraine into the fold meant that China now had access to a critical transit hub and gateway to Europe. Of longer standing are other factoids pointing to the depth of Sino- Ukrainian relations

- China was among the first to recognize Ukraine's independence and sovereignty
- In 2011 Chinese President Hu Jintao and his Ukrainian counterpart Victor Yanukovych elevated their bilateral relationship to 'Strategic Partnership' level. The agreement states that 'they would support each other on matters related to national sovereignty, unity and territorial integrity.

- Ukraine sold Aircraft Carrier Varyag to China and helped it to resurrect it as Liaoning – China's first Aircraft Carrier
- Ukraine is a supplier of military hardware to China which includes turbofan engines, diesel engines and gas turbines.
- Ukrainian engineers helped reverse engineer SU-27 into Chinese J-11 fighter

Having committed itself to support Ukraine in matters related to national sovereignty, unity and territorial integrity, China is clearly caught on the horns of a dilemma. Recently declared 'no limits' friendship with Russia caused it to abstain itself from the UN Security Council vote called to condemn Russian invasion. In a clear balancing act later, in a nuanced statement it declared that national sovereignty and territorial integrity of all states must be respected. However it continues to call Russian military's crossing international border into Ukraine an invasion.

Russia and China have historically nursed suspicion of each other's long term intentions and thus deep mistrust has characterized the relationship. Despite this baggage of the past, in recent times they have found a common purpose. Both had been experiencing increasing ostracism from the West. Russia had been on the receiving end since its armed intervention in Georgia in 2008 and matters came to a head when it annexed Crimea in 2014. China came in Western cross hairs as it began to flex its muscle in East and South China Sea. The win-win paradigm of globalized commerce which had lifted China from middle power status to a serious contender in the top rung of global power hierarchy turned sour. In turn it rapidly gave way to a laundry list of complaints including China's unfair trade practices, theft of technology, intimidation of neighbors and dark ambition to bring about a Chinese dominated international order. The strong Western push back has landed China squarely in Russia's lap. It suits both parties interest. For China safe access to the huge oil and gas reserves of Russia is an insurance against supply disruptions from other oil rich regions due to the long and vulnerable supply line stretching across Indian Ocean. Russia found in China a rich and increasingly powerful partner and an assured market for its hydrocarbons which largely underpin its economy. It is a relationship of convenience which doesn't completely eliminate the subterranean mistrust.

To protect its own equities China has generally shown wariness of getting into the slipstream of Western sanctions. Therefore how much and what assistance it would be ready to give to bail out a Russia crippled by sanctions, is not clear. On the one hand it is in China's interest to prop up a counterweight

in Europe to divert some of the mounting Western attention on East and South China Sea. On the other hand, a more pointed transatlantic strategic vision occasioned by closing of ranks against Russian action in Ukraine may gaslight its own actions in the neighborhood – provoking an even stronger, coordinated push back against it. Thus China will have to juggle several balls up in the air simultaneously.

Impact on India

The fall out of the War in Ukraine is likely to have severe global impact. Russia contributes about 10 % to global supply of oil and about 17 % of gas output. At first glance it may appear that other producers could make up the shortfall created by Russia's absence from the market; but both availability of capacity as well as geopolitical considerations tend to suggest otherwise. Therefore price of oil which has already risen beyond all pre-war calculations, could reach as yet unimaginable levels. In an environment in which the world is still struggling to recover from pandemic induced economic disruptions, global economy is likely to face more headwinds. In the worst case scenario it could plunge the world in a deep recession.

While none would escape the harm of a downturn in global economy, developing countries already teetering on the edge would be faced with the worst of consequences and India will not be immune to the shock. While such an outcome is still a subject of speculation and smart economists may find ways to lessen the pain of recession, what else stares India in the face is far more serious. Indian military is critically dependent on an uninterrupted supply chain from Russia to maintain its preparedness against external threats. Both the internal disruptions caused by the ongoing war as well as Western sanctions could pose a serious threat to the unhindered flow of required support.

Impact on India's Military Posture

Open source estimates of Russian origin equipment in Indian armed forces vary between 60 and 80%. Notwithstanding the precise figure, the following list (by no means exhaustive), serves to highlight the critical nature of dependence.

Indian Army

- Main Battle Tank force consists of Russian T-72 (66%), T-90 (30%) tanks. The balance is filled by indigenous Arjun tanks .

Indian Navy

- Entire complement of fighter aircraft on India's only Aircraft Carrier INS Vikramaditya (43X MiG29 K/KUB)
- 4 of 10 Kashin Class Guided Missile destroyers
- 6 of 17 Talwar Class Frigates, 8 of 14 submarines

Indian Air Force

- IAF's fighter aircraft fleet is 71% of Russian origin consisting of SU 30 MKI (39%), MiG 21(22%). MiG 29 (9%). The share between MiG21 and 29 percentages may be outdated because MiG21 force is winding down. However these three types comprise the bulk of IAF's fighter aircraft inventory.
- The entire complement of Air to Air Refueling tankers consisting of six IL-78
- Airborne Warning and Control System (AWACS)
- Bulk of Medium lift tactical transport aircraft and utility helicopters

Spares for T-72, T-90 tanks, OSA-AK low level SAM systems, Tungushka anti aircraft gun system, Gas turbine engines for Indian Navy ships and spares for AN-32 upgrade program are sourced from Ukraine.

Deals in the Pipeline.

Neither Open source information nor space permits listing all contracted deals from Russia. Just a few are mentioned below to highlight the intended trajectory.

- $5.43, S-400 deal for five systems, only first of which has been delivered
- Two stealth frigates for Indian Navy are under manufacture in Russia. Another two are being manufactured by Goa shipyard under technology transfer.
- In 2019, India signed a $3 billion deal with Russia to lease an Akula class nuclear submarine for a period of 10 years. It was expected to be delivered by 2025.
- In July 2020, India expressed intention to purchase of 12 Su-30 MKIs and 21 MiG 29 fighter aircraft from Russia. This Rs 18,148 crore deal also included upgrade of IAF's existing fleet of 59 Russian MiG 29s.

- In December 2021 in the first maiden 2+2 dialogue with Russia, India and Russia signed a 10 year military tech cooperation agreement. This agreement was aimed at bolstering defense ties over the next decade and included orders for military platforms worth over $9 billion

Although both Russian as well as Indian Government sources has assured that support for Russian origin weapon systems would not be effected, Russia's ability to fulfill its obligations appears doubtful, firstly because war time attrition would compel It to accord priority to the needs of its own forces, and secondly ongoing conflict is bound to impact supply chains. Therefore depending on how long it takes for normalcy to return, disruption of supplies is likely to cause some degradation of India's military posture in the near and medium term.

Following border skirmishes on Northern borders in 2020, Indian government had taken note of some gaping deficiencies in weapon platforms and munitions inventory. As a quick fix it had placed orders for additional fighter aircraft, helicopters and anti-tank munitions. In a testimony before the Foreign Relations Committee in early March 22, Assistant Secretary of State Donald Lu made known that India had cancelled the said orders – not stated, but obviously under US pressure.

Replacement from alternate sources

Useful operational life of state of the art combat platforms like aircraft, ships, submarines, tanks etc extends over several decades. In fact because of the prohibitive cost of development, contemporary combat platforms are designed for periodic upgrades to maintain their relevance for as long as possible. While India has for some time been trying to diversify its sources, and also has set course towards self reliance through ambitious 'Atam Nirbharta' framework, the umbilical cord connecting Russian armaments with India's defence capability must survive for the next several decades. One to one replacement of weapon systems from alternate sources is not a choice in the short or even medium term - even if they were to be available off the shelf.

Evolving US, China, Russia, India Dynamic

To give teeth to its Indo-Pacific strategy, strong Indian military capability is undoubtedly in US interest. However in its missionary zeal to isolate and choke Russia, particularly after the latter's invasion of Ukraine, its actions appear to overlook India's dire need to keep alive its arms supply relationship with

Russia. Thus far Indian diplomatic effort has successfully shielded the S-400 deal from CAATSA sanctions. However the threat continues to hang - which in turn casts a shadow both on India's current needs as well as future plans.

While US' apparent relegation of India's concerns below its declared commitment to inflict pain on Russia gives rise to one set of anxieties, further consolidation of Russia - China axis adds more complications to India's strategic calculus. Even before the current turn of events, Russia and China's view of QUAD as a hostile alliance was completely aligned. India's declared position on QUAD's purpose cut no ice with either.

Russia's difficulties in Ukraine are unlikely to disappear anytime soon. Even if they overwhelm Ukrainian forces and succeed in installing a regime of choice in Kyiv, its forces will have to remain to ensure regime's survival – which is a classical recipe for insurgency to take hold. Supported by Western weapons and finances, the prospect of an enduring insurgency immobilizing Russia's occupation forces is real. If history is any guide, no insurgency (particularly ones supported from the outside) has ever been successfully quelled by an occupying force. Bled by insurgency, and with its economy severely weakened by Western sanctions, Russia will have no choice but to lean on China for support. As a payback, what price China would extract may not be quantifiable but it is not unreal to expect that Russia will have to subordinate its foreign policy interests to China's priorities. Under the circumstances if push were to come to shove, India is unlikely to find in Russia a sympathetic or even a neutral actor in its confrontation with China.

India's growing proximity to the United States has already cooled some of the past ardor of Indo Russian relationship. Russia's overtures to Pakistan in the last few years (including military exercises and sale of equipment) is clear evidence of the shift in Russia's balancing of India / Pakistan equation. India being tethered to Russian supply of defense equipment (including some very sensitive technologies unavailable elsewhere), and Russia's dependence on the valuable stream of revenue provides ballast to the current Indo-Russian relationship. Threat of US sanctions and increased weight of Chinese objections could put strain on this mutually beneficial arrangement.

The sum total of this appraisal is that the tight rope which India had been successfully negotiating to balance its relations between the United States and Russia is likely to become very much more challenging. A weaker Russia dependent on a more assertive China and United States bent on inflicting maximum pain on Russia is leading the world into unchartered territory – the destination fro which is difficult to predict

Conclusion

War in Ukraine has dragged on for nearly three weeks now without an end being in sight. Turkey's President Erdogan and Israel's Prime Naftali Bennett Minister have been active in trying to broker a deal to end the war. Financial Times of London in its issue dated 16th March 2022 suggests that the warring sides have made 'significant progress on a tentative peace plan which includes a ceasefire and Russian withdrawal if Kyiv declares neutrality and accepts limits on its armed forces' . The draft plan also includes Russia's demand that 'Kyiv renounce its plan to join NATO and promise not to host foreign military bases or weaponry in exchange for protection from allies such as the US, UK, and Turkey'. How far the proposals would go or how long it would take to smooth out the wrinkles is unpredictable. However even if Russia achieves its aim to secure Ukraine's neutrality and other guarantees sought by it, it would have lost the all important battle of perceptions being shaped by endless stream of images of refugees, destruction of civilian areas, and corpses lying scattered on pavements in Ukraine. Therefore the longer war goes on the more public opinion would turn against it.

The harsh sanctions imposed by the United States and its allies and their power to compel the recalcitrant to fall in line would impoverish Russians. The Russian Ruble has already halved in value and its Central Bank has doubled interest rates. Ukrainian President Volodymyr Zelensky defiant stand seems to have infused a new sense of nationhood amongst the Ukrainians partly by creating many martyrs. Therefore Ukrainians are becoming increasingly more defiant and are likely to resist occupation with all means available. With easy availability of lethal weapons, they are likely to impose significantly heavy casualties and slow the occupying forces' advance. If war drags on, the hit to Russian economy would increase exponentially and with each turn of the screw, likelihood of desperate Russians spilling out on the streets would increase with unpredictable consequences for the regime. What role China could play to alleviate Russian difficulties remains unknown.

Despite the calamitous decline in its influence since the Soviet days, Russia still remains a significant military power with the second largest stock of nuclear weapons. It has a commanding presence in space and many other cutting edge technologies. With vast reserves of oil, gas and several metals like nickel, aluminum, palladium etc. critical to sunrise industries, it is a potential disruptor of global markets. Global warming is opening up the vast Arctic Ocean both for exploitation of hydrocarbon reserves as well as a crucial navigation routes.

For its location, richness of natural resources, military power and many other reasons Russia cannot be ignored for long. US administration has committed to degrade Russia to 'pariah' status. After the war it will be a significant diplomatic challenge to bring a humiliated Russia back in the fold.

Isolation of Russia from the international market place will impact most corners of the globe and India is no exception. While it could get by with the economic fall- out, disruption of military supply chain has potentially more serious consequences. Weaker military posture would test our political and diplomatic management of border disputes, at least until balance is restored. In this context, Beijing's recent outreach to revive bilateral dialogue is significant and India should look out for every straw in the wind to prevent situation from deteriorating.

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✎ ABOUT THE AUTHOR

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Joined the IAF as a fighter pilot in April 1964. Has flown nearly 5000 hours on fighter and trainer aircraft. Trained as a flying instructor and deputed abroad for flying training of cadets. Flew a number of mission during the 65 and 71wars against Pakistan. Was 'Mentioned in Despatches' for conspicuous acts of bravery during the 71 war. He was Commandant National Defence Academy and AOC-in-C Southern Air Command .Now writes on Strategic Affairs in various journals and newspapers and delivers lectures occasionally at different institutions.

AN ARCHITECTURE EXPLORATION OF NOC AND SOC:

A Way Forward for Military Organisations

BY GP CAPT DEEPESH SHAHJEE AND DR NILESH WARE.

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Military organisations are mission-oriented and aim to safeguard national territory, air space, and maritime zones. During the last two decades, the traditional military battle space dimension has been replaced with a unique dimension known as information-cyber warfare. Its uniqueness is that the enemy is forced to surrender with no bloodshed. The opponent often does not realise that a disguised enemy compromises his national security. The military operations of today scenario are becoming more complicated due to growing netcentric campaigns, operations-other-than conventional war, and cyber threats. According to a recent analysis report of the cost of crime, information and cyber warfare have recently taken the front seat in the present online digital scenario due to the rise in information and cyber security threats (Bissell & Ponemon, 2019, p. 3). The organisations reported security breaches have risen by 11% from 2017 to 2018 and a total increase of 67 % in the last five years. Regrettably, considerable cyber-attacks go concealed for a surprisingly prolonged time. The average time to detect an issue or incident was 196 days in 2018, and 69 days additional on average to mitigate them after its detection **(Bissell & Ponemon, 2019).** This detection duration indicates how inadequate organisations are at identifying, detecting and neutralising these threats. The grounds for this inefficiency comprise but are not confined to organisations (a) not having full assessment and in-depth know-how and know-why of their information technology (IT) infrastructure, such as network elements, systems, devices, and applications, (b) not comprehending which IT infrastructure assets to shield, (c) not aware which tools to use and know-how to combine them with the existent infrastructure, or (d) being dominated by the swiftness of technology and the fast-growing threat landscape.

Motivation for Exploring Architecture

Network operations centers (NOCs) and security operations centers (SOCs) are military organisations' pillars that ensure the availability of IT infrastructure assets and network elements with optimal performance, speed and the highest level of security. NOC and SOC can detect and neutralise an attack and act as a force multiplier for information security and cyber warfare if configured precisely. NOC and SOC comprise a blend of "people, processes, technologies, and governance and compliance" to effectively manage and operate network and security centers, such as ensuring "power, ping and pipe" to network computing resources and identifying, detecting and mitigating threats, ideally before any breach occurs **(Chavan, 2016; Vielberth et al., 2020).** NOC and SOC ensure real-time IT assets availability and information cybersecurity for day-to-day operations and cyber warfare campaigns. With the recent exponential growth in the advanced persistent threats such as stealth and air-gap malware, there is a need to enhance the monitoring and detecting capabilities of present network and security centers, especially in the military scenario, to ensure incidents can be identified, detected, mitigated and neutralised efficiently and effectively in a real-time basis.

The structure of the rest of the paper is as follows. First, the authors defined what a NOC is and a SOC. Second, a detailed overview of NOC and SOC. Third, general description of network topology. Fourth, how are the NOC and SOC architecturally designed? Fifth, what are the parallels and disparities between NOC and SOC? Sixth, can a NOC and SOC take the functionality of each other? Finally, before concluding our article, a way forward for the military organisations is summarised.

What is a Network Operation Center (NOC)?

A Network Operation Center is a command control center conceptualised to operate, control, and monitor an organisational network and IT infrastructures assets **(Chavan, 2016).** A NOC is usually operated 24 / 7, 365 days a year with a tiered methodology, with personnel who continuously monitor for faults, configurations, administration, performance and security (FCAPS) based on the FCAPS model **(Chavan, 2016; Hernandez, 2018).** NOC includes the entire IT infrastructure and network equipment such as servers, switches, hubs, routers, software/hardware firewalls, network storage, various databases,

wireless and security endpoints, telecom devices, IoT devices and any other internet protocol address established terminals. These network elements are from layer 1 to 4 based technologies of open systems interconnection model (OSI model), viz., physical, data link, network, and transport layer. A NOC may also be an alias as IT Operations, NetOps, Data Center Operations or Network Management Center based on how an organisation integrates this resource.

What is a Security Operation Center (SOC)?

A Security Operation Center is a team organised to identify, detect, analyse, respond to, report, and contain cybersecurity incidents within an organisation network **(Onwubiko, 2015).** The SOC symbolises an organisational element of an organisational security strategy. It connects processes, technologies, and people to operate and strengthen its overall security posture. This objective can usually not be achieved by a particular entity or technique but by a system of systems structure. It creates situational awareness (SA), mitigates the exposed threats, and helps to monitor and meet defined rules and regulations. Moreover, a SOC adopts a framework to stipulate governance and compliance in which "people operate and to which processes and technologies are tailored" **(Vielberth et al., 2020).**

SOCs are either part of the organisation they serve, i.e., external or internal, in which they manage security service providers to the organisations. Additionally, a SOC may be answerable for various tasks, depending on its scope, complexity, NOC alignment, and in-house managed or outsourced to a third party **(Zimmerman, 2014; Hernandez, 2018).** A SOC is also termed as Cyber Defense Center, Computer Security Incident Response Center (CSIRC), Cybersecurity Operations Center (CSOC), Computer Security Incident Response Team (CSIRT) or Computer Incident Response Team (CIRT).

NOC and SOC Detailed Overview

The NOC and SOC independently serve different functions and processes with different services. Organisations, especially military oriented ones, need NOC and SOC to protect their networks and IT infrastructure assets in a netcentric scenario against any external or internal potential cybersecurity threats while keeping IT infrastructure fully functional and available for the real-time campaign. The SOC and NOC help identify, analyse, prioritise, and

resolve issues that may affect the availability and integrity of IT infrastructure assets for smooth operation. However, their roles are subtly but fundamentally different.

What is the Purpose of NOC and SOC?

The purpose of any NOC and SOC is to sustain optimal network performance and availability of its IT infrastructure assets to provide continuous uptime and detect, identify, and mitigate any threats before any breach or damage occurs. The NOC and SOC manage various tasks, which are listed in table 1 below:

NOC Tasks	SOC Tasks
Distributed denial of service (DDoS) attacks, faults, configuration, administration, performance and security based on FCAPS model.	Threat analysis and assessment, incident analysis and response. Forensic analysis and artefact handling, malware analysis and reverse engineering.
Remote support to end-users. Network port management (enabling and disabling firewall ports to communicate with external servers or network elements).	Cyber intel creation by the aggregator and its synthesis, distribution and fusion, if required.
Help the network users in the event of any incident to resolve the network issues.	Trending, the long-term synthesis of event feeds and integrated incident information for evidence of abnormal activity.
First-tier triage of network change requests; once identified, then forwarded to the concerned team members.	Countermeasure implementation includes IP blocks, firewall blocks, Domain Name System black-holes, patch verification, validation and deployment.
Incident handling, i.e., power or telecom failures, performance or configuration issues management.	Tradecraft analysis, adversary tactics analysis, technics, and procedures, i.e., honeypots.

Data-backup, disaster recovery, patch updates, mail, voice/video management.	Vulnerability and data leakage monitoring, scanning and assessment. Configuration of anti-DDoS, monitoring and reporting.
Firewall, intrusion prevention and antivirus and policies management.	Network Scanning to assist risk assessment exercises and exposure analysis. Domain or Typo squat scanning and takedown services.
To meet Service level agreements, manage vendors/contractors, and other routine tasks.	Footprints and traces of compromise collection, monitoring and dissemination or integration into existing security tools.

Military network and security operation, performance, monitoring and management have never been difficult to handle during the initial networking era. Nowadays, military organisations deal with increasingly complex networks and information cybersecurity issues. They have units and offices that span the entire country's geographical area, personnel working round the clock, and many systems and devices to operate and monitor. Many users, significant online traffic, and advanced persistence threats, especially stealth and air-gap malware, can all impact network performance and security, so the possibility for concerns can reach from anywhere. Even apparently minor problems can lead to downtime that can devastate overall network performance, security, and the military's ability to meet end-warriors needs and overall operational capabilities.

According to a recent analysis report by Gartner on "cost of downtime", one minute of downtime can cost an enterprise $5,600 **(Andrew Lerner, 2014).** Network outages reduce the operational capabilities of any netcentric military campaign and its overall security posture. Moreover, this downtime may lead to national security at stake if it results from a cyber-attack by adversaries, which cannot be compared with other private organisational network downtimes. With that in mind, military NOCs and SOCs are explicitly designed and developed to dissuade downtime so that operational users do not realise when outages happen.

What are the primary roles at the NOC and SOC?

At the NOC and the SOC, one will find a professionally qualified team of technical personnel such as NOC and SOC operators, analysts, subject matter experts (SMEs) and one overall manager or a team leader. Both NOC and SOC personnel require precise know-how and know-why in monitoring, assessing, maintaining and quickly resolving performance and security threat issues per defined service level agreements. NOC and SOC analysts' knowledge and professionalism are usually above the unspecialised IT professional **(Hernandez, 2018).** NOC and SOC technical personnel usually have outstanding work knowledge in the security and network field, particularly in monitoring, assessing, analysing, and adequately tools usage and their management.

The military organisation adopts in-house NOC and SOC concepts over third-party service due to the nature of work, confidentiality and security of data and its management. As a large team of personnel focused on network and security management at NOC and SOC alone, retention of experienced personnel at one unit is an issue in the military scenario due to transferable work scenarios and operational methodologies. Though the creation and management of in-house NOC and SOC for small organisations is a challenge, third-party services for NOC and SOC are a better alternative vis-a-vis in-house NOC and SOC.

General Network Topology

In this section, the authors discuss the general network architecture to understand the ins and outs of NOC and SOC architecture of a military organisation. General network architectures are classified as centralised, distributed, and decentralised based on the network topology configuration adopted by an organisation. General network topology is depicted in **Fig. 1 (Truong et al., 2016).**

Centralised architecture describes wherein different network or data resources are placed at various locations and managed from one central location. In contrast, a distributed architecture resembles a single system running across several subsidiaries. It seems for personnel as if they are connected with a single entity. The distributed system allows all entities to recover, process, merge and furnish information and assistance to other entities **(Truong et al., 2016).** It also allows for evenly sharing workload and
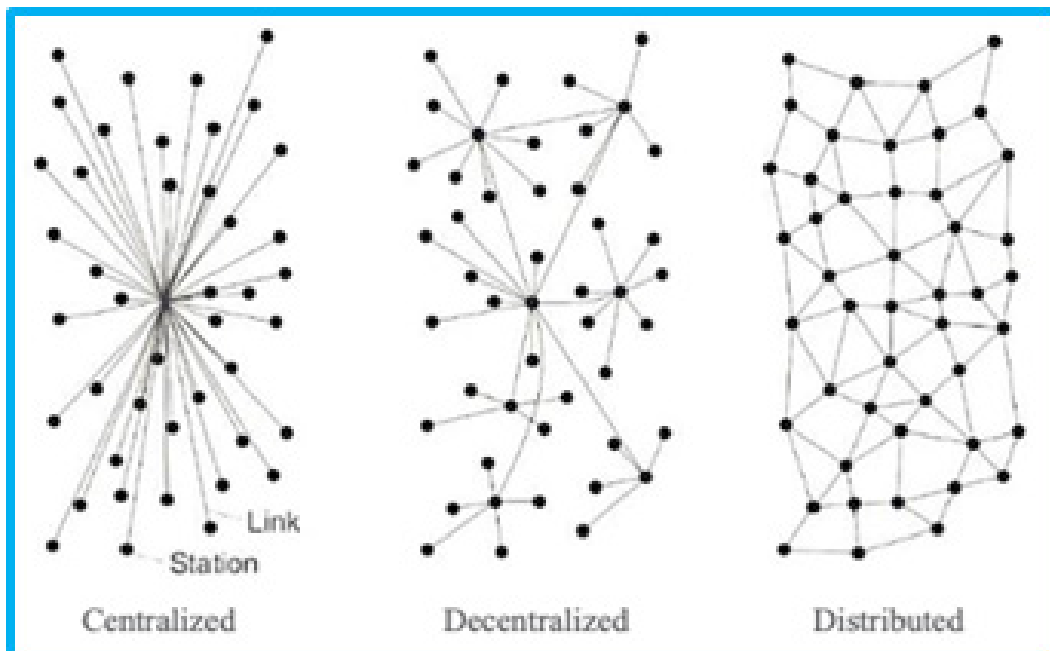
Figure - 1. Different types of Networks are based on (Truong et al., 2016).

data among all distributed networks.

Whereas, in a decentralised architecture, the concept of centralised and distributed architecture collaboration occurs. A decentralised network incorporates a few networks with perhaps low capabilities, notifying one or more centralised networks. A notable transformation from centralised to decentralised networks is observed while mapping the previous architecture with the current military scenario. The main reason for this evolution in design architecture is presumably to build more redundancy and avoid a single point of failure **(Truong et al., 2016).**

NOC Architecture

NOC is the nerve center of the military organisations with different roles and responsibilities that ensure the availability of a military network with the required speed and performance for its personnel **(Chon & Jaeger, 2007; Mathenge, 2021).** It is a centralised location for small geographical areas based on military and decentralised or distributed for the large military where IT and decentralised network teams can monitor performance and health continuously. It follows a

tiered hierarchy by employing people, processes and technology.

As per **(Chavan, 2016),** the earliest NOCs began in the 1960s. A network control center opened in 1962 by American Telephone and Telegraph Company (AT&T) in New York uses status boards to display switch and routing information in real-time from AT&T most important toll switches. Later, AT&T enhanced the network control center with a modernised network operation center in 1977. A NOC model with an end-to-end communication service provider (CSP) architecture is shown in Fig. 2 **(Chavan, 2016).** This model defines a NOC, which consists of five layers: the display of alerts and messages layer, business support system (BSS) layer, operation support system (OSS) layer, network management system (NMS), FCAPS layer, and an element management system (EMS) layer.
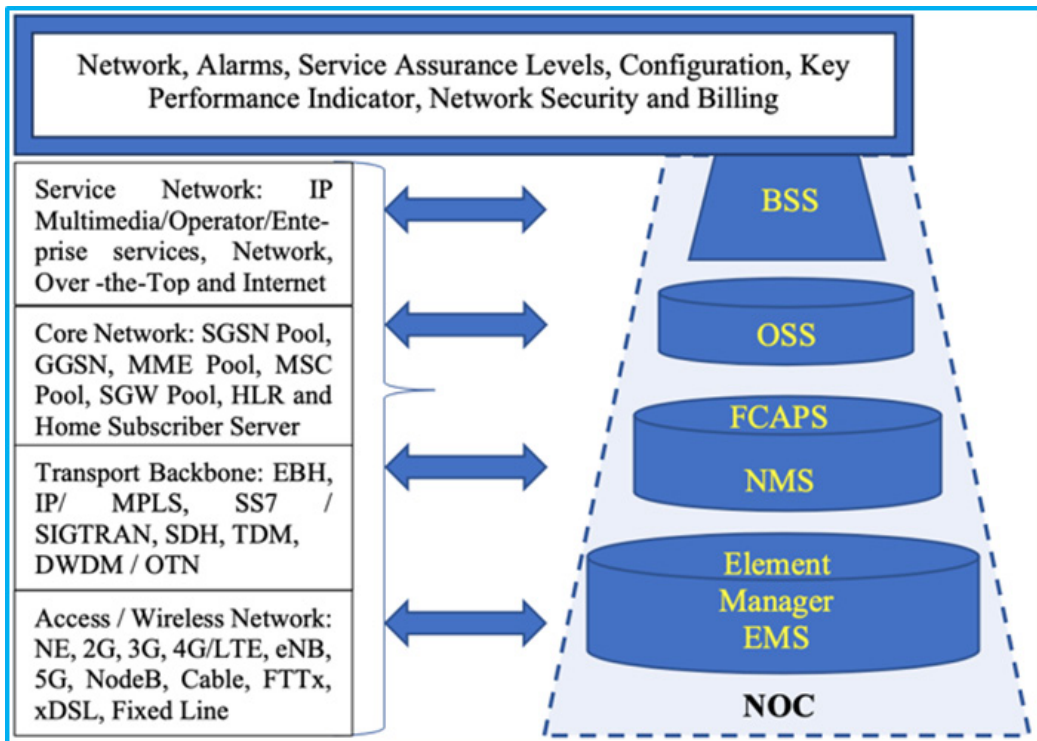
Figure 2. NOC Architecture: end-to-end CSP Network.

With the immense complexities involved in the current NOC campaign, primarily in cloud-based infrastructure and software as service applications, there are many challenges that NOC encounters. Some key NOC challenges include (a) coordination dearth among teams members, (b) problem fixing is time-consuming, as it frequently involves correlating information across

numerous devices and demands manual processes to reach sound diagnoses, (c) many disparate tools from different merchandisers may mandate staff work with diverse technologies, command-line interfaces and low-level utilities, or (d) escalation to subject matter experts is required often to evaluate core causes.

SOC Architecture

SOC is the immune center of the military organisation, with different roles and responsibilities to provide real-time security operations and management **(Vielberth et al., 2020; Onwubiko, 2015).** As seen in the preceding paragraphs, it follows the same architecture as the general NOC architecture. Its function is to detect, analyse, and respond to cybersecurity threats and incidents employing people, processes, and technology. To analyse cyber and security incidents, it follows a tiered approach of triage, analyses, and neutralising it. Fig. 3 depicts the architecture model of SOC, which shows four components: data collection, data processing, correlation analysis, and visualisation **(Duna et al., 2021).** While widely accepted as vital for organisation security, SOCs have still been deemed passive and reactive defence mechanisms.
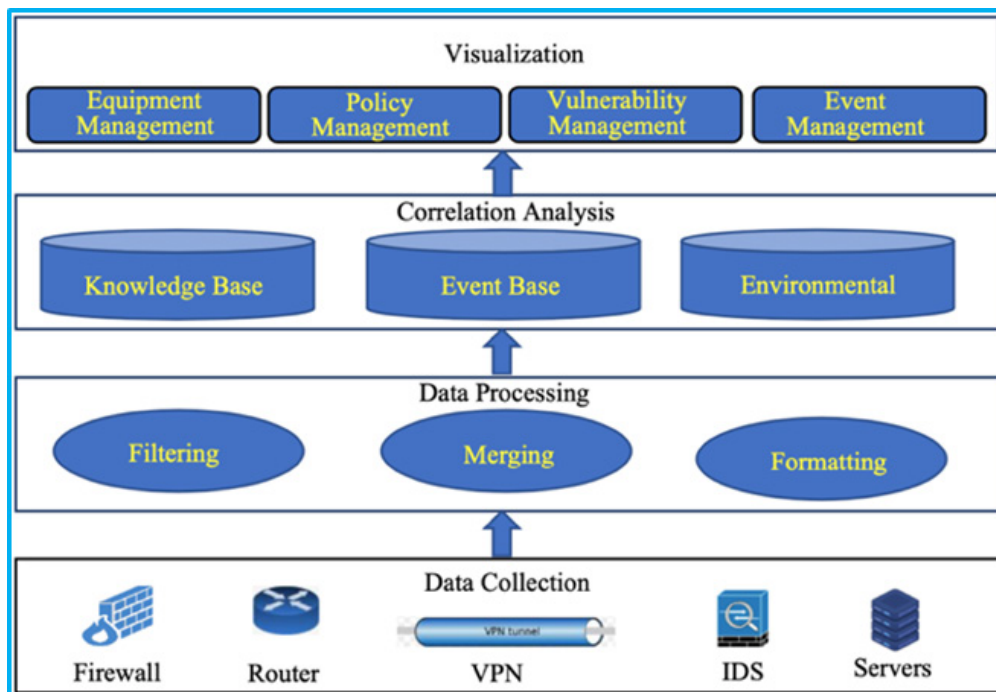
Figure 3. The architecture of SOC.

The SOC has a growingly challenging role in addressing all aspects of the organisation's online cybersecurity. For large organisations, building and maintaining a SOC can be challenging. Some key SOC challenges include (a) limited availability of skilled cybersecurity professionals since cybersecurity professionals are in high demand worldwide, making recruiting and retaining these individuals challenging, (b) creating a SOC demands substantial time and resources, as maintaining it can be even more challenging given threat landscape frequently varies and needs regular updates and upgrades and constant training of the cybersecurity team, or (c) with the enormous volume of security alerts, some threats can be miscategorised or missed entirely, emphasising the need for advanced monitoring tools, automation capabilities, and skilled cybersecurity professionals.

How are NOC and SOC Architecturally Designed?

The basic architecture will give the NOC and SOC dedicated operation rooms. One of the operation room walls is covered with a videowall displaying a real-time picture of network architecture, its performance, security endpoints, orchestration, and active incidents with various events, alerts and alarms **(Zimmerman, 2014).** The videowall displays are set up in an interconnected grid and connected to operate as one large, high-resolution unit, which is used to present the global picture of the entire network in real-time, as depicted in Fig. 4 based on **(Constant Technology Inc, 2022).** The size of the NOC and SOC depends on the size of the military organisation and data center.

Figure 4. The Architecture of NOC and SOC Operation Room.

The NOC and SOC videowall screens on which various events and alerts will pop with continuous alarms, mainly showing analysts where a problem is and what network element is impacted and forecasting the potential data breaches based on the cyber-attacks. The videowall also broadcasts notifications/data and tracks weather to allow analysts to plan around ongoing incidents that may affect more comprehensive network and security operations. Additionally, the videowall is connected to analysts workstations, where they monitor specific issues. From there, analysts can explore related issues and follow protocols that have been devised to resolve the NOC and SOC incidents.

Multiple monitors are connected to each workstation, as depicted above in Fig. 4, making it easier for analysts to analyse data and react efficiently and effectively in a real-time campaign. All workstations are further connected to the announcement system for analysts to communicate and share information. Analysts can place incident alert details on the videowall screen for everyone to review further. In some classified organisations, especially in the military, one will often find a separate classified room dedicated to a team that manages classified operational networks and other severe incidents.

The NOC and SOC take a tiered strategy to incident management. Thus, the personnel are categorised as tier 1, 2 or 3 based on their knowledge and practical exposure in resolving issues. Once a NOC or SOC operator identifies a problem, the analyst will create a ticket categorising the case based on the alert and severity criteria. If the NOC or SOC analyst designated to a particular problem fails to resolve in a set time, it escalated to a higher tier for its resolution. It persists in escalating until the problem is resolved. Integrating equipment, tools, and experts operating under precise protocols enables the NOC or SOC team to manage round the clock, i.e., 24 / 7, 365 days per year **(Zimmerman, 2014).**

NOC and SOC mostly follow either centralised, distributed or decentralised architecture with people, process and technology (PPT) or people, process, technology, governance and compliance (PPTGC) framework. This framework is used for various information technology topics like "knowledge (explicit and tacit) management or customer relationship management". Also, this framework is prevalent among NOC or SOC merchandisers to present and design their products **(Bhatt, 2001; Jacobs et al., 2013).** Although the governance and compliance part is usually subordinated to processes, authors deem it a type of its own due to the high priority within NOCs or SOCs. It offers the framework in which people operate and how the processes and technologies are built **(Ashton & Metzler, 2008).** This original "PPT" framework is further extended, resulting in the "PPTGC" displayed in Fig. 5 is based on **(Bhatt, 2001).** When

implemented along with the PPTGC framework, the NOC or SOC can improve the organisation overall network and security posture (Vielberth et al., 2020; Jacobs et al., 2013).

Figure 5. The PPT and PPTGC framework is based on (Bhatt, 2001).

What are the Parallels and Disparity Between NOC and SOC?

The NOC is mainly focused on managing network performance and availability. In contrast, the SOC has focused on overall network security by monitoring the security endpoints continuously, i.e., 24 / 7, 365 days a year, by detecting, identifying, analysing, and neutralising the threats.

The SOC team protects operational and classified data and overall IT infrastructure assets. The network operation center deals with everyday network issues and events (**McClelland, 2021).** In contrast, security operation centres primarily respond to outside threats targeting the organisation network.

Analysts in the network operation center are digging for cases that could inhibit network performance and availability. In contrast, the security operation center team aim to root out cybersecurity threats and respond to cyberattacks.

Moreover, security operation center, adopts the situational awareness (SA) technique and follows the "observe, orient, decide, and act loop" (OODA Loop) as depicted in Fig. 6, a decision cycle initially proposed by "Colonel John Boyd of the United States Air Force" **(Richards, 2012; Freeman et al., 2014).** In this methodology, "the analysts constantly observe the constituency, familiarising that data with earlier data and experience, making decisions based on that analysis, taking action, and then repeating the process. Over time spans varying from minutes to years, SOC analysts build their acquaintance with their constituency and relevant cyber threats".

Figure 6. OODA Loop is based on (Richards, 2012).

As that SA is enhanced, they become more effective analysts. Because each analyst builds up good SA over time, analysts attrition can be a severe impediment to effective security center operations; therefore, the military organisation must take steps to minimise and cope with turnover **(Zimmerman, 2014).**

The network and security operation center teams perform critical functions for the organisation, such as identifying, investigating, and resolving network or security issues. Before getting operations hampers or data breaches, NOC and SOC teams intend to fix issues in real-time. Similarly, teams operate in a hierarchical order, i.e., a tiered approach in resolving the incidents. In contrast, both teams focus on very diverse network and security issues. Accordingly, NOC and SOC teams talents, understanding, and approaches are distinct. A NOC team member must understand the intricacies of the network and its tools, application, its monitoring and management. In comparison, a SOC analyst will focus solely on the complexity of security and its tools, application control and monitoring **(Hernandez, 2018).**

Can a NOC and SOC Take the Functionality of Each Other?

In smaller organisations, when it is not viable to form a separate network and security operation center, the network operation center can monitor and resolve security issues. However, it is not ideal, especially for military organisations, if the availability of trained personnel and colossal capital to maintain separate NOC and SOC is not an issue. NOCs can perform the role of SOC in emergency scenarios and can detect security threats and network bottlenecks simultaneously, and can resolve them efficiently. Moreover, NOC analysts must understand the art of detecting security threats and skillsets to mitigate or neutralise them **(Miloslavskaya N., 2018).** Professionals having capabilities and expertise in handling both network and security matters are hard to come by, especially in military organisations. However, with cross-training, on-the-job training or shadowing more experienced team members, this limitation of different skillsets can be overcome, which paves the way for handling both SOC and NOC intricacies by one team.

Moreover, the correct blend of skillsets, the dual responsibility based NOC needs the appropriate tools to monitor network and security-related tasks and issues under one umbrella of NOC management. For example, a "security information and event management" (SIEM) is a software tool with a single security and network management dashboard that offers complete visibility into activities that are taking place on the organisational network **(Hernandez, 2018).** SIEM systems collect information, parse and categorise the information from a wide range of sources on a network, and synthesise and analyse the information so that analysts can act in real-time. SIEM is an automated SOC with most functionalities based on the SOC working methodologies and its operation. This SIEM shows actual incidents while rejecting false positives, making it more manageable for the NOC team to keep an eye on the security responsibilities of SOC **(Miloslavskaya N., 2017).** However, close interaction between NOC and SOC will improve efficiency in resolving network performances and security issues **(Hae et al., 2016).**

Way Forward for the Military Organisations

NOCs and SOCs of military organisations work on an identical operational hierarchy, i.e., tiered incident handling and monitoring management system. As seen earlier, NOC and SOC have three levels of technical personnel, viz.,
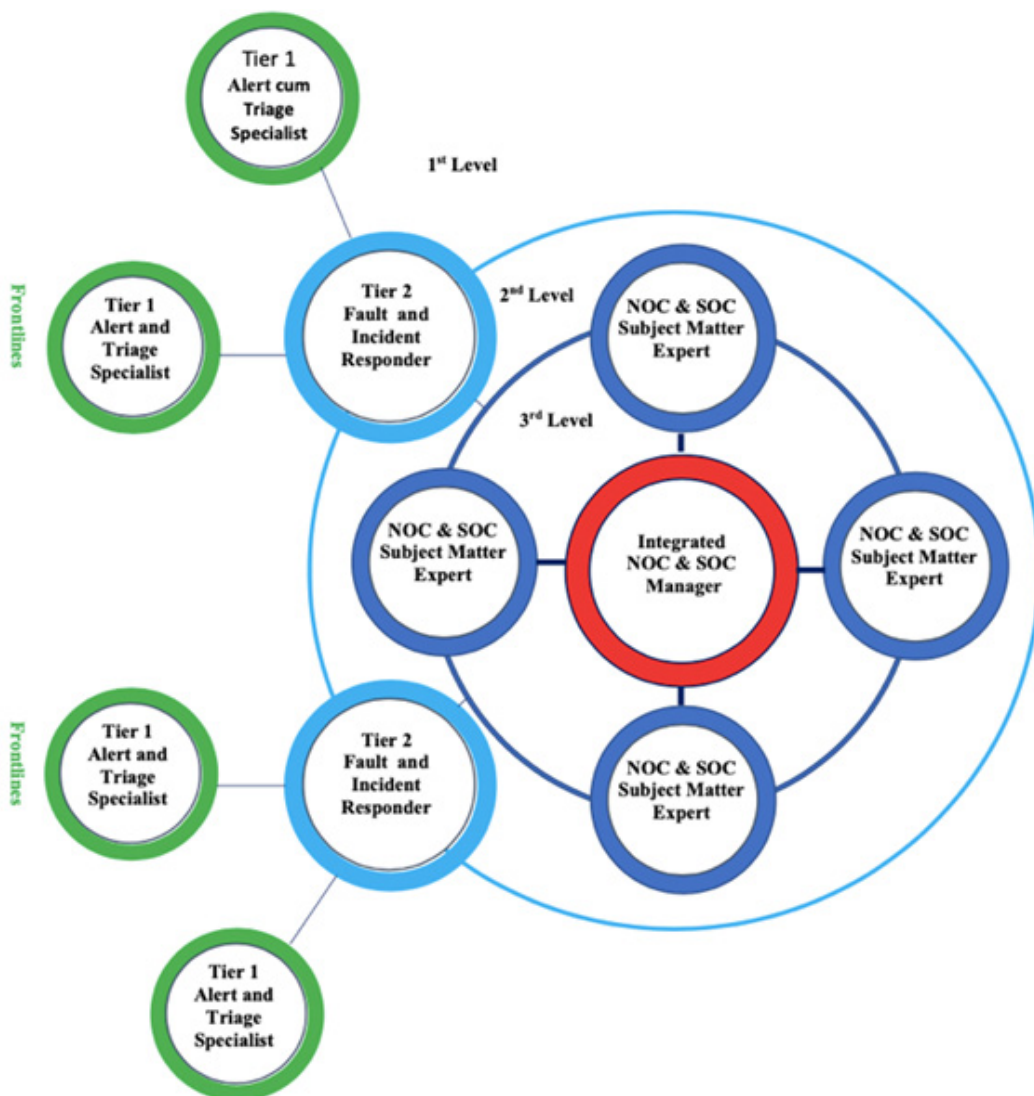
Figure 7. Integrated NOC and SOC.

operators at tier-1, analysts at tier-2 and subject matter experts (SMEs) at tier-3. Tier-1 is responsible for IT assets and monitoring, helpdesk handling, work orders, initial investigation, triage of identified, detected and reported events. Moreover, incidents that cannot be triaged are escalated to higher tier-2 analysts for more detailed review and resolution. The tier-3 SMEs are the highest level for all complicated incidents and problems resolutions **(Hernandez, 2018).** As seen, NOC and SOC work on an identical operational hierarchy, and therefore, their infrastructures are also similar. Both teams have videowalls

and workstations for the analysts, a helpdesk for handling and routing calls, workflow and ticket generation management, defined service level agreements and standard operating procedures.

With the exponential growth of cyber security threats and the mammoth proliferation of IT infrastructures and network assets in the present online digital era, NOCs and SOCs of military organisations will need to work in close tandem to meet end-warriors cyber information warfare operational needs. In close tandem with NOC and SOC, this scenario will enable better sensemaking, situational awareness, and cognition, which paves the way for an integrated team to resolve the incidents efficiently and effectively in a real-time military warfare campaign **(Miloslavskaya N., 2018; Hae et al., 2016).** The military organisations need to envision converging the institutionally separated and independent NOC and SOC under the "NOC and SOC" integrated umbrella as depicted in Fig. 7. The integration of NOC and SOC can be achieved by converging similar operations and process reengineering using integrated commercial off-the-shelf tools (COTS) and techniques. This integrated approach is also suggested by SANS institute and others and is being researched by different commercial players, viz., HP, IBM, General Dynamics (GD) and American Systems (AS) **(Hernandez, 2018; Hae et al., 2016).**

Furthermore, as NOC and SOC components require significant resources to run, this strategy conserves priceless data centre resources and infrastructure, viz., power and cooling facilities. This combined approach may also reduce the monitoring, ticket generation, helpdesk, loads as placed on the individual infrastructure assets under separate NOC and SOC. Also, one standard data integrator can gather the required information and then disseminate it with standard integrated NOC and SOC tools and techniques rather than each network and security operations centre accumulating information individually under siloed scenarios. In addition, an integrated NOC and SOC can have merged operations, functions and systems to let NOC and SOC teams share and coordinate seamlessly and tap each other knowledge and backgrounds to recognise, address and fix incidents efficiently and effectively. The usefulness of an integrated approach in a military organisation comprise but are not confined to (a) improved network and security posture, (b) overcoming the scarcity of trained NOC and SOC subject matter experts by imparting cross-training and on-the-job training, or (c) improved service level assurance and response time in a cost-effective manner. As per the SANS research article, the integrated NOC and SOC will have better efficiency in cyber-security incident response **(Hernandez, 2018).**

Conclusion

The sole intent of this work is to explore the NOC and SOC architecture and suggest a way forward. To comprehensively accomplish this purpose, we needed to analyse the relevant literature on the subject. The foremost part consists of a comprehensive NOC and SOC architectural exploration from pure research and military campaign viewpoint. Its objective is to examine NOC and SOC definition, working methodologies, similarities and differences, and overall architecture using the PPT and PPTGC framework. This article includes as numerous aspects of NOC and SOC as possible. We define NOC and SOC architecture as currently defined in the literature and based on our expertise and experience in the field.

NOC and SOC are the pillars of military organisations that provide the overarching solution for network availability, performance and overall security within desired service level agreement. The integrated approach can be worthwhile in combining the "cognition, alertness, and control of a nervous system, viz., NOC, with the defence and response of its immune system, viz., SOC, if they have been merged optimally and accurately". This strategy can enhance the overall military network and security posture, incident response time, and optimisation of resources at a lower operational and management cost. Moreover, incident response duration is decreased as the combined operation will have the ability and commitment to enact the mitigating measures by using NOC and SOC capabilities in tandem (Hernandez, 2018).

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LEADERSHIP: BY BIRTH OR ACQUIRED?

BY LT COL M K GUPTA RAY (RETD)

"Leadership is a matter of intelligence, trustworthiness, humaneness, courage, and discipline. Reliance on intelligence alone results in rebelliousness. Exercise of humaneness alone results in weakness. Fixation on trust results in folly. Dependence on the strength of courage results in violence. Excessive discipline and sternness in command result in cruelty. When one has all five virtues together, each appropriate to its function and then one can be a leader. — Jia Lin, in commentary on Sun Tzu, Art of War".

I may add "Excessive dominance results in Revolt".

"I suppose leadership once meant muscle, but today it means getting along with people". Mahatma Gandhi.

"Leadership is a combination of compassion, knowledge, passion and vision." Author.

Leadership is conditioning of mind in which most essential aspect in achieving success as a leader is the art of motivating a group of people to act toward achieving a common goal. In a business setting, this can mean directing workers and colleagues with a strategy to meet the company's needs, in military, it is leading troops to winning a war, in social influence it is maximising the efforts towards the achievement of a social goal, in political leadership it is a concept central to understanding political processes. Here we need to know about leadership, and how does it work? But the main contention in this article is that whether leadership qualities, exhibited by the leaders in their respective fields, are attributed to him by birth or acquired. But it is very difficult indeed to come to a definite conclusion about origin, evolution and development of leadership.

In one of the leadership lectures, Field Marshal Sam Manekshaw made a statement that if the leadership is by birth than our country of 120 crore (2008) populations would have produced a sizeable number of leaders, but it did not! He claimed he would be able to transform any individual with basic IQ and commonsense to be a leader should he be placed under him.

The question is what makes a leader? Though each person may have some degree of leadership qualities in him, is it the matter of dynamism and intensity of the qualities and its projection that decides the level of leadership? We shall try to analyse what makes one to become a leader with qualities inherited, acquired or both.

How does the Personality develop

We take a closer look at how do personalities develop? In doing so, we will look at multiple theories those are usually discussed within the field of psychology, regarding shaping the leadership. Out of the five main influences cited for developing leadership are, hereditary, acquired, environmental, circumstantial and situational. I also shall try to analyse how each one and at the end all five characteristics shape a leader?

Within the field of psychology, personality development process has been studied for many years. Psychologists have been conducting research in this field by engaging in experiments, case studies, self-reported research, and clinical research. As early as the mid-1700s, researchers began making evaluations and trying to learn more about personality and its development.

What is personality? It is the combination of characteristics and traits, inherited or acquired or both, that form certain distinctive express qualities in an individual which ultimately make him different from common beings and propel him to become leader and achieve success in any given field..

What is leadership? A Leader should be able to lead his followers to attain the goal and perhaps go beyond. Leadership requires certain traits which go beyond management duties. Leadership is an art of motivating a group of people to act towards achieving common objective of people or an organisation or a country etc. These kinds of leaders generally come out from mass unless thrust upon by dynasty rule. This entails having some tangible and some intangible characteristics which cannot possibly be measured but effect felt. Now which quality or qualities help a person to achieve that elevated position and whether those are acquired or developed is very difficult to identify: may

be next to impossible! But this is indisputable that such qualities set a person different from rest of the common people who would like to follow that person to achieve their goal. There are lots of contradictory theories and types of qualities, needed in one to qualify as a leader, which are doing round.

Another very important issue which is oft-discussed is the distinction between manager and leader in achieving the goal. I would like to make a short note here on this issue to highlight major conceptual differences.

Managers may be more likely to preserve existing structures and work within that parameter because they themselves operate within that structure. Their scope of work is limited within that compass. Manager works in the confinement of a given bound. They have less freedom to deviate from that bound. Management is a process of planning, decision making, organizing, leading, motivating and controlling the human, financial, physical, and information resources of an organization to attain its goals efficiently and effectively but do their work within the given resources and parameter. They are ultimately answerable to someone over him. They can manage the system fine but may be restricted from having a free hand. The main things which the nomenclature represents are that the manager work up to a certain level beyond which leadership takes on. Managers, however, also need basic attributes, something like leaders, to be a successful one. They also must be knowledgeable, well trained.

Leadership, on the other hand, gives a free hand to attain a limitless goal which is exactly not bound by any given parameter. It requires traits that extend beyond management duties. Leaders often operate fairly independently to attain a lofty goal. They perhaps may need more vision and oratory skill to inspire people at larger canvas and not to work within any confinement. That allows them to tolerate a greater degree of chaos, so long as they believe it will be worth it in the end.

Let's now discuss who is a leader and what is leadership? Is leadership less about a strong or charismatic individual and more about a group of people working together to achieve results or vice versa or combination of both?

There are various types of leadership; viz., Political, Military, Religious, Social, Autocratic, Democratic, Corporate etc. At the same time there are various styles of leadership; viz., Autocratic, Authoritative, Pacesetting, Democratic, Coaching, Laissez-fair etc. Whatever might be the type or style of leadership the idea is that the person should be able to lead the followers, subordinates, soldiers or countrymen towards success, towards achieving their respective goal. However each type of leadership needs certain specific traits to make it a success.

At the same time there are certain basic characteristics which are required being present in all types of leader. These generally are: honesty, initiative, self-discipline, knowledge, passion, vision, attitude, conscientiousness, confidence, motivation, commitment, resourcefulness, bounce back ability, politeness, resilience, perseverance and persistence, communication, hard work, self-control and integrity. However how many of these could be present in a person by birth and how many could be acquired is debatable. But one thing is certain whether the characteristics are inherited by birth or acquired, one needs to sharpen them by constant endeavour to achieve the level which would make a person acceptable as a leader.

After going through the article I request the reader to study the lives of following great personalities of different time, country and field of activities to find out how these personalities had achieved such a dizzy height in their respective fields. There are many more such great leaders worth studying their lives.

Chhatrapati Shivaji   **Vivekanand**   **Napoleon**
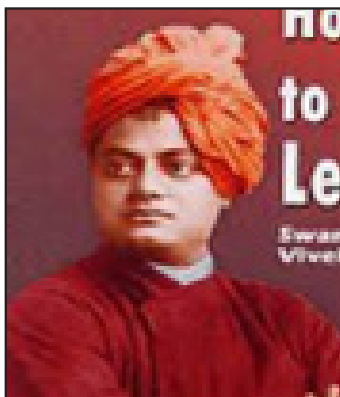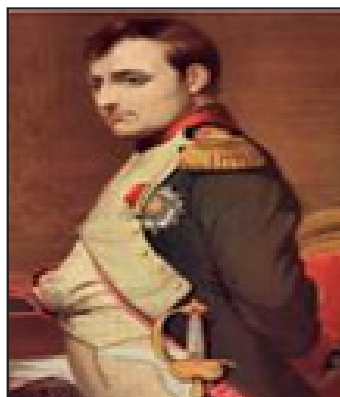
Mahatma Gandhi   **Tagore and wife Mrinali**   **Subhash Ch Bose**
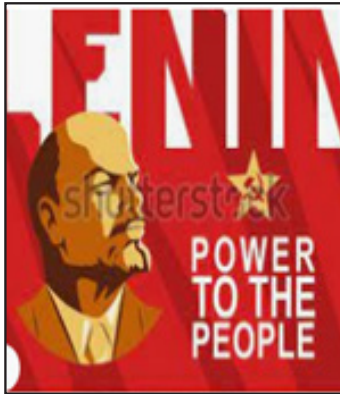
lenin

Einstein with his
second Elsa, in 1921

Churchill

Jawaharlal Nehru

Vallabh bhai Patel

JRD Tata

John F Kenedy

Indira Gandhi

Azim Premzi

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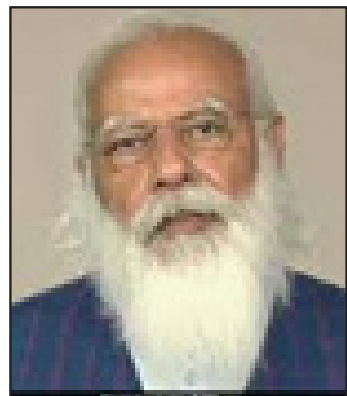
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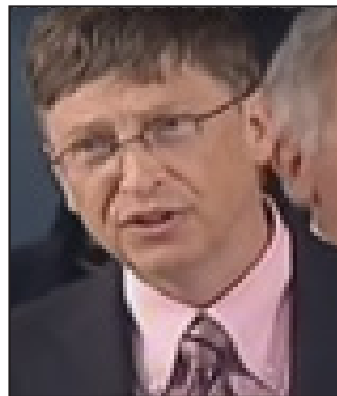
Bill Gate

Dhirubhai

I now proceed to discuss few basic characteristics required which act towards making a leader.

Traits

Traits are of two types, inherited and acquired. Both are complementary to each other to fill in the gaps if any.

Inherited Traits are those which are inherited by birth. In organisms, which functions as an individual entity, inherited traits must come from a parent or other ancestor. A trait may seem to skip a generation or even two or three, but if a trait shows up it must have been present in an ancestor. Mutations are the exception to this rule. Inherited traits include physical things such as hair color, eye color, muscle structure, bone structure and various intellectual

and emotional traits like compassion, courage, passion, vision, empathy etc. Inherited traits are traits that get passed down from generation to the next generation.

At the same during the growth any individual may acquire certain traits as required to fill in the gaps, as per the nature of work, those are required for further advancement. Debates on possibility of Inheritance of acquired characteristics was historically proposed by renowned theorists such as Hippocrates, Aristotle, and French naturalist Jean-Baptiste Lamarck. Conversely, this hypothesis was denounced by other renowned theorists such as Charles Darwin. Today, although Lamarckism is generally discredited, debate still goes on whether some acquired characteristics in organisms are actually inheritable.

Lamarckism is the notion that an organism can pass on to its offspring's physical characteristics that the parent organism acquired through use or disuse during its lifetime. It is also called the inheritance of acquired characteristics or more recently soft inheritance.

Whereas we can copy a person's external traits but we can't inherit his knowledge, skills, ideas or memories. Behaviors that help an organism survive would also be considered acquired characteristics most of the time. Acquired traits are synonymous with acquired characteristics. They are not passed on to offspring through reproduction.

Hereditary

Certain hereditary theories from different eras by eminent philosophers are being discussed.

Before the nineteenth century, philosophers from Aristotle to Weismann, question about offspring looking like their parents. The contributions of the parents to the offspring were not necessarily assumed to be equal, or even to be purely material. The ancient Greek philosopher Aristotle, for example, thought that the male semen contributed the "active element" to the offspring, bringing it to life, while the female contributed only nutritional material for the offspring.

The parental contributions were believed to blend together so that the offspring's characteristics were usually intermediate between those of the parents. It was accepted that environmental effects on parental characteristics could reappear in their offspring. This would later be called "the inheritance of acquired characters," or "Lamarckism," Thus, if parents were well educated, it was assumed that their children would be smart.

In the late nineteenth century, this framework was gradually abandoned. Two shifts in outlook were especially important. First, spurred on by new observations, scientists came to view hereditary transmission as a purely material process (possibly exempt from the effects of the environment). Starting in the 1860s, biologists developed new microscopic techniques to study the physical processes of the cell. In 1875, the German anatomist Oscar Hertwig was the first to observe a sperm penetrating an egg), thereby lending credence to the idea that a material substance was actually physically transferred via the sperm.

In the 1870s, new structures in the nucleus were discovered, called chromosomes. The fact that they came in pairs (perhaps one from each parent) suggested a possible role in heredity. Cytologists, from the late 1870s to the early 1900s, constructed innovative theories of heredity to accommodate these new observations. In contrast with earlier work, most of these theories postulated that some physical substance carried by the sperm and egg combined during fertilization to produce the offspring, thus they inherited certain qualities present in the sperms and egg.

At the same time, theorists began to challenge a second fundamental assumption of the old framework: blending inheritance. They suggested that inheritance was particulate: each parent contributed to the offspring its own share of discrete units corresponding to some hereditary trait (such as height or eye color), which were somehow then combined and sorted in the offspring. In the 1880s and 1890s, the German zoologist August Weismann influentially combined the two new concepts (material transfer and particulate inheritance), postulating a substance called the "germ plasm" that was carried in the chromosomes of the reproductive cells from generation to generation, and that was made up of invisible particles corresponding to particular body structures. Though Weismann's theory was highly speculative, by the early 1900s studies of chromosomal action during fertilization and early development seemed to confirm important parts of it, especially the role of the chromosomes as bearers of particulate hereditary material.

Charles Darwin had conceived of heredity as particulate in the late 1860s (though his theory of heredity was not well regarded). Thus, in 1900 scientists were already thinking about hereditary particles when Hugo de Vries put forward a theory of evolution, called mutation theory and the German botanist Carl Correns rediscovered an obscure paper published in 1865 by the Austrian monk Gregor Mendel.

Gregor Mendel developed his basic concept of paired, discrete hereditary "factors". Each parent contributed one factor for each trait, and each trait came

in one of two forms, dominant or recessive. Although only the dominant form would be visible in any combination of dominant and recessive, the recessive factor was still there, hidden, and could be passed to the next generation. If two recessives combined together, then the recessive form would be "expressed." A tall pea plant could thus have either smooth or wrinkled seeds; so could a short pea plant. In 1909, the Danish Mendelian Wilhelm Johannsen named these presumed hereditary particles "genes."

Mendel's ideas commanded immediate, widespread interest. His pea breeding experiments, which ran over many generations of plants to yield impressively stable statistical ratios of hereditary traits, provided biological theorists with compelling new evidence for the hypothesis of paired hereditary characters that sorted independently. Mendel's results appeared to offer practical guidance as well. Animal and plant breeders believed that they would help them develop rational systems for combining desirable traits in livestock and agriculturally important plants. Eugenicists, who sought to improve the human race through breeding "the best" traits together (such as strength and intelligence), thought Mendelism would provide rules for rational human breeding. Eugenics is the practice or advocacy of improving the human species by selectively mating people with specific desirable hereditary traits. It aims to reduce human suffering by "breeding out" disease, disabilities and so-called undesirable characteristics from the human population. In ancient history trace of it is available which mentions that special care used to be taken to build strong army by selective mating.

It was further largely developed by Sir Francis Galton as a method of improving the human race. Ugenics was increasingly discredited as unscientific and racially biased during 20th century, specially after the adoption of its doctrines by Nazis in order to justify their treatment of Jews, disabled people and other minority groups.

Thomas Hunt Morgan, by the early 1900s, proposed the existence of discrete genes that governed heredity seemed plausible to most biologists. However, the location and the physical nature of these theoretical entities were still uncertain. In particular, the relation between genes (which seemed to come in pairs) and chromosomes (which also came in pairs) was still a matter of some debate. Then in the 1910s, Thomas Hunt Morgan at Columbia University, New York, performed an experiment that helped identify that chromosomes play in heredity.

Personality Traits

Every individual in this world possesses different personality. It is believed that environment is one of the most influencing factors for personality development leading to becoming leader.

The personality of a human being is generally distinguishable from as early as infancy.. The term, Personality Development, refers to the change as well as growth in personality throughout the lifetime of an individual.

As per studies, the process of personality development depends on three main influential factors, including

- Temperament
- Character
- Environment

Temperament is the genetically determined personality traits. It affects a person's approach towards the world and his learning abilities. The genetic materials play their role by influencing the nervous system development, which in turn affects the behaviour.

Character is a collection of cognitive, emotional, and behavioural patterns which manifests as per one's nature and perhaps experience. These determine our perspective, feelings, and actions. Over time, the character continues to evolve with experiences. However, it is also dependent on one's morals.

The third and most influential factor is the environment. Psychologists suggest that the environment surrounding an individual plays an almost 50-70% role in personality development.

Environment's Impact in Personality Development.

It's been a long time since the world's trying to figure out whether or not the environment has an impact on personality development. It's now known as the nature VS nurture debate. Among various theories, some people consider the idea of Tabula Rasa proposed by John Locke, to be more rational. His concept says that the human mind comes in the world as a blank slate. Everything that it learns is only by experience. Personality often depends on particular combinations of genes that brothers and sisters may not necessarily share, but what about the environmental influences on personality? Consider the impact of the parents and the family environment on personality. One might expect children who are raised by the same parents in the same way in the same home

ought to turn out similar, but this fact isn't necessarily the case. Researchers have also found the environments that children from the same family share with each other exert a much weaker influence on their personalities than the environments that each child experiences individually. Based on genetic data, researchers have concluded that environment accounts for approximately 50 to 70 percent of personality. John B. Watson further supported this idea by suggesting that a man can learn anything or behave like anything irrespective of their background. Certain researches claim that the environment's effect on personality development is just as intense as hereditary factors.

Situational Influence on Personality

Certain situations and circumstances can influence in bringing out a person's leadership traits in a positive or negative way. It is human nature for emotions and personalities to differ depending on what is happening in our lives. It is reasonable to assume that certain situations in the lives of all individuals impact their personality. Situational influence also changes along with the situation and such changes can be for short, medium and long time. On any one occasion, a person's behavior is influenced by their personality and the situation, as well as other factors such as their current thoughts, feelings and goals. Behavior is believed to be influenced by external situational factors rather than internal traits or motivations.

The traits like courage, compassion, passion, persuasiveness, knowledge etc get highlighted under a specific situation and these vary from person to person.

And while personality traits are relatively stable over time, they can and often gradually change across the life span. Effect of Environment and situation on each individual cannot be measured. Many a time it has been observed that during crisis, otherwise an unassuming person takes the lead to confront a difficult situation when many so called established leaders did not react. In that case it may so happen that the otherwise unassuming person have had all the leadership qualities in him dormant, but at the right time with timely and situational ignition, otherwise a common person, happens to come forward to lead to give direction or meet the situation.

Today while I am writing this paper I feel a great urge to take the example of Volodymyr Zelensky, Ukraine's President, who for most of his carrier had been in entertainment field, becoming a comedian. From there he fought for election and became the President of Ukraine. His main idea was to eradicate

corruption, an environmental effect. He did not know then that Russia would invade his country one day! Today Ukraine is under attack and the world is hailing him for his strong leadership and holding on to Russian advance. This can be attributed to situational leasership.

Experience, Self-realisation and Knowledge

It has long been believed that people can't change their personalities, which are largely stable and inherited. But a review of recent research in personality science points to the possibility that personality traits can change through persistent intervention, major life changing event(s), personal life experiences, self realisation and knowledge gathering. These factors keep consistently affecting to modify the person's reactions on his actions and circumstances.

Reality determines the choices one makes in life. Research shows that one's personality trait (patterns of thinking, feeling and behaving) not only changes one's outlook in life but also change the way one perceive reality at work, and how he relates with family, friends, and romantic partners. These are:-

Adverse childhood experiences are risk factor for personality psychopathology. Positive childhood experiences reduce the risk of personality psychopathology. Positive experiences do not predict histrionic, narcissistic and sadistic traits.

The changing role of realization and experience is backed by great determination.

Modern Theories of Leadership Process.

With the passage of time in the modern theories of leadership process following theories are gaining ground:-

Charismatic Leadership.

Charismatic leadership theory says that followers make attributions of heroic or extraordinary leadership abilities when they observe certain behaviours. Studies on charismatic leadership have, for the most part, been directed at

identifying behaviours that differentiate charismatic leaders from their non-charismatic counterparts. Several authors have attempted to identify personal characteristics of the charismatic leaders. Robert House has identified the following characteristics of the charismatic leaders:

- **Self-confidence:** They have complete confidence in their judgment and ability.

- **Confidence in followers:** They believe in their followers as well, giving them tasks which are important.

- **High expectations from followers:** Derived from the characteristic of confidence in followers,

- **Ideological vision:** This is an idealized goal that proposes a future better than the status quo. The greater the disparity between this idealized goal and status quo, the more likely those followers will attribute extraordinary vision to the leader.

- **Superior debating skills:** They are able to clarify and state the vision in terms that are understandable to others. They are good at communication and the articulation demonstrates understanding of the followers' needs and, hence, acts as a motivating force.

- **High technical expertise:** Charismatic leaders are people who have high technical expertise which impresses the followers.

Transformational Leadership

Transformational leaders are people who provide individualized consideration and intellectual stimulation and who possess charisma. Bernarnd Bass and Bruce Avolio identified the following as the qualities of

- **Change agent:** Transformational leaders are perceived as leaders of radical change rather than caretakers of the status quo.

- **Courage:** Transformational leaders are considered be highly committed, and willing to take on high personal risks, incur high costs, and engage in self-sacrifice to achieve their goal.

- **Belief in followers:** Transformational leaders trust their followers' abilities.

Substitutes for Leadership

Researchers have also identified certain substitutes for leadership. This leadership is mostly system based. Steve Kerr and John Jerkier have identified the following substitutes for leadership:

- **Nature of task:** Structured and routines tasks are a substitute for leadership.

- **Nature of subordinates:** Experienced and able subordinates do not need leadership and serve as substitutes for leadership.

- **Organizational Characteristics:** Cohesive groups also serve as substitutes for leadership.

Author's Observation.

The subject issue has been discussed at length and in depth to find a plausible answer to the most debated issue in the field of psychology i.e., origin of leadership: is it by birth or is acquired? Lots of studies have been gone into. Five main influences cited for developing leadership are, hereditary, acquired, environmental, circumstantial and situational. At the same time we have discussed types and style of leadership. Types are generally: political, military, religious, social and corporate; the styles are autocratic, democratic, pacesetting, coaching, laissez-fair etc. We may come to one conclusion that leadership does need certain specific qualities which are more prominent to the leader from that of common people who must stand out from among commoners irrespective of the fact whether those endowed qualities to the leader are hereditary by birth or acquired after being born. We have discussed if all the required characteristics could not be obtained by birth then certain voids could be fulfilled by acquiring or modifying after birth. In that case what would be the mixture of both the traits and if so at what percentage? We have further discussed the role of heredity, environment, effect of traits and most importantly how the situation, knowledge, experience, - such external attributes - effect on the overall development of a leader.

I have purposefully projected pictures of certain universally accolaed leaders of all time in different fields coming out from different backgrounds and different countries. I have requested the readers to carry out their individual studies to substantiate what they have read here and form their own opinion on the subject.

Change of situation and gaining experience have considerable influence in shaping the leadership pattern, one may change the autocratic style to democratic and vice versa, depending on the need of the given situation. History suggests that most of the leaders are born out of situation as it provides the opportunity exhibit the leadership quality.

Mental model in us would define who we are, what we can become, how much risk we can take and degree of self-sacrifice etc. Unless we expand this model, do not accept our capability, no effort of training will help to bring full potential.

Blind acceptance that leadership is fixed by Individual qualities attained by birth would not propel to act which may lead to avoiding making effort thus limiting oneself. Thinking, dreaming and determination of becoming something are essential parts of growth for leader of any stream.

So it makes certain that combination of being born with good traits, acquiring some more to fill void, accepting the opportunity, having good environment and last but the least self-effort make steps for successful leadership. No degree of in born qualities will bring one up to leadership level unless one burns mid-night oil and tries to improve one. "It is 99% perspiration and 1% aspiration" – said by Einstein.

It is also tried here to describe the subtle differences between a Manager and a Leader. Whereas a manager, though is a highly qualified person, works as a professional within a given parameter, the leader has a free hand to achieve a lofty goal. Leadership generally starts from the point where management ends.

Gradually old management theories are also taking changes and Modern Theory of Leadership process propagates that it is possible to achieve by Charismatic, Transactional and Transformable leadership as discussed above.

At the end I would like to mention that whatever one is born with, ultimate success in any field is hard work. Yes, advanced genes do give a lead.

Hope the readers have got some insight and any one reading it gets benefit out of it and strives to become a leader. Our country at the moment is short of this precious product which we need very badly.

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✎ ABOUT THE AUTHOR

**Lt Col
M K Gupta Ray
(Retd)**

Lt Col M K Gupta Ray (Retd) was born in Dhaka, then east Bengal, on 23rd Oct 1946. He with family migrated to Kolkata in 1950. He did his schooling and graduation from Kolkata. He joined OTS (now OTA) on 12th April 1968 and passed out with SS(NT) 6th Course. He was commissioned in 9 Sikh and after 1971 war was transferred to 16 Sikh.

He had done both regimental and staff duties. He participated in 1971 war and Operation Meghdut in Srilanka. He has the distinction of taking the battalion to Jaffna, clearing it with only 220 solders of 16 Sikh which was reduced to 180 by the time Jaffna was cleared.

He retired in 25th May 1999. He is settled in Pune.

He has authored two books: Sri Lanka Misadventure, Co-authored with Gautam Das and Birth of a Nation on 1971 War.

HEROES WHO HAVE CONTRIBUTED TO THE NATIONAL SECURITY OF OUR NATION : PART 3

BY MAJ GEN (DR) VIJAY P PAWAR, AVSM, VSM

Background

The background to this subject is covered in detail in the earlier Parts – Part 1 and 2 – published in the last two Journals of CASS. Important part played by a few Military Leaders and certain Important Personalities of the Nation, more so the Ex Presidents of India, have been introduced and discussed earlier, for their outstanding contributions to Nation Building and improving the National Security. Needless to mention, that, the list of such great people who are contributing continuously to the National Security, in different fields, in varied times and environment and with or without holding a Government appointment or in their individual capacity, is long. It has been possible to high light only a few Heros. All those who have been highlighted are those Individuals who have set a pace to the people of the country, the common men, to follow them to contribute towards National Security.

Considering 'Economy' as   one of the important parameters to measure, maintain and grow a Country's National Security, an effort has been made in this Part of the article to highlight the great deeds of Tatas, Birlas ,Ambanis, Adanis and Kalyanis. Due to constraints of space to print, a large number of our great people could not be included for their contributions in this article. All the personalities explained in the three parts only convey that 'individuals' too play and have played great part, in the past in improving the National Security of the Country.

The Sons of Tata

Ratanji Dadabhoy Tata

J. R. D. Tata

Ratan Naval Tata

The three sons of Tata, grand father Ratanji Dadabhoi Tata, his son JRD Tata and another son of Tata, Ratan Naval Tata have done great to India since 1856 . They have created a rock foundation for the country in Business, Industry, Philosophy, Philanthropy and in Investment. All three have been Padma Awardees and well recognised for their contribution from time to time. Their contribution to the growth of economy of India has been significant and has added to the regional and India's Security before and after independence.

Ratanji Dadabhoi Tata

RD Tata, (1856–1926) was an Indian businessman who played a pivotal role in the growth of the Tata Group in India. He was the first cousin of Jamsetji Tata, a pioneering industrialist of India and the Founder of Tata Sons. RD Tata was one of the partners in Tata Sons founded by Jamsetji Tata.

Personal life. Ratanji was born in Navsari in Gujarat, He studied at The Cathedral & John Connon School and Elphinstone College in Bombay. After graduating, he took up a course in agriculture in Madras and then joined his family trade in the Far East. Ratanji was married to a Parsee girl at a tender age. However, she died childless not long after the marriage. Ratanji was in his forties when he remarried a French woman, Suzanne Brière, in 1902. They had five children Rodabeh, Jehangir (JRD Tata), Jimmy, Sylla and Dorab.

Opium Trade. Under the name Tata & Co, Ratanji ran an opium importing business in China, which was legal at the time. In 1887, he and other merchants such as David Solomon Sassoon presented a petition on behalf of the opium traders to complain about a Hong Kong Legislative Council bill that threatened to affect their trade and fight against unethical practices.

Director of Tata Steel. Tata Steel was conceived and commissioned by Jamsetji Tata, a cousin of RD Tata. However, Jamsetji died before the completion of the project. Ratanji played an important role in the completion of the Tata Steel Project along with Jamsetji's son Dorab and thus Tata Steel was established in Jamshedpur. The Tatas supplied steel to the British during the First World War. However, after the war Tata Steel went through a difficult period, as steel was dumped into India from Britain and Belgium. Ratanji, along with other Directors successfully sought protection for the Indian steel industry from the colonial government of the day and steadied the operations of Tata Steel.

Award. For all his outstanding works RD Tata was awarded Bharat Ratna.

JRD Tata

JRD Tata (29 July 1904 – 29 November 1993) was an Indian Aviator, Industrialist, Entrepreneur and Chairman of Tata Group. Born into the Tata family of India, he was the son of noted businessman Ratanji Dadabhoy Tata and Suzanne Brière. Suzanne Briere, was the first woman in India to drive a car and, in 1929, JRD became the first licensed pilot in India. He is also

best known for being the founder of several industries under the Tata Group, including Tata Consultancy Services, Tata Motors, Titan Industries, Tata Salt, Voltas and Air India. In 1983, he was awarded the French Legion of Honour and in 1955 and 1992, he received two of India's highest civilian awards the Padma Vibhushan and the Bharat Ratna respectively. These honours were bestowed on him for his contributions to Indian Industry.

Childhood in France. As his mother was French, JRD Tata spent much of his childhood in France and so French was his first language. He attended the Janson De Sailly School in Paris and the Cathedral and John Connon School in Bombay. Tata was educated in London, Japan, France and India. As a citizen of France JRD had to enlist in the French Army for at least a year. On completing his time in the French Army, his father decided to bring him back to India and that is when JRD Tata joined the Tata Company.

Career. Tata while on a tour, was inspired by his friend's father, aviation pioneer Louis Blériot, the first man to fly across the English Channel, and took to flying. On 10 February 1929, Tata obtained the first Pilot's license issued in India. He later came to be known as the father of Indian Civil Aviation. He founded India's first commercial airline, Tata Airlines in 1932, which became Air India in 1946, later became India's National Airline in 1948 and now in 2022,again it is owned by Tata Group. He and Nevill Vintcent worked together in building Tata Airlines. In 1932 Tata flew the first commercial mail flight to Juhu , in a de Havilland Puss Moth. The first flight in the History of Indian Aviation lifted off from Drigh in Karachi to Madras with JRD at the controls of a Puss on 15 October 1932. JRD nourished and nurtured his airline baby with, Nevill Vintcent, through to 1953, when the government of Jawaharlal Nehru nationalised Air India. It was a decision JRD was not for. In 1953, the Indian Government appointed Tata as Chairman of Air India and a Director on the Board of Indian Airlines – a position he retained for 25 years. For his crowning achievements in aviation, he was bestowed with the title of Honorary Air Commodore of India.

Growth of JRD. He joined Tata Sons as an unpaid apprentice in 1925. In 1938, at the age of 34, Tata was elected Chairman of Tata Sons making him the head of the largest industrial group in India. He took over as Chairman of Tata Sons from his second cousin Nowroji Saklatwala. For decades, he directed the huge Tata Group of companies, with major interests in steel, engineering, power, chemicals and hospitality. He was famous for succeeding in business while maintaining high ethical standards – refusing to bribe politicians or use the black market. Under his chairmanship, the assets of the Tata Group grew from US$100 million to over US$5 billion. He started with 14 enterprises under his leadership and half a century later on 26 July 1988, when he left, Tata Sons

was a conglomerate of 95 enterprises which they either started or in which they had controlling interest.

Major Contributions of JRD. He was, for over half a century, the trustee of 'Sir Dorabji Tata Trust' from its inception in 1932. Under his guidance, this Trust established Asia's first cancer hospital, the Tata Memorial Centre for Cancer, Research and Treatment, in Bombay in 1941. He also founded the Tata Institute of Social Sciences (TISS) in 1936, the Tata Institute of Fundamental Research (TIFR) in 1945, and the National Center for Performing Arts. In 1945, he founded Tata Motors. Tata cared greatly for his workers. In 1956, he initiated a programme of 'closer employee association' with management to give workers a stronger voice in the affairs of the company. He firmly believed in employee welfare and espoused the principles of an eight-hour working day, free medical aid, workers' provident scheme, and workmen's accident compensation schemes, which were later, adopted as statutory requirements in India. He was also a founding member of the first Governing Body of NCAER, (National Council of Applied Economic Research) in New Delhi, India's first independent economic policy institute established in 1956. In 1968, he founded Tata Consultancy Services as Tata Computer Centre. In 1979, Tata Steel instituted a new practice: a worker being deemed to be 'at work' from the moment he leaves home for work until he returns home from work. This made the company financially liable to the worker for any mishap on the way to and from work. In 1987, Tata founded Titan Industries. Jamshedpur was also selected as a UN Global Compact City because of the quality of life, conditions of sanitation, roads and welfare that were offered by Tata Steel.

Honours and Awards. Tata received a number of awards. He was conferred the honorary rank of 'Group Captain' by the Indian Air Force in 1948, thereafter promoted to the rank of 'Air Commodore' (equivalent to Brigadier in Army) on 4 October 1966, and was further promoted on 1 April 1974 to the rank of 'Air Vice Marshal'. Several international awards for aviation were given to him – the Tony Jannus Award in March 1979, the Gold Air Medal of the Federation Aeronautique International in 1985, the Edward Warner Award of the International Civil Aviation Organisation, Canada, in 1986 and the Daniel Guggenheim Medal in 1988. He received the Padma Vibhushan in 1955. The French Legion of Honour was bestowed on him in 1983. In 1992, because of his selfless humanitarian endeavours, Tata was awarded India's highest civilian honour, the Bharat Ratna. In the same year, Tata was also bestowed with the United Nations Population Award for his crusading endeavours towards initiating and successfully implementing the family planning movement in India, much before it became an official government policy. In his memory, the Government

of Maharashtra named its first double-decker bridge the 'Bharatratna JRD Tata Overbridge' at Nasik Phata, Pimpri Chinchwad. In 2012, Tata was ranked the sixth "The Greatest Indian" in an Outlook magazine poll, 'conducted in conjunction with CNN-IBN and History18 Channels with BBC.'

Ratan Naval Tata

Ratan Tata, born on 28 December 1937, is an Industrialist, Philanthropist, and former Chairman of Tata Sons. He was also Chairman of Tata Group, from 1990 to 2012, and again, as interim Chairman, from October 2016 to February 2017, and continues to head its charitable trusts. He is the recipient of two of the highest civilian awards of India, the Padma Vibhushan (2008) and Padma Bhushan (2000). He is a scion of the Tata family, and son of Naval Tata who was later adopted by Ratanji Tata, son of Jamsetji Tata, the founder of Tata Group. He is an alumnus of the Cornell University College of Architecture and Harvard Business School through the Advanced Management Program that he completed in 1975. Ratan joined his company in 1961 when he worked on the shop floor of Tata Steel, even being the apparent successor to JRD Tata upon the latter's retirement in 1991. He got Tata Tea to acquire Tetley, Tata Motors to acquire Jaguar Land Rover and Tata Steel to acquire Corus, in an attempt to turn Tata from a largely India-centric group into a global business.

Ratan as Manager. Promoted to management during the 1970s, Ratan achieved initial success by turning Group Company National Radio and Electronics (NELCO) around, only to see it collapse during an economic slowdown. In 1991, JRD Tata stepped down as Chairman of Tata Sons, naming Ratan Tata as his successor. When Ratan settled into the new role, he faced stiff resistance from many company heads, some of whom had spent decades in their respective companies and rose to become very powerful and influential due to the freedom to operate under JRD Tata. He began replacing them by setting a retirement age, and then made individual companies report operationally to the group office and made each contribute some of their profit to build and use the Tata Group brand. Innovation was given priority and younger talent was infused and given responsibilities. During the 21 years Ratan Tata led the Tata Group, revenues grew over 40 times, and profits over 50 times. Where sales of the group as a whole, overwhelmingly came from commodities when he took over, the majority sales came from brands when he exited. Tata's over 65% revenues came from operations and sales from over 100 countries. He conceptualised the Tata Nano car in 2015, to explain that the development of the Tata Nano was significant because it helped put cars at a price-point

within reach of the average Indian consumer.

Tata as an Investor. Tata invested personal savings in Snapdeal – one of India's leading e-commerce websites and in January 2016 Teabox, an online premium Indian Tea seller, and CashKaro.com, a discount coupons and cash-back website. He made small investments in companies in India, such as INR 0.95 Cr in Ola Cabs. In April 2015, Tata acquired a stake in Chinese smartphone startup Xiaomi. In 2016, he invested in Nestaway, an online portal to find fully furnished flats for bachelors to later acquire Zenify to start family rental segment and online pet care portal, Dogspot. Tata Motors rolled out the first batch of Tigor Electric Vehicles from its Sanand Plant in Gujarat, to assist the Indian Government to achieve its ambitious target to have only electric cars by 2030."

Ratan Tata as a Philanthropist. Ratan Tata is a supporter of education, medicine and rural development, and is considered a leading philanthropist in India. Tata supported University of New South Wales Faculty of Engineering to develop capacitive deionization to provide improved water for challenged areas. Tata Hall at the University of California, San Diego (UC San Diego), opened in November 2018, houses facilities for the biological and physical sciences and is the home of the Tata Institute for Genetics and Society; this is a binational institution that coordinates research between UC San Diego and research operations in India to assist in societal and infrastructure development in the area of combating vector-borne diseases. Tata Hall is named in recognition of a generous $70 million gift from Tata Trusts. Tata Education and Development Trust, a philanthropic affiliate of Tata Group, endowed a $28 million Tata Scholarship Fund that will allow Cornell University to provide financial aid to undergraduate students from India. The scholarship fund would support approximately 20 scholars at any given time and will ensure that the very best Indian students have access to Cornell, regardless of their financial circumstances. In 2010, Tata Group companies and Tata charities donated $50 million for the construction of an executive center at Harvard Business School (HBS). The executive center has been named Tata Hall, after Ratan Tata. The total construction costs have been estimated at $100 million. Tata Hall is devoted to the Harvard Business School's mid-career Executive Education program. It is seven stories tall. It houses approximately 180 bedrooms, in addition to academic and multi-purpose spaces. Tata Consultancy Services (TCS) has given the largest ever donation by a company to Carnegie Mellon University (CMU) for a facility to research in cognitive systems and autonomous vehicles. TCS donated $35 million for this grand 48,000 square-foot building that is called TCS Hall. In 2014, Tata Group endowed the Indian Institute of

Technology, Bombay and formed the Tata Center for Technology and Design (TCTD) to develop and design engineering principles suited to the needs of people and communities with limited resources. They gave ₹950 million to the institute which was the largest ever donation received in its history. Tata Trusts provided a grant of ₹750 million to the Centre for Neuroscience, Indian Institute of Science to study mechanisms underlying the cause of Alzheimer's disease and to evolve methods for its early diagnosis and treatment. Tata Group, formed the MIT Tata Center of Technology and Design at Massachusetts Institute of Technology (MIT) with a mission to address the challenges of resource-constrained communities, with an initial focus on India. Ratan's Philonthrophist

Ratan Tata as a contributor to and with many. Ratan Tata was the interim Chairman of Tata Sons. He continues to head the main two Tata trusts - Sir Dorabji Tata and Sir Ratan Tata Trusts, with a combined stake of 66% in Tata Sons, Tata group's holding company. He has served in various capacities, in organizations in India and abroad. He is a member of Prime Minister's 'Council on Trade and Industry' and the 'National Manufacturing Competitiveness Council'. He is on the jury panel of Pritzker Architecture Prize – considered to be one of the world's premier architecture prizes. He is a director on the boards of Alcoa Inc, Mondelez International and Board of Governors of the East–West Center. He is also a member of the board of trustees of University of Southern California, Harvard Business School Board of Dean's Advisors, X Prize and Cornell University. Ratan Tata is a member on the board of International Advisory Council at Bocconi University. He is also a member of the Harvard Business School India Advisory Board (IAB) since 2006 and previously was a member of the Harvard Business School Asia-Pacific Advisory Board (APAB) in 2001–2006. In 2013, he was appointed to the Board of Trustees of the Carnegie Endowment for International Peace. In February 2015, Ratan took an advisory role at Kalari Capital, a venture capital firm founded by Vani Kola. In October 2016, during the crisis of 'Cyrus Mistry', Ratan Tata Sons removed Cyrus Mistry as its Chairman when Ratan Tata made a comeback, taking over the company's interim boss for four months till Natarajan Chandrasekaran was named as the chairman of Tata Sons, in February 2017; Natrajan has now an extended tenure of five more years up to February 2027.

Honours and Awards. Ratan Tata received the Padma Bhushan in 2000 and Padma Vibhushan in 2008. In 2021 he received the highest civilian award of Assam 'Assam Baibhav' for his exceptional contribution towards furthering cancer care in Assam. The list of other awards of Ratan Tata is long and illustrious.

The Birla Family

Ghanashyam Das Birla

Basant Kumar Birla

Aditya Vikram Birla

Kumar Mangalam Birla

Tata – Birla Plan and India's Five Year Plan

A plan for development of India was made by a group of Industrialists in 1944, which was termed the Tata-Birla plan or the Bombay plan, which is said to have served as a blueprint for India's first five-year plan. JRD Tata and GD Birla were Industrialist and knew each other well. Birla has been on the board

of Tata Steel since 2001. ... Not only was GD Birla on the board of Tata Steel, but the Birlas then owned a higher stake compared to the Tatas. Every layman, would have heard the name 'Birla – Tata' or 'Tata – Birla' associated with the development of India in the past.

Having discussed 'Sons of Tata' there is a need to discuss four personalities of Birlas ie GD Birla, Basant Kumar Birla, Aditya Bikram Birla and Kumar Mangalam Birla - who have contributed to improve the industrial and financial structure of India and thus its National Security.

Ghanshyam Das Birla

Ghanshyam Das Birla (10 April 1894 – 11 June 1983) was a businessman and member of the Birla Family. He was born in Pilani in Jhunjhunu district, in the Indian state then known as Rajputana, as a member of the Maheshwari Marwari community. His father was Raja Baldev Das Birla. In 1884 Baldeo Das Birla went to Bombay in search of new avenues of trade. In 1884, he established his firm as Shiv Narian Baldeo Das in Bombay and in 1897 as Baldeo Das Jugal Kishore in Calcutta. The firms started business in silver, cotton, grain and other commodities. Raja Baldev had four sons and Ghanshyam Das was the most successful of them.

The Family Business. GD Birla inherited the family business and moved to further diversify it into different areas. He wanted to turn the moneylending business into manufacturing so he left for Calcutta in Bengal Presidency, the world's largest jute producing region. There, he began independently as 'a jute broker'. In 1918, GD established Birla Jute Mills, much to the consternation of established European merchants, whom the biased policies of the British government favoured. He had to scale a number of obstacles as the British and Scottish merchants tried to shut his business by unethical and monopolistic methods, but GD was able to persevere. In World War I, when supply problems resulted throughout the British Empire, Birla's business skyrocketed. With an investment of ₹5 million in 1919, the Birla Brothers Limited was formed. A mill was set up in Gwalior in the same year.

Progressive GD Birla. In 1926, GD was elected to the Central Legislative Assembly of British India. He became the founding President of Harijan Sevak Sangh founded by Mahatma Gandhi in 1932. In 1940s, GD ventured into the territory of cars and established Hindustan Motors. After independence, Birla invested in tea and textiles through a series of acquisitions of erstwhile European companies. He also expanded and diversified into cement, chemicals, rayon

and steel tubes. Ghanshyam, during the Quit India Movement of 1942, had conceived the idea of organising a commercial bank with Indian capital and management, and the United Commercial Bank Limited was incorporated to give shape to that idea. UCO Bank, is today, one of the oldest and major commercial banks of India.

Birla a Philanthropist. Envisioning infrastructural development in his hometown, Birla founded the Birla Engineering College (rechristened as Birla Institute of Technology and Science in 1964) in Pilani and the Technological Institute of Textile and Sciences in Bhiwani among other educational institutions. Both colleges have evolved over the years to develop into one of India's best engineering schools. Now, Pilani also houses Birla Public School, a famous residential Public School named after Birla's family and a number of polytechnic colleges. GD Birla Memorial School, Ranikhet, a premier residential school was established in his honour by his son BK Birla. The Birla School in Kalyan, was founded by GD Birla's efforts with the collaboration of Kalyan Citizens' Education Society (KCES).

Honours and Awards. In 1957, GD Birla was awarded India's second-highest civilian honour, the Padma Vibhushan by the Government of India.

Basant Kumar Birla

Basant Kumar Birla (12 January 1921 – 3 July 2019), the youngest son of GD Birla, was an Indian businessman of the Birla family. He was Chairman of the Krishnarpan Charity Trust, BK Birla Institute of Engineering and Technology (BKBIET) and various educational trusts and institutes. By fifteen years of age, he was actively associated with a large number of companies and eventually became the Chairman of Kesoram Industries. In this role, he concentrated on the industries of cotton, viscose, polyester and nylon yarns, refractory, paper, shipping, tyre cord, transparent paper, spun pipe, cement, tea, coffee, cardamom, chemicals, plywood, MDF Board and so on. In 1959, he established the Indo Ethiopian Textiles Share Company, which was the first major joint venture by any Indian industrialist. In response, the Emperor of Ethiopia, Haile Selassie I, awarded him the medal of the Order of Menelik II, the highest Ethiopian award. On 13 April 1942, he married Sarla. They had a son, Aditya Vikram Birla.

B K Birla headed the Swargashram Trust, which administers a Sanskrit school in Rishikesh. He also established Birla Public School in Qatar and the Birla College of Arts, Science and Commerce in Kalyan near Mumbai. He is the

author of several books, including an autobiography entitled Svantah Sukhaya.

Honours and Awards. Besides Basant Birla being awarded the Order of the Holy Triniy and Order of Manelik II, he was awarded Padma Bhushan, the third highest award of the Government of India for his contribution to the National Economy, Literacy and Philanthropy and that was his lead to India's National Security.

Aditya Vikram Birla

Aditya Vikram Birla (14 November 1943 – 1 October 1995), born into one of the largest business families of India in Calcutta, was an Industrialist, born to Basant Kumar Birla and Sarala Birla. His grandfather Ghanshyam Das Birla was an associate of Mahatma Gandhi and had built his fortune on aluminum prospecting and as the manufacturer of the Ambassador cars.

Aditya's Growth. He oversaw the diversification of his group into textiles, petrochemicals and telecommunications. He was one of the first Indian Industrialists to expand abroad, setting up plants in South East Asia, Philippines and Egypt. His net worth was estimated at £250 million by 1995. After attending St. Xavier's College, Calcutta, he earned a degree in Chemical Engineering at the Massachusetts Institute of Technology. Aditya was married to Rajashri and had a daughter Vasavadatta and a son Kumar Mangalam. Aditya's death at the age of 51 left his young son Kumar Mangalam Birla in charge of his group of companies

Achievements. After returning to India in 1965, Aditya Birla struck out on his own in textiles. His Eastern Spinning Mills in Calcutta quickly became a success, putting the group's sinking rayon and textile business back on track. He was then placed in charge of the corporation's expansion into the oil sector. In 1969, Birla set up Indo-Thai Synthetics Company Ltd, the group's first overseas company. In 1973, he established PT Elegant Textiles to manufacture spun yarn. It marked the group's first venture in Indonesia. In 1974, Thai Rayon, the Group's Viscose Rayon Staple Fiber business, was incorporated in Thailand. In 1975, the Indo Phil Group of companies, the first Indo-Filipino joint venture, commenced production of spun yarn. In 1977, Pan Century Edible Oils was incorporated in Malaysia, going on to become the world's largest single-location palm oil refinery. In 1978, Thai Carbon Black was incorporated in Thailand. In 1982, PT Indo Bharat Rayon was established, to be the first producer of Viscose Staple Fiber in Indonesia. All these ventures not only put the Birla group on the world map, but the companies became the largest producer of Viscose staple

fiber and refiner of palm oil. Ghanshyam Das Birla died in 1983, bequeathing most of his companies to his grandson Aditya. With Aditya Vikram Birla as the Chairman, the Birla group of companies' success expanded. On Aditya Birla's death in October 1993, Former Indian Prime Minister (then Finance Minister) Manmohan Singh called Mr. Birla "amongst the best and brightest citizens of India."

Philanthropy, Honours and Awards. Birlas instituted the Aditya Birla Scholarships in his memory. Every year more than 40 scholars from among seven Indian Institutes of Management, seven Indian Institutes of Technology, Birla Institute of Technology and Science and Faculty of Management Studies (Delhi) receive this scholarship. From 2012–13 year onwards, this scholarship was extended to four law campuses as well. Hospital in Pimpri-Chinchwad has been named after Aditya Birla. Kalashikhar and Kalakiran Puraskar awards for excellence in theatre and performing arts that are given every year were instituted in 1996 by the Sangeet Kala Kendra (SKK), founded in 1973 by Aditya Vikram Birla to encourage performing arts. A special commemorative stamp was released by Government of India in the name of Aditya Vikram Birla on 14 January 2013, honouring him as 'India's first global industrialist'.

Kumar Mangalam Birla

Kumar Mangalam Birla (born 14 June 1967) is an Indian Billionaire Industrialist, philanthropist, and Chairman of the Aditya Birla Group, one of the largest global conglomerates in India. He is also the chancellor of the Birla Institute of Technology & Science and Indian Institute of Management Ahmedabad. A fourth generation member of the Birla Family from Rajasthan, Kumar Birla was born in Kolkata and grew up in a joint family in Mumbai with his parents and younger sister. He did his high school from Sydenham College of Commerce and Economics and a bachelor's degree from HR College of Commerce and Economics of the University of Mumbai. He later studied at London Business School (LBS) and was awarded Master of Business Administration from University of London in 1992. He is also an honorary fellow at LBS. He is a chartered accountant from Institute of Chartered Accountants of India (ICAI).

Achievements. Kumar Mangalam Birla took over as Chairman of the Aditya Birla Group in 1995, at the age of 28, following the death of his father Aditya Vikram Birla. During his tenure as Chairman, the group's annual turnover increased from US$3.33 Billion in 1995 to US$48.3 billion in 2019. This is despite the 'financial distress' that Vodafone Idea Ltd has been experiencing, in addition to the fall in

'shares of flagship firms that produce chemicals, metals and cement.'

Kumar Mangalam as a Philanthropist. As per the Edel Give Hurun India Philanthropy List 2021, Kumar Mangalam and his family ranked fourth on the philanthropy list with donations mostly to the healthcare sector. In 2020, the Aditya Birla Group contributed Rs. 500 crores towards COVID relief measures. Kumar Mangalam Birla has created a 15 million pound endowed scholarship programme to support 10 full-time MBA candidates every year at the London Business School. This scholarship programme is the largest endowed scholarship gift to an European Business School. The Birla family has built schools and temples around India, including BITS Pilani and Birla Mandirs.

Honours and Awards. Kumar Mangalam Birla has received several awards, that include National and International awards. The list is long and increasing each year. An active personality in the business world today, he would go a long way to meet Country's needs in large number of fields.

Ambanis

Dhurubhai Ambani

Mukesh Ambani

Dhirajlal Hirachand Ambani

Dhirajlal Hirachand Ambani (28 December 1932 — 6 July 2002), popularly known as Dhirubhai Ambani, was an Indian business tycoon who founded Reliance Industries. Dhirubhai took Reliance public in 1977 and was

worth US $2.9 billion in 2002. In 2016, he was honoured posthumously with the Padma Vibhushan, for his contributions to trade and industry.

Dhirubhai was one of the sons of Hirachand Gordhanbhai Ambani, a village school teacher belonging to the Modh Baniya community and Jamnaben Ambani. He was born in Chorwad, Junagadh district, Gujarat. He schooled at Bahadur Khanji school. In his youth, Dhirubhai joined the protests against the Nawab of Junagarh and organized many actions against the Nawab's plans to join Pakistan after independence.

In 1948, he left for the Port of Aden, Yemen to work for 'A Besse and Co' along with his brother Ramnikbhai and later returned to sell shell and Burmah oil products for the company. His friends described Dhirubhai as someone who was affable yet ambitious, cheerful yet had a 'dark side' because of his extreme ambition and risk taking. In Aden, his first son, Mukesh was born to him in April 1957. Another son, Anil, was born two years later in 1959. Dhirajlal left Aden in 1958 to try his hand at his own business in India in the textiles market.

Establishment of Reliance Industries. In India Dhirubhai started "Majin" in partnership with Champaklal Damani, his second cousin, who lived with him in Yemen. 'Majin' was to import polyester yarn and export spices to Yemen. In 1965, Champaklal and Dhirubhai ended their partnership as both had different temperaments and different take on how to conduct business, the major differences were on the risks being taken and building inventories to increase profit, both being done by Dhirubai. In 1966 Dhirubhai formed Reliance Commercial Corporation which later became Reliance Industries in May 1973. He launched the brand 'Vimal' during this time which sold polyester materials for saris, shawls, suits, and dresses.

Stock Exchange and Ambani. Ambani had a total control over the Stock Exchange. Ambani's 'Only Vimal' brand, the brand name that was changed from 'Vimal', of textiles sold very well. The World bank too appreciated the 'Reliance Textiles Manufacturing Unit' and visited it in 1975. In 1988 the Bear Cartel group of stock brokers from Calcutta made all efforts to bring down the prices of Reliance stocks but failed due to Diurbhai's excellent management of his business and the stock market.

Reliance after Dhirubhai . On 24 June 2002 Dhirubhai Ambani expired and the death of this Industrialist was a great loss to the Nation. The group was split into 'Reliance Industries Limited' headed by Mukesh, and 'Reliance Anil Dhirubhai Ambani Group' headed by Anil. As of 2017, the company had more than 250,000 employees. In 2012, Reliance Industries was one of the two Indian companies to be ranked among the top 100 in the Fortune 500 list

of the world's largest companies by revenue.

Honours and Awards. The list of awards of Dhirubhai Ambani is long and not being detailed here. One of his awards that needs to be mentioned is the award given to him by the Country posthumously in 2006 – Padma Vibhushan. His awards speaks of the great achievements of Dhirubai Ambani, which he scaled when the country was much younger than today and looking up at doing well to improve its National Security.

Mukesh Ambani

Mukesh Dhirubhai Ambani (born 19 April 1957) is an Indian billionaire businessman, and the Chairman, Managing Director, and largest shareholder of Reliance Industries Ltd (RIL), a Fortune Global 500 company and India's most valuable company by market value. On 02 December 2021, Mukesh was the richest person in Asia with a net worth of US$90 billion and the 11th richest person in the world. He was born in the British Crown colony of Aden (present-day Yemen) to Dhirubhai and Kokilaben. Mukesh has a younger brother Anil and two sisters.

Mukesh lived only for a short period in Yemen, as his father decided to move back to India in 1958 to start a trading business that focused on spices and textiles. Ambani lived in a communal society, used public transportation and never received an allowance. Today, Mukesh resides at the Antilia Building, one of the world's most expensive private residences with its value reaching $ 1 billion.

Schooling. Mukesh attended the Hill Grange High School at Peddar Road, Mumbai, along with his brother and Anand Jain, who later became his close associate. After his secondary schooling, he studied at the St. Xavier's College, Mumbai. He then received a BE degree in chemical engineering from the Institute of Chemical Technology. Ambani later enrolled for MBA at Stanford University, but withdrew in 1980 to help his father build Reliance, which at the time was still a small but fast-growing enterprise. His father felt that real-life skills were harnessed through experiences and not by sitting in a classroom.

Mukesh's Achievements. In 1981, Mukesh was deep into textiles, polyester fibers and further into petrochemicals, which the yarns were made from. After joining the company, he reported daily to Rasikbhai Meswani, then Executive Director. The company was being built from scratch with the principle of everybody contributing to the business and not heavily depending on selected individuals. Dhirubhai treated Mukesh as a business partner allowing him the

freedom to contribute even with little experience. Mukesh set up Reliance Info Comm Limited (now Reliance Communications Limited), which focused on information and communications technology initiatives. At the age of 24, Ambani was given charge of the construction of Patalganga Petrochemical Plant when the company heavily invested in oil refinery and petrochemicals. Ambani directed and led the creation of the world's largest grassroots petroleum refinery at Jamnagar, which had the capacity to produce 660,000 barrels per day (33 million tons per year) in 2010, integrated with petrochemicals, power generation, port, and related infrastructure. Ambani launched 4G broadband services with Bharati Airtel in 2015. He was elected as a member into the National Academy of Engineering in 2016 for engineering and business leadership in oil refineries, petrochemical products, and related industries. In February 2016, Ambani-led Jio launched its own 4G smartphone brand named LYF which was a great success, and Reliance's shares increased. During the 40th annual general meeting of RIL, Mukesh announced bonus shares in the ratio of 1:1 which is the country's largest bonus issue in India, and announced the Jio Phone at an effective price of ₹0. As of February 2018, Bloomberg's "Robin Hood Index" estimated that Ambani's personal wealth was enough to fund the operations of the Indian federal government for 20 days.

Mukesh's Forbes Ranking. Ambani has consistently held the title of India's richest person on Forbes magazine's list for the past ten years. He is the only Indian businessman on Forbes' list of the world's most powerful people. He surpassed Jack Ma, executive chairman of Alibaba Group, to become Asia's richest person with a net worth of $44.3 billion in July 2018. He proved to be the wealthiest person in the world outside North America and Europe. As of October 2020, Mukesh Ambani was ranked by Forbes as the 6th-wealthiest person in the world. As of 2015, Ambani ranked fifth among India's philanthropists, according to China's Hurun Research Institute. He was appointed as a Director of Bank of America and became the first non-American to be on its board.

Mukesh and Sports. Mukesh owns the 'Indian Premier League franchise Mumbai Indians' and is the founder of Indian Super League, a football league in India. Forbes has named him as one of the richest sports owners in the world.

Honours. Today, Mukesh is a Director of many companies. He has been bestowed with large number of awards for his great business acumen.

Gautam Shantilal Adani

Gautam Shantilal Adani (born 24 June 1962) is an Indian billionaire businessman. He is the Chairman and Founder of the Adani Group, an Ahmedabad-based multinational conglomerate involved in port development and operations in India. Adani is also the President of the Adani Foundation, which is primarily led by his wife, Priti Adani.

Gautam founded the Adani Group in 1988 and diversified his business into resources, logistics, energy, agriculture, defence and aerospace, amongst others. According to Forbes, his family's net worth is estimated to be around US $ 79.6 Billion as of 8 December 2021. He was the second richest man in Asia and 13th richest man in the world, a spot that he attained in 2021. As this article goes for publication, Adani is the richest person in India and Asia. As of 2018 Adani had a 66% stake in Adani Ports & SEZ, 75% stake in Adani Enterprises, 73% stake in Adani Power, and a 75% stake in Adani Transmission.

Adani Family. Born in a middle class Jain family to Shantilal and Shanti Adani in Ahmedabad, Gujarat, Gautam has two siblings. Gautam Adani's parents had migrated from the town of Tharad in the Northern part of Gujarat. His father was a small textile merchant. Gautam was educated at Sheth Chimanlal Nagindas Vidyalaya in Ahmedabad. Gautam enrolled for a bachelor's degree in commerce at Gujarat University, but dropped out after the second year. Adani was keen on business, but not his father's textile business.

Professional Achievements. In 1978 as a teenager, Adani moved to Mumbai to work as a diamond sorter for Mahendra Brothers. He worked there for 2–3 years before establishing his own diamond brokerage firm at Zaveri Bazaar, Mumbai. In 1981, Adani's elder brother Mansukhbhai Adani bought a plastics unit in Ahmedabad and invited him to manage the operations. This venture turned out to be Adani's gateway to global trading through polyvinyl chloride (PVC) imports. In 1985, Adani started importing primary polymers for small-scale industries. In 1988, he established Adani Exports, now known as Adani Enterprises – the holding company of the Adani Group. Originally, the company dealt in agricultural and power commodities. In 1991, the economic liberalization policies turned out to be favorable for his company and Adani started expanding the businesses into trading of metals, textiles, and agro products. In 1994, the Government of Gujarat announced managerial outsourcing of the Mundra Port and in 1995, Adani got the contract. In 1995, he set up the first jetty. Originally operated by Mundra Port & Special Economic Zone, the operations were transferred to Adani Ports & SEZ (APSEZ). Today, the company is the largest private multi-port operator. Mundra Port is the largest private sector Port in India, with the capacity of handling close to 210 million tons of cargo per annum. In 1996, the power business arm of the Adani Group, Adani Power, was founded. Adani Power holds thermal power plants with a capacity of 4620 MW, the largest private thermal power producer of the country. In 2006, Adani entered the power generation business. From 2009 to 2012, he acquired Abbot Point Port in Australia and Carmichael coal mine in Queensland. In May 2020, Adani won the world's largest solar bid by the Solar Energy Corporation of India (SECI) worth $6 billion. The 8000 MW photovoltaic power plant project will be taken up by Adani Green; and Adani Solar will establish 2000 MW of additional solar cell and module manufacturing capacity. In September 2020, Adani acquired a 74% stake in Mumbai International Airport, India's second busiest airport. In January 2022, he became Asia's richest person, surpassing Mukesh Ambani. In a span of just about 43 years, Gautam Adani has made progress to become the richest person in Asia and this fact speaks of the person's capability. His contributions towards the Ports of India, in particular, is a great achievement of his. Today, Gautam S Adani is making a whole hearted effort to give a push to various aspects of the National Security.

Babasaheb N Kalyani

Bharat Forge and the Kalyani Group

On 23 December 2021, Pune based Indian multinational company Bharat Forge Ltd. launched one of its kind indigenous Multi-terrain Artillery Gun (MArG) 155 – BR at the hands of Defence Minister of India, Rajnath Singh, in the presence of the Chief of the Army Staff General Manoj Mukund Naravane. In line with the Government's Make-in-India and Atmanirbhar Bharat Mission, Bharat Forge has been making great strides to create defence solutions with high-end technology and advanced manufacturing techniques with the objective to design, develop and manufacture state- of-the-art weapon systems for the Indian Defence Forces.

The Made-In-India Multi-terrain Artillery Gun (MArG) 155 – BR is the only 155mm, 39 calibre gun system mounted on 4×4 HMV in the world. The vehicle weighs 18 tons and has the capability to be deployed even in mountain regions. The gun system is equipped with 'shoot and scoot' capability, providing advanced technical performance and high integration.

Bharat Forge is following what it calls a three-horizon strategy for development of defence equipment. Horizon One has products such as artillery guns, some armoured vehicles, and some speciality vehicles. Horizon Two also has speciality vehicles. Horizon Three has electronics and high-end technology developments. With decades of metallurgical know how, manufacturing

prowess and innovation driven solution providing capability, Bharat Forge has aggressively scaled up its role during the last two decades in strategic sectors of defence, aerospace and nuclear. The organization has partnered with leading defence companies all over the world to address, design and cater to the requirements of the Indian defence sector. The company is set to take giant leaps and make significant contributions to indigenize the Indian defence sector while helping India achieve the dream of self-reliance.

Bharat Forge is one of the leading suppliers of components from India to the aerospace industry. The company makes airframes, structural components, aircraft turbines, fan blades, landing-gear components, compressors and engine parts for the aviation sector. Contributions of Bharat Forge and its allied Companies in the manufacture of Defence related equipment and spare parts of sorts is increasing each year and the credit of all this goes to Babasaheb N Kalyani. Bharat Forge, 500 million (revenue) Company,   has also jumped into manufacture of Electric Vehicles with Tork Motors to improve the atmosphere. A brief on Baba in this article, as he has proved / proving a great contributor to India's National Security by building up its Defence requirements would be apt.

Early life. Babasaheb Kalyani was born in a Marathi family on 7 January 1949 to Mrs Sulochana and Mr. Neelakanth Kalyani, a Pune-based technocrat and maker of automotive components. He completed his high school from Rashtriya Military School, Belgaum; earlier known as King George School, Belgaum. He also attended Dr (Mrs) Erin N.Nagarvala School, (formerly National Model School), Pune; BITS Pilani, from where he earned a BE (Hons) in Mechanical Engineering in 1970, and later Massachusetts Institute of Technology where he earned his MS degree. Baba has served as the Chairman and Managing Director of Bharat Forge, the Flagship company of the Kalyani Group and the world's second-largest forgings manufacturer after Thyssen Krupp of Germany.

Baba's Achievements. Babasaheb joined Bharat Forge, a global manufacturing company, in 1972. To contribute to a clean and emission-free environment, Kalyani has set up 'Kenersys Limited' to manufacture various energy-efficient wind turbines for domestic and international markets. The company also has its own wind turbines in Maharashtra which generate "green energy" for the group's manufacturing operations. Baba is also engaged in developing solar energy equipment for the non-conventional energy sector. In a joint venture with 'Kirtaney Pandit Information Technologies' (KPIT) Cummins, Bharat Forge is developing a hybrid solution that would contribute in the country being able to meet its vehicular emission targets. Baba Kalyani is on the Board of Directors in 'Svenska Kullager Fabriken' (SKF),a Swedish

Ball Bearing Company, since 2011. On 19 February 2015, the Kalyani Group announced a joint venture with Rafael Advanced Defense Systems of Israel. This joint venture company will be based in India. Baba is the founder-chairman of Pratham Pune Education Foundation, an NGO that is engaged in providing primary education to children belonging to under-privileged sections of the local community, which was established in 2000. In April 2021, Forbes estimated net worth of Kalyani Group to be around US$2.3 billion

Baba's Honours and Awards. Kalyani received the Indian Government's Padma Bhushan award for contributions to Trade and Industry. He was made Commander First Class of the Royal Order of the Polar Star by the Swedish government in recognition of his contribution in furthering trade and business cooperation between Sweden and India. Other major awards of Baba include CEO of the Year 2004 by the Business Standard group; Entrepreneur of the Year 2005 for Manufacturing by Ernst & Young; German Businessman of the Year, 2006 by Business India Magazine and Global Economy Prize, 2009 for Business by Kiel Institute. Government of India constituted a task force under the Chairmanship of Baba Kalyani to study policies related to special economic zone (SEZ) on 6 June 2018.

Baba a Philanthropist. He is the founding Chairman of Pratham Pune Education Foundation, a charity that provides primary education for underprivileged children. Baba has adopted 5 Districts covering 100 Villages in Maharashtra to assist them in their development using its CSR funds.

Kalyani Group. Kalyani Group is a private industrial group in India. It is focused in four primary sectors, viz. Engineering Steel, Automotive & Non-Automotive Components, Renewable Energy and Infrastructure and Specialty Chemicals. It has also made strides into defence manufacturing, which was showcased in Def Expo 2020. It has joint ventures with companies such as Meritor, Carpenter Technology Corporation, Hayes Lemmerz, First Automobile Works (FAW) Corp etc. Kalyani group has very recently forayed into Indian football by entering in 'India's Premier Football Tournament I-league'. They launched their football team on 23 November 2014 named 'Bharat FC'. The Kalyani Group was founded by Nilkanthrao Kalyani. The group is currently chaired by Baba Kalyani. The Group holds key stakes in about 15 Companies.

Baba Kalyani, with his two major establishments, Bharat Forge and the Kalyani Group, is deep into manufacturing and producing various other products which are building a large number of essentials related to National Security and thus giving it a good boost. .

Conclusion

National Security is an essential requirement of every Nation for its day to day existence and its development. In all three parts of this article an effort has been made, by describing only a few prominent personalities of the Country, to emphasise that leadership to take forward the National Security aspects matter. Leaders have motivated our public to work, they have taken Indian business overseas, by their great interactions and deeds the leaders have earned a name and a place of honour not only for themselves but also for Our Nation. The leaders have been great philanthropists for the betterment of the world community, helping a large number of Indians, they have been suitably honoured and awarded with many laurels and so on. Considering the contribution of the 'Individuals' like those mentioned in the three articles, the future scenario and the relentless work of the Nation on all aspects of National Security, one is sanguine, that we will be able to look at our Country, to be a progressive Nation and a leader of the World.

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✍ ABOUT THE AUTHOR

**Major General
(Dr) Vijay P Pawar,**

Major General (Dr) Vijay P Pawar, AVSM, VSM (Retired), an alumni of NDA Kharakvasala, served in the Indian Army for 41 years. He was assigned into the Corps of Engineers (Madras Sappers) where he worked with his troops to achieve outstanding fetes in the most difficult terrain of the North and the North East. He has taken part in active operations in Northern and Western frontiers. He commanded his engineer unit in J & K during the Peak of insurgency (1990 – 93) in the areas of Siachen, Leh - Ladakh, Kargil and Kupwara sectors to achieve the best during that time. While in service he was able to attend all the important courses of instruction including the Higher Command and the National Defence College Course. He has held, during service, important assignments of Instructor at NDA Khadakvasala, Brigade Major of an active Brigade formation, Colonel Administration of a Division on the Western Border, Commander an Engineer Brigade in Deserts, Chief Engineer with the Air force, Commandant of MEG & Center at Bangalore, Provost Marshal of the Indian Army and Major General In charge Administration in Northern Command. On retirement he has continued to work in the Corporate Sector, Government Institutions, NGOs and various schools in different capacities. He has studied 'Disability' as a subject and in 2017 received his 'Ph D' in Management and Human Resource in Pune. He has to his credit a large number of awards and decorations.

UKRAINE CRISIS

BY MAJ GEN NITIN GADKARI (RETD)

Russia invaded Ukraine on 24 Feb 22, thus lifting the prevailing uncertainty, and veil of hope. Despite the US and NATO warnings about a Russian invasion, the actual offensive surprised many countries, including Germany and France. They were hoping that Putin would at best launch an offensive more as a face-saving ploy than try and annex the whole of Ukraine. When the assault came, it came from three different directions and surprised many for its scale and audacity. The lack of principles involved in fighting a conventional war in Phase I has surprised many strategic thinkers and military experts. The Ukraine war has reached the end of its second Phase, and awaiting the launch of the Final Phase of the war. And with that, it has raised more questions than ever before. What is in Putin's mind? Will he ever stop or continue the fight relentlessly till he gets his military and political objectives? What is the end state he wishes to reach? Is the Russian military underprepared

or unwilling to fight? Why was the progress of the operations so slow? These questions and many more haunt students of military history and geopolitics.

Ukraine was a part of the erstwhile Soviet Union and separated from it in the 1990s, when the Soviet union disintigrated. It lies on the western front of Russia and is the buffer between Western Europe and Russia. While the physical distance between western Europe and Russia is not much, the ideological distance is far too great to be bridged. While one advocates freedom of life, the other advocates state control as a means to that freedom. The imposition of the state as a factor in achieving individual freedom lies at the core of this crisis. There are many other catalysts in the broth, which accelerate the reaction from time to time to keep the crisis alive. However, the state has reached a critical mass, with Russia having made up its mind to confront NATO'S expansion near its borders. Russia insists and would not back down on its demand of Ukraine not be admitted into NATO. And NATO must reverse its expansion eastwards.

Ever since the Soviet Union disintegrated, the desire of the erstwhile Warsaw pact countries to move away from the Russian Federation towards the west has been on the rise. From 1994 to 2004 Czech Republic, Hungry, Poland, Estonia, Latvia, Lithuania, Romania and Slovakia have joined the NATO alliance. Many others wanted to join NATO, but a democratic system is necessary to enter the alliance. So many ex-soviet countries instead signed an agreement for NATO Partnership for a peace programme like Armenia, Georgia, Azerbaijan, Kyrghyz Republic, Moldova, Kazakhstan, Ukraine and Belarus.

In 1992 Russia allied with post-soviet nations to counter NATO influence, named CSTO (Collective Security Treaty Organisation). CSTO has only six members today; all of them are CIS (Commonwealth of Independent States). CSTO became a military alliance in 2002. But it never could match the strength of the 30-member NATO alliance. The expansion of NATO to the east, i.e. closer to Russian borders, has been viewed with concern in Russia. As President Putin became more powerful at home, his ambition to see the return of the lost glory of the soviet era has resurrected. To understand the Ukraine crisis, readers must understand the Crimean situation and the annexation of Crimea by Russia in 2014. The Crimea Republic and the Port city of Sevastopol were critical strategic needs of the Russian Navy. Crimea was transferred to Ukraine in 1954 from the Soviet Federation to the Ukraine Federation by Nikita Khrushchev, the First Secretary of the Communist party. This transfer has come under severe criticism by nationalist Russians. The Crimean Peninsula had a majority Russian-speaking population which was at odds with the rest of Ukraine. The trouble grew in Crimea when the Russian-speaking population opposed the Ukrainian government curbing the region's autonomy. In March of

2014, Russian troops in civil clothing captured the Crimean parliament building. They sealed the borders, thus starting the annexation operation. Later they legitimised the annexation by conducting an in-house referendum in which 90% of the Crimean population voted to be a part of Russia.

Why was Crimea important to Russia? Because of the warm water port of Sevastopol, from where the Russian Navy made forays into the Black Sea and the Mediterranean and the abundance of hydrocarbon deposits in and around Crimea in the black sea. The annexation of Crimea did not go well with any NATO countries. The current US President Joe Biden was Vice President in the Obama regime then, and was accused of not doing enough to stop the Crimean annexation by Russia. The US president is still seething in that indignation. NATO and Ukraine have ever since been wary of Russia's intent in the region.

The Donbas region of Ukraine is the eastern frontier joining the Russian landmass. In March of 2014, with the Crimean crisis, protests erupted in the Donetsk and the Luhansk region, collectively known as the Donbas region of Ukraine, by the Pro Russian separatists of this region. By the May of 2014, these protests turned into an armed conflict. The Russian military supported the separatists. Eight years on, the war still rages despite two accords, the MINSK I & II. Ceasefire violations continue daily. The current Ukraine-Russia crisis is driven by Donbas as by Ukraine's desire to join NATO.

The situation worsened with the talks between NATO, and Russian authorities failed to reach an amicable agreement on Ukraine's membership in NATO. Russia is adamant about its demands of NATO closing its doors on Ukraine. On the other hand, NATO is unwilling to cease its open doors policy, stating Russia cannot dictate whom NATO should admit whom they should refuse. The stalemate was accentuated by 175 thousand strong Russian troops surrounding Ukraine from three sides in the garb of winter training exercises. These included their crack special forces, air force assets, tanks and artillery units. NATO perceived this as a direct threat to Ukraine. US President, Joe Biden, was scathing in his pronouncements about the Russian intent to attack Ukraine.

The war is still waging when writing this article in early Mar 2022; there seems no end in sight. It is believed that the Russian are following a plan, and as per that, they may be entering the final Phase of the war. The Russian armed forces are at par with NATO's best. They are well equipped, and before the war started, 175,000 troops surrounded Ukraine from three sides: The North, East, and the South. It is hard to find the actual dispositions of the Russian formations. Analysts believe that its composition and size are the same as

in 2014-2015 during the Crimean crisis. Taking that as a basis, Russia has a formidable force in these three directions. There is at least an Airborne Division on all these three thrust lines coupled with one SF (Special Forces) brigade. The array of forces is imposing. For this reason, it is surprising why Russia could not make much of a decisive foray in Ukraine in Phase- I of the war. The map with the dispositions below adequately illustrates this point. The first is deployments in 2014/15 and second in Feb 22.

The lack of progress in the First Phase of war, roughly from 24 Feb 22 to 01 Mar 22, has baffled all Russian watchers. Many have questioned the Russian strategy, their ability to fight, young soldiers' low morale, etc. While all these are worth examining, the most serious question is: what is in Putin's mind? His thought process was not evident in the first four days of the war. It gave hope of an early ceasefire and halting of hostilities. Yet these expectations were belied. A lot is spoken about the information warfare running before the invasion and concurrently running as the advance of the Russian forces into Ukraine. The general belief is that this campaign, led chiefly by the western media, has favoured Ukraine. All the images and stories emerging from Ukraine suggest

large-scale destruction by Russian bombardment and senseless killing of an innocent population. Social media videos have shown great resistance by the Ukrainians in the face of stiff Russian attacks. There were videos and snippets on Social media about the low morale of the young Russian soldiers. The Russians are losing the information war in Ukraine.

A sizeable section of the population worldwide, and even in India, believe that while President Putin cannot be condoned for his act of a naked invasion of Ukraine, he has a legitimate grievance against NATO for its hunger to expand eastwards come at the doorsteps of Russia. The exact section also believes that the Russian armed forces are moving based on a well-made plan. The Russians have avoided the destruction of civilian infrastructure and the population as a deliberate strategy, in line with their overall plan. It would explain the shyness shown by the Russians to use their vast air force. The majority of their aircraft, totalling over 300 against the Ukrainian borders, are silently sitting in their bases around Ukraine. Western experts are baffled at the reluctance of the Russians to use their air force for the destruction of the Ukraine ground forces at the beginning of their campaign. Many reasons have been attributed to the lack of employment of their air assets. Lack of training hours rendering the Russian pilots unsure about their flying skills could be the silliest of them. The Russian pilots are as good as any of their NATO

counterparts. Poor inventory of precision bombs with the air force is another reason attributed. These and others don't sound convincing. The Russian air force was overactive in bombing ISIS and fighting the NATO supported rebels in Syria.

What is Putin's end state?

As the war gets in the decisive Phase, it does appear that the Russians have a well thought out strategy and objective. Capturing Kyiv and important cities and bringing about a regime change seems the most likely objective. President Zelensky of Ukraine appears unlikely to give up the fight. The Russians aim to capture Kyiv and capture the government buildings and hope that by then, Zelensky is either eliminated or has escaped. The final Phase is bound to see the siege of Kyiv and other vital towns like Kharkiv, Mariupol and Kherson. The plan is to break the Ukrainian will to fight by denying them necessities like water, food, and electricity. On its face, the Russians appear to endeavour to minimise the civilian casualty and damage to infrastructure. The aim is to resurrect the capital at the earliest once the regime change
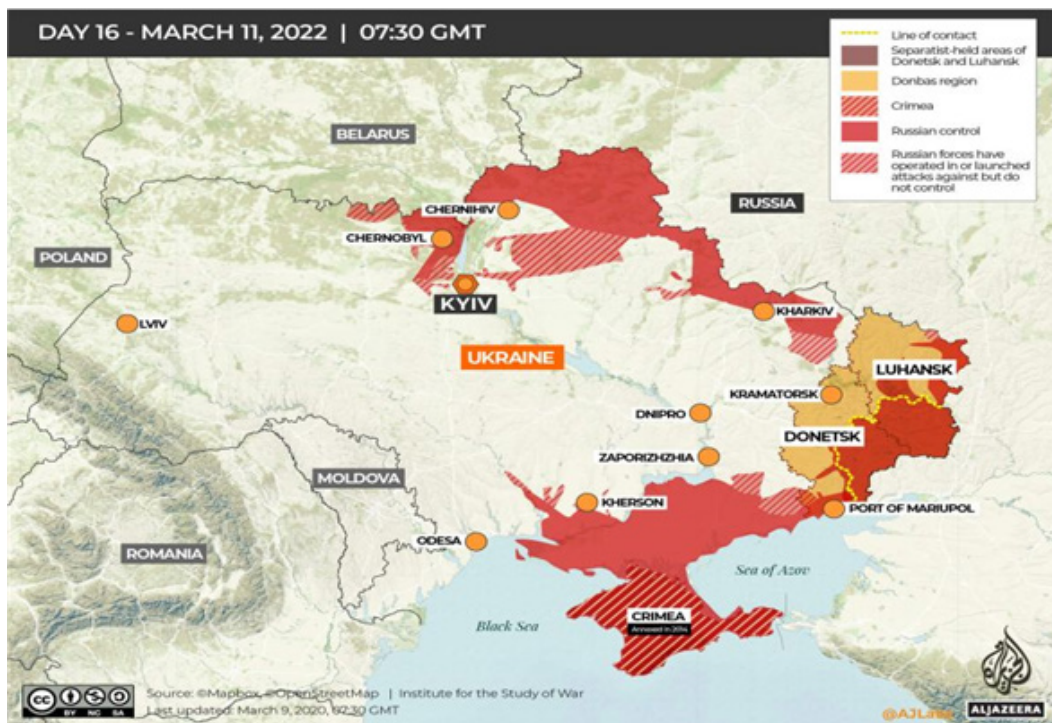
is affected. By the end of the second Phase, Russia has gained a foothold in the port city of Mariupol. The capture of Mariupol will allow Russians to create a land bridge between the Crimean Peninsula and the western border of Russia. It will enable the control of the sea of Azov. The port of Odesa is also under siege from the sea side in the south. The seige allows the Russian Navy to dominate the entire southern coastline of Ukraine along the Black sea. With no navy, Ukraine has lost sea access for its trade and commerce and would be at the mercy of the Russians for seafaring. Going into the third week, who controls what in Ukraine will allow readers to infer if Russia has made adequate progress or not.

From a military campaign point of view, the thrust into Kharkiv from the north is very significant. One, it allows a pincer to move to Kyiv from the east and south-east and second, it will enable the Russian forces to capture areas east of the Dnieper River which is a psychological frontier between the eastern part of Ukraine, which is predominantly pro-Russian and western Ukraine; where the population is more inclined towards the NATO. Should the primary political objectives fail, the integration of the eastern regions of Ukraine with Russia would be a great victory to boast.

Everyone is asking: Why has Russian military not able to get better of Ukraine's weaker defence forces? Something has gone wrong in the calculation. In the beginning, everyone believed that it would be a short war with Russian armed forces making mincemeat of the Ukraine defence forces. The war has now lingered for more than three weeks. The rest of the world tolerated Putin's defiance against NATO, hoping that he would quickly put an end to this war. It is now apparent that the invasion of Ukraine has not gone as planned by Putin. Either the Russian generals overestimated their strengths, or the Ukrainians have surprised them with dogged determination. It could be Putin's gravest strategic miscalculation. His forces are stretched too far. He either presses for a victory, which seems impossible every passing day, or accepts an unprecedented defeat. In either case, with each passing day, Putin's Russia is losing the battle. Let us analyse the Russian inability to end the war on their terms.

Ukrainians Resistance

A lot has come out in the media about Ukraine's stubborn resistance to the advancing Russian forces. While ordinary Ukrainians must be given credit for showing grit and determination against a more potent adversarial force. The media report of civilians holding their own against the advancing Russian troops may seem exaggerated. But they have become a symbol of Ukraine's resistance against the Russians. The Ukraine armed forces are deployed mainly around the major cities and towns and possible choke points to fight the Russians. Since the battle of cities and towns has yet not begun, a significant portion of the Ukraine defence forces is engaged in hit and run tactics rather than a bloody defensive battle. They have used the NATO supplied Anti-tank missiles to stall the Russian advance on roads leading to cities. The destruction of tanks has slowed the Russian advance due to the resultant roadblocks. The reluctance of Russian air force to engage ground forces has made matter worst. As reports suggest, the Russian forces are poised for a major assault on Kyiv. Yet increasingly, most Russian supporters, are losing faith in the abilities of the Russian Armed Forces. Everyone is asking: Has Putin bitten more than he can chew?

The world is battling a refugee crisis resulting in a humanitarian crisis. The war has resulted in a refugee crisis. As per UNHCR, nearly 2.6 million people have fled into neighbouring countries looking for shelter. People, mainly the older women and children from all parts, are leaving Ukraine for safer pastures.
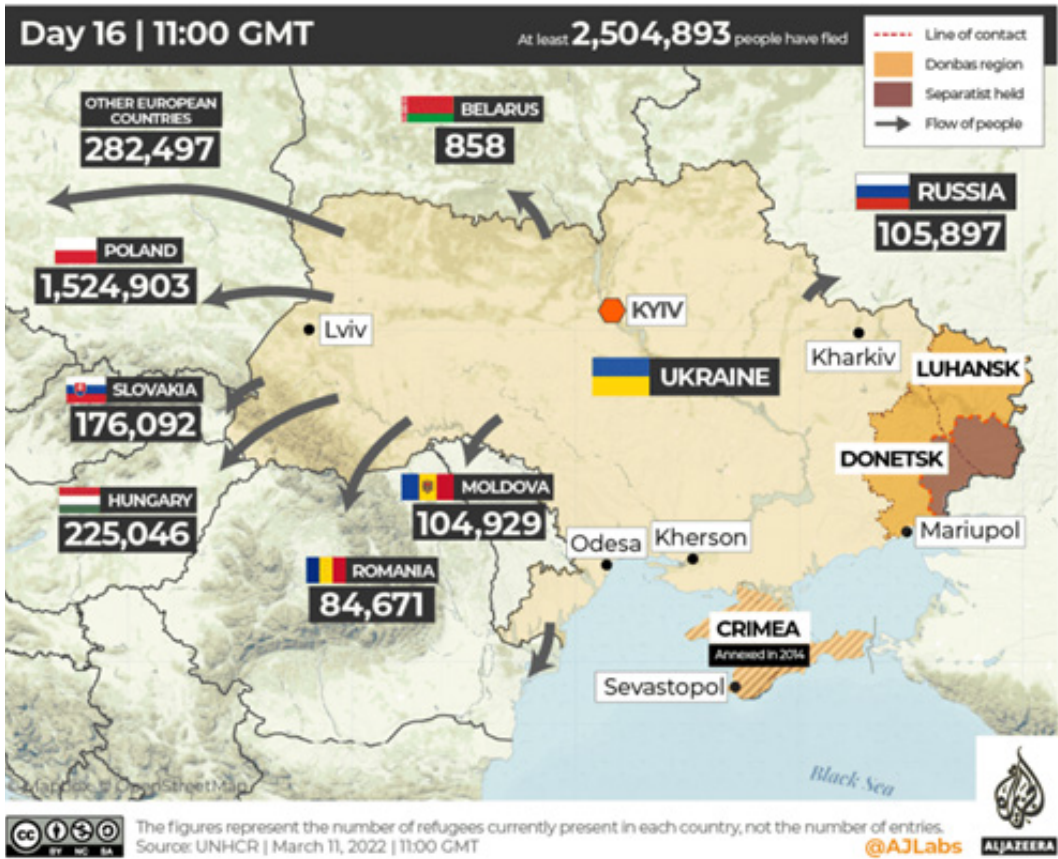
The abled men have opted to stay back to fight the Russians in the final battle of the cities. The map below shows the flight of refugees to various countries from Ukraine.

Russia is also losing the perception war. Its aggressive image resonates and reinforces every day under the barrage of western media reports. Trouble is growing in Russia too. There is a blanket ban on independent news and reporting. The Russian government has banned most social media platforms like Facebook and Twitter. The only networks that work are Kremlin-sponsored, which give one side of the story. Even the word 'War' is banned. In the face of this, Putin's internal troubles are growing. The Russian businesses have started feeling the heat of the newly imposed sanctions. Independent reports suggest that the young Russians, mostly the working class, are very upset with the current war. They do not want to be dragged by Putin's desires of taking on the world.

Even if Russia wins this war, which now seems very unlikely, what would be the consequences? The Russians have to leave Ukraine once the war is over. If they install a puppet regime in Ukraine, going for the new government would be tough. The Ukrainians civilians armed by the NATO and Ukraine army is a harbinger of a prolonged civil war in the coming days. It should be the most worrying future development for the Russian president: a low-grade insurgency in Ukraine during a puppet government rule. The division of Ukraine into eastern pro-Russian regions and NATO influenced western Ukraine is most likely breeding ground for a future civil conflict.

What's at stake for India?

India is on the horns of a dilemma whom to support in this ongoing crisis: the US or the Russians? Everyday pressure is building from both sides. The Quad insists that India is the key player in the Indo pacific region, targeting China. A war would see Russia and China ally against the Americans and NATO. Thus, India's continuance of supporting the Indo-pacific initiative would go against Russian interests being an ally of China. India has been steadfast in maintaining a good relationship with Russia despite leaning towards the US. As a new power block emerges, India faces a dilemma: where should it stand? China has become the king-maker in this conflict and put India in a spot of bother. Luckily for India, its abstaining from the vote in the UN on matters of the Russian Invasion of Ukraine has not come under major criticism. India would hope that it is not asked to pick one over the other during this crisis.

Oli prices will soon rise as the Russian oil goes out of circulation. The increase in oil prices would increase the inflationary pressure on the Indian economy. Petrol and diesel prices are already at their near highest points, and the common person would suffer even if he is a long way from Ukraine or Russia.

There is a fundamental problem in supporting Russia in its war with Ukraine. It stems from the occupation of disputed territories done by Russia in Crimea and wants to do in Donbas. India cannot show solidarity with such a cause. It would weaken its stance on Kashmir and disputed territories with the Chinese in Arunachal Pradesh and Eastern Ladakh. The Russian annexation of Crimea based on a close referendum is not the model that anyone, including China would wish to emulate. Chinese, too are unlikely to help Russia in public forums like the UN. They will help with other means. Internationally, the Russian stance on invading Ukraine is tenuous.

The evacuation of Indian students from Ukraine was a political victory for the Modi government. They have cash on its success. It is seen as a victory for the international standing of the Prime Minister as India is the only country that has been allowed to fly its planes for evacuation into the Russian announced no-fly zone. There are still Indian students stuck in Ukraine, and that would be a challenge to the government to get them all out of the war-torn cities. The Indian government may be unsure of Putin's intent in Ukraine, and it doesn't wish to be caught on the wrong foot. India's interests lie in countering the Chinese threat on its borders. It would guard its national interests at the end of the day. India's stance vis a vis Russia would thus be dictated by its long-term national interests and not by immediate sentiments.

What does NATO lose due to war between Russia and Ukraine? NATO is likely to lose more due to its dependency on the Russian LNG supply to fuel its daily household and industrial needs, especially in the cold winter season. The Russian oil purchase is going to reduce. But it's the Russian gas that fuels and heats the European homes and kitchens. Germany has shelved NORD STREAM 2 gas pipeline project. Thus, the door to cheap gas has closed for Germany. The economic sanctions would hurt Russia dearly but also hurt Europe. And this is where the differences between the US and the European allies would come to the fore. The US can pontify Russian sanctions, but Europe will bear the brunt with Russia. War on the European soil between two white Anglo-Saxon and Slavic people is the last thing that Europe wants. The war, if not stopped, would engulf the continent.

Conclusion

The media highlights this as the beginning of a third world war. No, it is not. In comparison, the media can bring many parallels and suggest similarities about how the other two started. The world is far wiser today. Maybe this explains the lack of desire of the NATO countries to come to the rescue of Ukraine by joining the fight against Russia. President Zelensky of Ukraine holds the key. His successor's removal in/from Ukraine would signal the beginning of the end of the Ukraine war. NATO countries may have given Ukraine a false hope of a membership, which President Zelensky bought hook line and sinker. In reality, Ukraine would never become a NATO member. It was a redline, which any wise Ukrainian leader should have assessed. The failure to see the redlines in respect of Russia has cost Ukraine this war. But Zelensky has come too far in this battle; he is unlikely to give up, especially if he senses that Ukrainian

forces can prevent Kyiv from falling into the Russian hands. Without Kyiv, Russia cannot claim victory. The longer the war lasts, the better the prospects of survival for Zelensky. It would now seem that the war is a survival battle for the two heads of Russia and Ukraine. Zelensky, the underdog, has sensed victory, and Putin is losing ground. How does it end? Only time will tell. But this clash of egos will cost many more lives and tonnes more of destruction.

✍ ABOUT THE AUTHOR

**Maj Gen
Nitin Gadkari**

Maj Gen Nitin Gadkari has had a distinguished career for 37 years in the army. He was commissioned into the Regiment of Artillery in June 1977. He commanded an artillery Regiment during Kargil operations in the strike corps in the western sector and an artillery brigade in a counter-terrorism role in the state of Jammu & Kashmir. He specializes in J&K and has done his PhD on "Motivation for Terrorism- A Study, focusing primarily on the J&K. He has a keen interest in security matters and has written in number of defence journals on allied subjects. He headed the prestigious College of Defence Management (CDM) Secunderabad. He retired on 30 June 14 from the Army War College, Mhow.

He has authored two books: Growing Sino Nepal Relations and Policy Implications on India, a book which came out of the research work he had done for CASS and his second book is a work of fiction; Oscar Tango (On Target), for which we are going to have a book launch in the second part of the session today.

RADIOLOGICAL DISPERSAL DEVICES (RDD):
THREAT PERCEPTION AND COUNTER MEASURES

BY LT COL (DR) TUSHAR GHATE

INTRODUCTION

Terrorism is a well planned sequential act executed to achieve mainly political goals. Killing people by unleashing deadly lethal activities is a very primitive aim of the terrorist organizations, wherein the primary focus remains towards polarization and weakening the social fabric of the society. Th e separation of the society takes place in three categories. One section gets 'convinced' by the philosophy of the organization that results in strengthening the terrorist organisations and further highlight the 'cause.' Second section remains unbiased and wows to fi ght this propaganda. However, these two sections form a very less percentile of the society. Th e most vulnerable is 'terrorized section of the society.' Majority of people form part of this. It is easy to exploit and terrorize people. Terrorist organizations look for unconventional ways to imprint terror on the mindsets of the people that remains persistent.

Use of Chemical, Biological, Radiological and Nuclear (CBRN) agents in terrorist activities is not a mere threat but proven fact. With change in dimensions and philosophy of terrorist organizations, these activities are stretching panborder. With this, there is an inevitable need of the day to address this menace in a holistic and coordinated manner.

Nuclear fi ssile material used in nuclear reactors and radioactive material used in commercial and research industries are two main potential sources that can be used in terrorist activities in form of Radiological Dispersal Device (RDD).

A "Radiological Dispersal Device (RDD)" or Dirty Bomb is high explosive such as RDX that has been combined with radioactive material, which scatters when it goes off . It kills or injures peoples through the initial blast of the conventional explosive and also result in spread of radiation and contaminationin the nearby region and in the downwind direction. It can be of almost any size. *RDD is not a nuclear weapon* as nuclear weapons involve complex fi ssion reactions and are signifi cantly more devastating. It is more appropriate to refer RDDs, as weapons of "mass disruption" that can spread fear and disrupt daily life. Th ese weapons are for terror. Th ey create psychological fear and also result in economical damage, due to release of various activities in the aff ected region and thereby requiring decontamination or demolition of structures in the aff ected areas. Th e likely radioactive ingredients for these devices Cesium, Cobalt and Iridium isotopes are widely used for industrial and medical purposes and are easy to come by.

Experts on international terrorism believe that the threat from radiological weapons is real and growing. Observers also have an understanding that the resources and expertise required to develop or acquire such weapons are already existing and spreading very fast amongst various terrorist organizations. As a result, the possibility of terrorists assembling the RDD or radioactive IED, a crude radiological weapon, which would probably use long-lived radioactive waste or nuclear fuel, is quite eminent.

BACKGROUND

Th e radiation produced by radioactive materials provides a low-cost way to disinfect food sterilize medical equipment, treat certain kinds of cancer, locate oil, build sensitive smoke detectors, and provide other critical services in our economy. Radioactive materials are also widely used in universities, corporate, and government research laboratories. As a result, signifi cant amounts of these materials are stored in laboratories, food irradiation plants, oil drilling facilities, medical centers, and many other sites. Access to radioactive materials by terrorist cannot be denied as the security of these materials is ensured by local agencies.

MANMADE DISASTER: POTENTIAL PROBABILITY VS. IMPACT
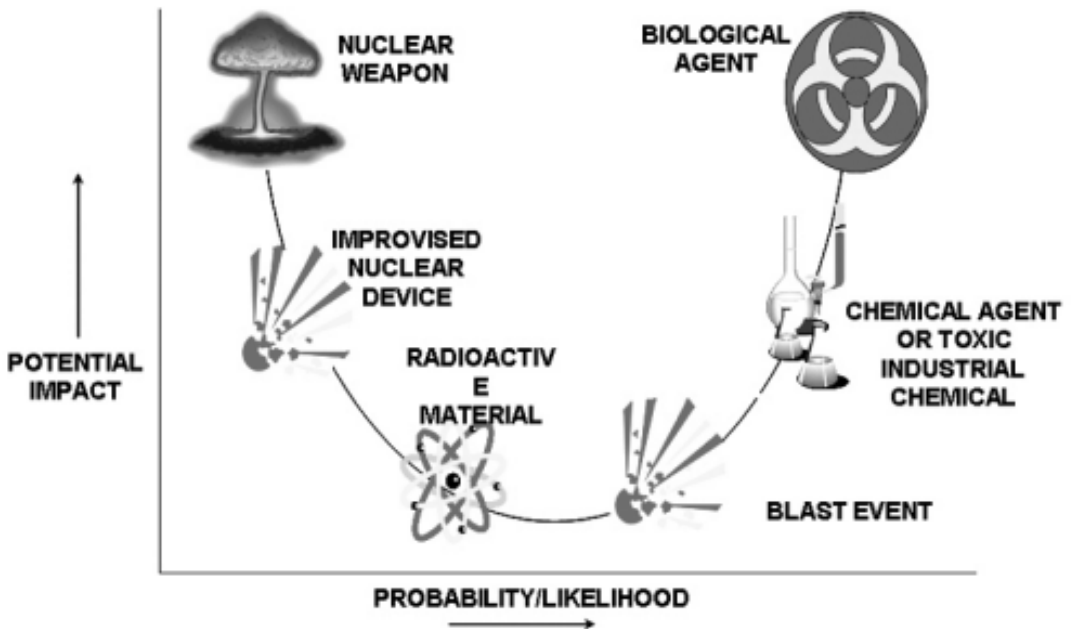
Threat Analysis

Radiological attacks constitute a credible threat. Radioactive materials that could be used for such attacks are stored in thousands of facilities around the world, many of which may not be adequately protected against theft by determined terrorists. Some of this material could be easily dispersed in urban areas by using conventional explosives or by other methods.

- While radiological attacks would result in some deaths, they would not result in the hundreds of thousands of fatalities that could be caused by a crude nuclear weapon. Attacks could contaminate large urban areas with high radiation levels.

- Materials that could be easily stolen from international research institutions and used in Dirty Bombs can contaminate crowded and important areas of the city at a level that would require prompt evacuation. Areas as large as tens of square Kilometer can be contaminated at levels that exceed recommended civilian exposure limits. Since there are often no eff ective ways to decontaminate buildings that have been exposed at these levels, demolition may be the only practical solution. If such an event were to take

place in a city like Mumbai, it would result in losses of potentially thousands of crores of Rupees.

• Important places like railways stations, crowded markets, religious places, Government establishments like parliament, assembly houses are most vulnerable targets. Terrorists will plant and explode multiple Dirty Bombs here and also announce the same in public. Th is will result in stampedes and commotions which will make security agencies diffi cult to control the situation.

Till the time these installations and places are not decontaminated, it cannot be opened to the public. For example, CST railway station in Mumbai, stock exchanges, parliament house remaining shut down even for weeks will have severe economical psychological and political eff ect.

POTENTIAL SOURCES OF RDD

Russian Spent Marine Fuel as a Global Security

Risk Russian marine fuel is a trans-national security concern. Russian fresh fuel for marine reactors has been involved in several signifi cant cases of illicit traffi cking of special nuclear materials. Th e amount and quality of nuclear materials in Russian spent marine fuel give also reason for concern. Not less than 200 marine reactor cores keep changing their spent fuel, unloaded and preliminary stored on shore in the far East and North West of Russia. Th is spent fuel is potential source for RDD.

OTHER SOURCES

Th e main potential sources of RDD are Hospital radiation therapy(Cobalt60, Cs-137), Radio Pharmaceuticals (I-123, Technnetium-99/ Th alium-201), laboratories and radiography and gauging(Co-60, Cs-137, Ir-192)

Possible Terrorist scenario Involving the Use of Radioactive Materials Use of Iridium-192 source available in industrial radiography cameras

These cameras are used in large numbers all over the country for the purpose of Non Destructive Testing (NDT) in the industry. Each camera would have a radioactive source with the strength of 60 Ci. Terrorists can steal one or more cameras, extract the source, combine it with conventional explosives and explode it as a normal explosion device.

USAGE OF CO-60 SOURCE AVAILABLE IN TELETHERAPY UNITS

Example 1- Cesium (Gamma Emitter)

Imagine that the cesium in this device was exploded in Mumbai, in a bomb using ten five Kgs of High Explosives such as RDX. The blast effect will claim the initial casualties and also spread the Cesium activity along with the dust in the nearby area. This will have deterministic effects like vomiting, nausea among the people coming in contact with radioactive dust. These apparent effects will further spread fear psychosis.

Example 2 - Cobalt (Gamma Emitter)

Now imagine if a single piece of radioactive cobalt from a food irradiation plant was dispersed by an explosion at the lower tip of Mumbai. Typically, each of these cobalt "pencils" is about one inch in diameter and one foot long, with hundreds of such pieces often being used in the same facility. Acquisition of this material is less likely than in the previous scenario, but we still consider the results. No immediate evacuation would be necessary owing to spread of radioactivity, but in this case, large area would be contaminated. The entire area of Mumbai would be so contaminated that anyone living there would have a onein-a-hundred chance of dying from cancer caused by the residual radiation. To tackle this situation, large amount of demolition might be necessary.

To summarize the first two examples, materials like Cesium, Cobalt, Iridium, and Strontium (gamma emitters) would all produce similar results. Long-term contamination would require abandonment of large urban areas, resulting in severe economic and political effects.

Example 3 - Americium (Alpha Emitter)

A device that spread materials like Americium and Plutonium would create an entirely a different set of risks. Consider a typical Americium source used in oil well surveying. If this were blown up with one Kg of RDX, people in a region roughly ten times the area of the initial bomb blast would require medical supervision and monitoring, After the initial passage of the cloud, most of the radioactive materials would settle to the ground. Of these materials, some would be forced back up into the air and inhaled, thus posing a long-term health hazard.

PRESENT SECURITY

With the exception of nuclear power reactors, commercial facilities do not have the types or volumes of materials usable for making nuclear weapons. Security concerns have focused on preventing thefts or accidents that could expose employees and the general public to harmful levels of radiation. Anti National Element (ANE) or even thief might, for example, take the material for its commercial value as a radioactive source, or it may be discarded as scrap by accident or as a result of neglect. Th is system works reasonably well when the owners have a vested interest in protecting commercially valuable material. However, once the materials are no longer needed and costs of appropriate disposal are high, security measures become lax, and the likelihood of abandonment or theft increases

Concern about the intentional release of radioactive materials changes the situation in fundamental ways. Th ere is a need to wrestle with the possibility that sophisticated terrorist groups may be interested in obtaining the material and with the enormous danger to society that such thefts might present.

Significant quantities of radioactive material have been lost or stolen from nuclear related facilities during the past few years and thefts of foreign sources have led to fatalities. In the US, sources have been found abandoned in scrap yards, vehicles, and residential buildings. In September, 1987, scavengers broke into an abandoned cancer clinic in Goiania, Brazil and stole a medical device containing large amounts of radioactive Cesium. An estimated 250 people were exposed to the source, eight developed radiation sickness, and four of them died. At large in most cases, the loss of radioactive materials has resulted from an accident or from a thief interested only in economic gain. In 1995, however, Chechen rebels placed a shielded container holding the Cesium-137 core of a cancer treatment device in a Moscow park, and then tipped off Russian reporters of its location. Th is can be termed as first of its kind of incidents in which the terrorists were succeeded in placing an actual RDD.

HEALTH RISKS

Gamma rays pose two types of health risks. Intense sources of gamma rays can cause immediate tissue damage, and lead to acute radiation poisoning. Fatalities can result from very high doses. Long-term exposure to low levels

of gamma rays can also be harmful because it can cause genetic mutations leading to cancer. Triggering cancer is largely a matter of chance: the more radiation one is exposed to, the more often the dice are rolled. Th e risk is never zero since we are all constantly being bombarded by large amounts of gamma radiation produced by cosmic rays, which reach us from distant stars. We are also exposed to trace amounts of radioactivity in the soil, in building materials, and other parts of our environment. Any increase in exposure increases the risk of cancer. Alpha particles emitted by plutonium, americium and other elements also pose health risks. Although these particles cannot penetrate clothing or skin, they are harmful if emitted by inhaled materials. If plutonium is inhaled, contaminated particles can lodge in the lung for extended periods. Inside the lung, the alpha particles produced by plutonium can damage lung tissue and lead to long-term cancers.

People will be exposed to radiation in following ways after RRD blast.

- **First,** they will be exposed to material in the dust inhaled during the initial passage of the radiation cloud, if they have not been able to escape the area before the dust cloud arrives. We assume that about 20% of the material is in particles small enough to be inhaled. If this material is Plutonium or Americium (or other alpha emitters), the material will stay in the body and lead to long term exposure.

- **Second,** anyone living in the aff ected area will be exposed to material deposited from the dust that settles from the cloud. If the material contains cesium (or other gamma emitters) they will be continuously exposed to radiation from this dust, since the gamma rays penetrate clothing and skin. If the material contains plutonium (or other alpha emitters), dust that is pulled off the ground and into the air by wind, automobile movement, or other actions will continue to be inhaled, adding to exposure.

Indian Government has a series of recommendations for addressing radiation related sabotage / accidents. Immediately after the attack, authorities would evacuate people from areas contaminated to levels exceeding these guidelines. People who receive more than twenty-fi ve times the threshold dose for evacuation would have to be taken in for medical supervision.

In the long term, the cancer hazard from the remaining radioactive contamination would have to be addressed. Typically, if decontamination could not reduce the danger of cancer death to about one-in-ten-thousand, the Department of Atomic Energy (DAE) would recommend the contaminated area be eventually abandoned. Decontaminating an urban area presents a variety

of challenges. Several materials that might be used in a radiological attack can chemically bind to concrete and asphalt, while other materials would become physically lodged in crevices on the surface of buildings, sidewalks and streets. Options for decontamination would range from sandblasting to demolition, with the latter likely being the only feasible option. Some radiological materials will also become fi rmly attached to soil in city parks, with the only disposal method being large scale removal of contaminated dirt. In short if there is high risk in the area that is contaminated by a radiological attack, that area would have to be deserted.

THE PRACTICALITY OF RDD (DIRTY BOMBS)

To kill or sicken a large number of people would require a relatively large weapon with highly radioactive material. A truck bomb, for example, with 220 kilograms of explosive and 50 kilograms of one-year-old spent fuel rods could produce a lethal dosage zone with a radius of about one kilometer. Detonating such a device in an urban area with a large, unsheltered population might contaminate thousands of people or more. Although producing such a weapon is far easier than building a nuclear bomb, fabricating a highly eff ective radiological dispersal device that could easily be transported to its target would be diffi cult. Among the problems in building such a large device is the heavy shielding required to work with a signifi cant amount of highly radioactive material. Otherwise, it would melt the carrying containers and sicken or kill anyone attempting to assemble or transport the weapon. For example, one assessment concluded that suffi cient radioactive material to contaminate 230 square kilometers would require about 140 kilograms of lead shielding. While such weapons will be diffi cult for most terrorists, the idea of martyrdom could lead some to disregard the dangers.

Distributing radiological material as a fi ne aerosol (the ideal molecule size being about one to fi ve microns, a fraction of the width of a human hair) would require some degree of specialized knowledge and specialized handling and processing equipment to mill the radioactive agent and blend it with an inert material to facilitate dispersion and increase the risk of inhalation.

Many variables can signifi cantly aff ect the eff ectiveness of an attack: the distance from the radioactive source; the manner of dispersal; weather conditions (extent of dispersal); the degree of protection (e.g., buildings and overhead cover); and the type of radiation. For example, Alpha particles--one type of radiation--travel only a short distance, and most will not penetrate

the dead, outside layer of skin. Th ey are harmful, however, if inhaled or swallowed. Beta particles can penetrate the skin and infl ict cellular damage, but they can be blocked by common materials such as plastic, concrete, and aluminum.

In contrast, gamma rays and neutrons are far more powerful and do not lose energy as quickly as alpha and beta particles when they pass through an absorber like clothing or walls. Heavy lead shielding, great amounts of other shielding with absorbent or scattering material (e.g., several feet of earth or concrete), or signifi cant distance (perhaps kilometers) may be required to avoid high-dose exposure.

Unlike nuclear weapons, a radiological dispersal device does not require plutonium or enriched uranium. It requires only some form of radioactive material, which any nuclear reactor is capable of producing. In addition, numerous medical and industrial practices employ radioactive substances. However, obtaining these less dangerous materials associated with industry and the medical fi eld would be easier than obtaining the more dangerous materials that result from nuclear power production.Illicitly obtaining these materials is not impossible. Most of the nations have stringent guidelines on storage, transportation and handling of radioactive materials. However this is not followed by rogue nations and results in large quantities of dangerous radioactive material remain unaccounted for.

PLANNING RESPONSE TO EMERGENCIES

Due to the enhanced safety features incorporated in the design of Indian nuclear reactors and the strict adherence to safety procedures during the operation of our nuclear facilities, probability of accidents leading to large quantities of radioactivity aff ecting members of the public is extremely small. In spite of this fact, DAE has established its own emergency control centers and emergency response mechanism to have an eff ective response in case of any radiation emergency situation. Periodic emergency exercises are conducted at by DAE to test the coordination between various response agencies and implementation of various emergency measures if an emergency situation arises due to any major accident in any of the facilities.

In case of a nuclear / radiological accident / sabotage, the prime concern will be the health and safety of the public. Since such incidents can lead to radioactive contamination of the environment, a very detailed emergency preparedness plan is in place to ensure that appropriate measures are taken

to prevent damage to the men, material and the environment.

The emergency preparedness plan involves diff erent agencies like DAE, National Disaster Management Authority (NDMA), state authorities etc. The plan in nutshell comprises of the following:-

- A quick and reliable monitoring methodology to detect the onset of an emergency condition,
- Rapid and continuous assessment of the accident / sabotage as it proceeds.
- Respond quickly and mobilise the resources at a short notice,
- Coordination for communication to agencies like fi re fi ghting, medical, police etc.
- Intervention levels for protective action,
- Action levels for withdrawal of specifi c supplies of food and drinking water and for temporary relocation of the exposed persons Initiation of the counter measures at the earliest
- Assistance to the aff ected group of people

LIKELY IMPACT OF DIRTY BOMB (RDD)

The impact of a successful dirty bomb attack on those who do not receive an immediately lethal, incapacitating dose of radiation is diffi cult to predict. Even the largest radiological dispersal device is likely to infl ict catastrophic casualties only if long-term cancer risks are considered. Prompt modern medical treatment can dramatically improve survivability after radiation injury for individuals who do not receive an initial, lethal dose of radiation. In particular, dramatic medical advances have been made in caring for individuals with suppressed immune systems, a common byproduct of radiation attack.

However, the danger of low-dose exposure from a radiological weapon is quiet eminent. Th e long-term eff ect of low-dose radiation is determined by the capacity of irradiated tissue to repair DNA damage within individual cells, which is governed by a number of exposure, health, and genetic factors. This eff ect neither can be predicted or detected.

Also, due to public fears of radiation, an attack might have a considerable disruptive eff ect--forcing mass evacuations, creating economic chaos, and infl icting environmental and property damage and signifi cant cleanup costs. Goiânia, incident mentioned earlier required a massive environmental cleanup.

Thus, radiological release that is intentional and associated with a terrorist attack would undoubtedly have a psychological eff ect disproportionately greater than the actual physical threat.

In RDD threat, fear factor is a major component. A radiological strike, in which the fear of the unknown might be particularly acute, could trigger severe and widespread reactions, including mass hysteria and serious psychological casualties.

RECOMMENDATIONS

A number of practical steps can be taken that would greatly reduce the risks presented by radiological weapons. Some recommendations are listed as under:

1) Reduce opportunities for terrorists to obtain dangerous radioactive materials with proactive intelligence.
2) Install early warning systems to detect illicit movement of radioactive materials in form of area monitors and network the same to assess the levels of suspected moving radioactive source.
3) Strict monitoring across borders.
4) Ensure accountability of the sources used in laboratories, institutes (especially spent sources).

Radioactive materials facilitate valuable economic, research and health care technologies. Measures needed to improve the security of facilities holding dangerous amounts of these materials will increase costs. In some cases, it may be worthwhile to pay a higher price for increased security. In other instances, however, the development of alternative technologies may be the more economically viable option. Specifi c security steps include the following:

● Fully fund material recovery and storage programs. Hundreds of plutonium, americium, and other radioactive sources are stored in dangerously large quantities in laboratories and other facilities. When these materials are actively used and considered a valuable economic asset, they are likely to be well protected. But in all too many cases they are not used frequently, resulting in the risk that attention to their security will diminish over time.

- Expanded use of radiation detection systems. Systems capable of detecting dangerous amounts of radiation are comparatively inexpensive and unobtrusive. Some have already been installed in critical locations in cities, at border points and throughout the country. High priority should be given to key points in the transportation system, such as airports, harbors, rail stations, tunnels, highways. Routine checks of scrap metal yards and land fi ll sites would also protect against illegal or accidental disposal of dangerous materials.

- Fund research to improve detectors. Low-cost networking and low-cost sensors should be able to provide wide coverage of critical urban areas at a comparatively modest cost. A program should be put in place to fi nd ways of improving upon existing detection technologies as well as improving plans for deployment of these systems and for responding to alarms.

- Training for hospital personnel and fi rst responders. First responders and hospital personnel need to understand how to protect themselves and aff ected citizens in the event of a radiological attack and be able to rapidly determine if individuals have been exposed to radiation. There is great danger that panic in the event of a radiological attack on a large city could lead to signifi cant casualties and severely stress the medical system. Panic can also cause confusion for medical personnel. The experience of a radiological accident in Brazil suggests that a large number of people presented themselves to medical personnel with real symptoms of radiation sickness - including nausea and dizziness - even if only a small fraction of these people have actually been exposed to radiation. Medical personnel need careful training to distinguish those needing help from those with psychosomatic symptoms

- Decontamination Technology Th e ability to decontaminate large areas to ensure inhabitation after decontamination and not requiring abandoning it.

CONCLUSION

The events like 9/11 in US has made it essential for us to revisit our national plans to tackle asymmetrical acts of terrorism. In coming years, with so called internationalization of terrorism, threat of use of unconventional methods like RDD is quiet eminent. Even though most of the nations ensuring strict control over storing, transporting and handling of radioactive materials,

loop holes in poor nations and rogue countries can be easily exploited by terrorist organizations to gain access and use radiological material. Proactive intelligence, international coordination and eff ective situation handling capabilities required to be developed to address this looming threat.

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PEOPLE'S ARMED POLICE : PARAMILITARY FORCE OF CHINA

BY MAJ GEN S H MAHAJAN

Background

India has Assam Rifles and the Coast Guard as Para Military forces. In addition, we have Central Armed Police Forces (CAPF) like the ITBP, CRPF, BSF, CISF and SSB. Established in 1982, the People's Armed Police (PAP) is the paramilitary wing of the Chinese Communist Party (CCP) which is a combination of India's Para Military Forces and CAPF, with a primary responsibility for maintaining domestic stability and a secondary role in providing rear area support for the People's Liberation Army (PLA) during wartime.

The PAP—with a strength of up to a million personnel—also fills a variety of other important roles and missions, such as responding to natural disasters, guarding government compounds, and participating in United Nations (UN) peacekeeping operations around the world. For most of its existence, the PAP was under the dual leadership of the Central Military Commission (CMC) and the State Council, with provincial and local officials granted significant latitude over PAP deployments in the event of emergencies. Some efforts to centralize authority were made during the 1990s and 2000s, but the basic character of the PAP went unchanged for three decades.

Since the 1930s, the CCP has fielded a paramilitary force to protect the party and, after the establishment of the People's Republic of China in 1949, ensure domestic stability. This force existed under different names, moved between different organizations, and involved a shifting degree of central versus local control. The modern PAP, established on June 19, 1982, was the result of Deng Xiaoping's desire to streamline the military's responsibilities and organizational structure—the PAP's predecessor had been under PLA authority for several years prior to Deng's arrival—and reduce its bureaucratic clout while handing more authority over to local officials. The PAP remained an integral part of China's armed forces, alongside the PLA and the militia, and was ultimately responsible to central party leaders, but actual lines of authority varied over time and across different operating forces within the PAP. Prior to the recent reforms, the PAP was under the dual leadership of the CMC and State Council.

According to the 2006 Defence white paper, the CMC was responsible for "management of officers" (including selection and promotions), organizational structure, training, and political work, while the State Council—via "relevant functional departments," referring principally to the Ministry of Public Security (MPS)—oversaw PAP operations, budgets, size, and composition. Reporting to both the CMC and State Council was PAP headquarters, led by a military region grade commander and a first political commissar who served concurrently as MPS director. PAP headquarters was organized along the same lines as the PLA, with first-level staff, political, and logistics departments and a general office to manage paper flows. One difference was that, unlike the PLA, which established a General Armament Department in 1998, the PAP's equipment bureau remained under the staff department. PAP headquarters had only limited authority over 31 contingents based in the provinces, autonomous regions, and provincial-level cities. Each contingent was composed of detachments, battalions, and companies at the prefecture, county, and township levels, respectively. Prior to 1995, command and management authority over these units was delegated to provincial- and lower level MPS departments,

an arrangement cemented by double-hatting MPS chiefs as first political commissars in PAP units at the same level. Spurred by the lessons of the 1989 Tiananmen crisis, in which PAP forces proved ineffective at handling a national crisis, the State Council and CMC issued a directive in March 1995 that placed PAP personnel management under centralized CMC control. However, local MPS bureaus—and thus provincial leaders and others with oversight of those departments—retained the authority to deploy PAP units within their area of responsibility.

In August 2009, the National People's Congress (NPC) approved the PAP Law, which stated that deployments must strictly adhere to procedures prescribed by the CMC and State Council, but did not provide details on those processes. This autonomy allowed local officials opportunities to use PAP units at their disposal in illicit or egregious ways. Most notably, PAP forces were used to quell protests and other "mass incidents" on many occasions in the 1990s and 2000s. These incidents, which centred on local grievances ranging from labour disputes to environmental concerns, topped 58,000 in 2003, with about 700 of those involving direct clashes with police forces. Some of these involved the use of force by PAP units. For instance, in December 2005, local officials summoned the PAP to quash an uprising in Shanwei, Guangdong, resulting in the death of at least 20 protesters, while in June 2008, local PAP forces clashed with protesters following a similar incident in Wenjian county, Guizhou Province. Use of PAP forces to abet local corruption was also a problem. In 1997, central leadership over the PAP was strengthened with the transfer of 14 mobile divisions from the PLA as part of a 500,000-person downsizing. These divisions, accounting for roughly 150,000 personnel, were at a second-tier level of readiness and thus less able to execute modern combat operations than other units, but could perform basic stability maintenance functions and provide rear area support to PLA units during wartime. Once absorbed into the PAP, they were rebranded as "forces" and geographically dispersed throughout the country. The mobile divisions offered national leaders additional capabilities to address crises such as the 2009 Urumqi riots—and one mobile division was in fact based within Xinjiang—and support events such as the 2008 Olympics. Along with the provincial contingents, the mobile divisions comprised the internal security forces, the largest of the PAP's operational commands.

The Military Balance estimated the overall size of the internal security forces at 400,000 during the 2000s (representing perhaps two-thirds of all PAP forces), though some estimates have run higher, putting the total number at up to 800,000. The internal security forces were also the largest recipient of PAP expenditures, which increased in the 2000s both in absolute terms and

as a share of China's domestic security spending. This funding came primarily from State Council coffers (with some contributions from local governments) and was thus not included in China's military budget, although some foreign analysts regarded it as a type of defence spending. Growing budgets allowed the internal security forces to modernize significantly during the 1990s and 2000s. Provincial units were increasingly mobile and lethal, with many units possessing armoured personnel carriers and military-grade equipment such as anti-tank weapons and Type-05/06 submachine guns. The PAP, like the PLA, also focused on building "new type capabilities" such as helicopters and unmanned aerial vehicles (UAVs), which could be used in tandem with ground patrols to carry out a range of missions. Key developments included the introduction of Z-11WB light attack helicopters, which could provide support for counterterrorism, counter narcotics, battlefield reconnaissance, and other missions; establishment of helicopter units within five provinces as part of a June 2011 CMC and State Council decision; and the proliferation of special operations forces (SOF) capabilities in all of the provinces, as well as the creation of elite commando teams such as the Falcons and Snow Leopards.

Until the most recent reforms, the PAP also included seven other operating forces. However, in practice, none were directly supervised by PAP headquarters. Three were law enforcement services that reported to the MPS: the Public Security Border Defence Force, which conducted surveillance and inspection activities along China's land and sea borders; Public Security Firefighting Force; and Public Security Guards Force, which protected officials as well as visiting dignitaries. Li Zuobiao, a professor at the PAP Academy, assessed that placing Border Defence and other forces under their own command created a system of "horizontal internal relations" that was "not conducive to the long-term construction and sustainable development of the PAP" and advocated centralizing these units under PAP headquarters (a suggestion that was not adopted).Through the Border Defence Force, the MPS also oversaw the China Maritime Police (CMP), which was the largest and best equipped of China's maritime law enforcement forces. Because of this affiliation, CMP personnel wore PAP uniforms, followed PAP ranks, and attended PAP academies. In July 2013, the CMP was merged into a new China Coast Guard (CCG) under the dual leadership of the MPS and State Oceanic Administration, thus ending its direct affiliation with the PAP, though former CMP troops continued to follow PAP customs. The remaining four forces were specialized economic units that had been absorbed from the PLA in the mid-1980s. These included the Gold Force, responsible for securing gold and other mineral resources; Hydropower Force, which managed hydroelectric dams; Forestry Force, responsible for

fighting forest fires; and the Transportation Force, which maintained China's national highways. These forces also reported to their own commands, rather than PAP headquarters, and coordinated with relevant State Council departments. China's defence white papers credited these units with a number of accomplishments such as the Three Gorges Dam and the Sichuan-Tibet highway, which aided China's overall economic growth.

In sum, the PAP developed into a proficient force capable of addressing a range of internal security, law enforcement, and economic challenges over its 35-year history. However, despite occasional reforms, such as the 1995 State Council/CMC directive and the 2009 PAP Law, PAP structure and lines of authority were not fundamentally altered. Several problems and weaknesses persisted, including a fragmented chain of command, excessive authority in the hands of local officials, and missions that extended well beyond ensuring regime security. The reasons for these failures are murky, but likely mirrored the impediments to overhauling the PLA during the same period, such as lack of effective political leadership from Jiang Zemin and Hu Jintao, bureaucratic intransigence, and threats that changes would pose to the interests of corrupt officers and local officials.

Key Changes

Under Xi Jinping's tenure, China has embarked on a series of major reforms to the PAP. These followed, and in some ways complemented, earlier organizational reforms to the PLA. Indeed, while changes to the PLA came first, the breadth of reforms to the PAP—which were unveiled toward the end of 2017 and into 2018—is no less ambitious. Key changes included:-

- restructuring PAP headquarters
- placing the PAP under the sole authority of the CMC and limiting the ability of local officials to deploy PAP units during a crisis
- establishing new mobile contingents, which will provide national leaders with additional rapid response capabilities
- divesting the PAP of certain law enforcement and economic responsibilities, such as border inspections and gold mining
- merging the coast guard—previously under civilian authority—into the PAP, and thus into the military command structure.

These changes raise a number of questions: what goals motivated Xi and other officials to develop such an expansive reform agenda? What political,

operational, and bureaucratic challenges will the PAP encounter as it implements the reforms? What implications could the reforms have for China's domestic governance and elite politics, the Chinese armed forces, and for the United States and others in the region? This article explores the key dimensions, drivers, and implications of the PAP reorganization.

Restructuring

China's premier paramilitary force—the People's Armed Police (PAP)—is undergoing its most profound restructuring since its establishment in 1982.

- Previously under dual civilian and military command, the PAP has been placed firmly under China's military. As chairman of the Central Military Commission, Xi Jinping now has direct control over all of China's primary instruments of coercive power. This represents the highest degree of centralized control over China's paramilitary forces since the Cultural Revolution.

- Local and provincial officials have lost the ability to unilaterally deploy PAP units in the event of civil unrest or natural disasters, but can still request support through a new coordination system.

- The China Coast Guard, which previously reported to civilian agencies, has been placed within the PAP and is thus now part of the military command structure.

- New PAP operational commands, known as "mobile contingents," have been established with a diverse mix of capabilities. They will play a key role in protecting the capital and could be deployed in a Taiwan contingency, among other missions.

- Geographic distribution of mobile PAP units remains skewed to western China, providing rapid reaction capabilities that could be used to repress dissent in Xinjiang and Tibet.

  Politically, the reforms reaffirm Chinese Communist Party (and Xi Jinping's) control over the PAP and may reduce the scope for local abuse of power.

- Despite earlier reforms, the PAP's chain of command was convoluted, confusing, and decentralized. These reforms sought to ensure central party control over an organization deemed vital for ensuring the party's security and survival.

- Centralizing command also attempts to bolster the party's legitimacy by reducing the ability of local officials to misapply PAP assets through

corruption or overuse of force to handle local grievances.

- A consequence of tighter control, however, could be slower responses to incidents as local officials have to submit requests through PAP channels. In some cases, officials may be reluctant to request PAP support in order to avoid negative attention from senior leaders.

- The reforms place Xi firmly in charge of the PAP, though he will have to exercise authority through trusted agents. The success of continued PAP reforms will depend on elite consensus that centralized management of PAP deployments is desirable.

   Operationally, the reforms narrow the PAP's responsibilities to three key areas: domestic stability, wartime support, and maritime rights protection.

- Several law enforcement and economic functions previously under the PAP, such as border guards and gold mining, have been divested and placed within appropriate civilian ministries and localities.

- PAP internal security forces remain focused on domestic security missions, including maintaining stability in western China, guarding government compounds, and disaster relief. PAP units would also be on the frontlines in responding to a major threat to the regime.

- The PAP has also been encouraged to play a stronger role in supporting People's Liberation Army (PLA) combat operations. Key roles could include guarding critical infrastructure and supply lines during wartime. Nevertheless, current PAP-PLA cooperation appears superficial and will remain so if the PAP is not better integrated into the PLA's joint command system.

- Incorporating the coast guard into the PAP could presage stronger integration with the navy in terms of operations, training, and equipment development, but this will require closer institutional cooperation than currently exists.

- The PAP will continue to face capabilities gaps, especially in niche areas such as special operations forces and helicopters. Its ability to close those gaps will depend on its political effectiveness in future budget negotiations.

Implications

As with the preceding organizational reforms to the PLA, the implementation of the PAP reforms both reflected and deepened Xi's ability to counter bureaucratic resistance and effect practical changes of the sort that eluded

Jiang and Hu. The result is that Xi's authority now encompasses all of China's armed forces, though that change should not be exaggerated since he already had control over PAP personnel appointments, political work, and training as CMC chairman, in addition to his direct leadership of the PLA. Nevertheless, as CMC chairman, he is now able to leverage PAP budgets and force structure to solidify his influence within the PAP, has operational authority over the internal security forces and the two new mobile contingents, and oversees the CCG. Given his other responsibilities, Xi must obviously rely on trusted agents within the PAP to formulate and carry out policies in line with his wishes. Aside from strengthening Xi's position, the key political implication will be more effective management over PAP resources and operations. Incidences of corruption may decline as local governments are less able to misuse PAP assets and as the PAP's Discipline Inspection Commission is more empowered to root out malfeasance within the ranks. Assuming that the new coordination system works as intended, embarrassing cases involving the use of force against civilians could decline (or at least shift to local police forces, where blame can be more easily attributed to local mismanagement) and thus aid the party's domestic legitimacy.

The reforms also brought PAP management into alignment with budgetary authorities: the internal security forces had been primarily funded by the central government and will now be under the tighter operational oversight of central leaders. The restructured internal security forces could be more effective in quelling unrest in Tibet and Xinjiang as well as in ethnic minority areas of Sichuan, Yunnan, and Qinghai. From the perspective of the CCP, this would contribute to stronger social and political control and either deter or enable better responses to mass incidents, especially as specialized capabilities such as helicopters and SOF are added. A more capable PAP presence in Xinjiang would complement, but not replace, other forms of social coercion that the CCP has been developing to manage discontent among ethnic Uighurs. These include augmenting local police forces, increasing use of facial recognition and other surveillance technology, and the opening of "re-education training centres" that international observers have compared to concentration camps. These developments have led to statements of concern by the United Nations as well as human rights advocates. An ancillary benefit of the reforms could be in the area of emergency management. Dispatching the Forestry and Firefighting forces to the State Council Emergency Management Department, for instance, could promote better integration of those functions with other civilian capabilities.

PAP internal security forces will likely continue as first responders in large-

scale disasters, although local autonomy over deployments will be curtailed. It is telling that one of the first reported exercises of the 2nd Mobile Contingent was a winter drill in Zhenjiang, Jiangsu, involving PAP transportation units working alongside provincial and municipal units to clear roads. It is also likely that some high-level coordination persists between the PAP and civilian agencies through the National Security Commission, established in late 2013 to improve interagency cooperation. The provincial and mobile contingents may also provide stronger support for PLA combat operations, assuming that the PAP devotes more attention to its wartime support mission and coordination challenges between the PAP and PLA are resolved.

Key PAP roles will include protecting critical infrastructure within China, guarding supply routes, and maintaining social stability (including responding to potential unrest in Beijing and other major cities). Despite the transfer of Border Defence Force units to the State Council, the PAP may also reinforce China's borders during a conflict involving North Korea and handle an influx of refugees in the event of a North Korean collapse. In comparative context, this mirrors the role that the newly reconfigured Russian national guard is anticipated to play in the event that Russian territory is threatened during a regional conflict. While the PAP will remain focused on domestic missions, there are also several notable international implications of PAP reform. First is that the PAP is emerging as a valued training and operational partner in the non traditional security arena. Some of these activities take place within China. As early as 2002, the PAP opened a training centre for foreign police forces engaged in UN peacekeeping operations. In August 2016, the PAP Academy initiated another UN-related course for foreign police forces, with the first class drawn from several African countries. In 2016, the PAP also launched a biennial "Great Wall" counterterrorism forum in which it has brought representatives from many countries to China for discussions and to observe drills. PAP forces have also conducted joint counterterrorism exercises in China, such as a December 2017 event with Russian national guard forces that focused on "jointly cleaning up terrorist groups . . . [including scenarios] such as a bus hijacking." The PAP is also poised to expand its overseas partnerships. One way is through participation in UN peacekeeping operations. The PAP first deployed civilian police to a UN mission in East Timor in 2000 and has participated in subsequent missions in countries such as Liberia, Haiti, and Afghanistan. These activities may continue or even increase as China looks to buttress its international reputation as a "responsible" country. Another avenue is through joint counterterrorism operations with individual countries. A legal basis was provided in the 2015 Counter-Terrorism Law, which

permitted PAP (and PLA) overseas deployments with CMC approval. Recent media reports suggest that PAP assets are pursuing this mandate through joint patrols in Afghanistan and have even opened a forward base in Tajikistan, from which PAP units are attempting to interdict terrorists flowing into Xinjiang. An advantage of using PAP assets is that Beijing can deny official "military" intervention in neighbouring countries; those claims, however, will ring less true now that the PAP is fully under CMC control. Second is that the PAP may be called on to protect Chinese civilians and assets abroad. Overseas protection has become a key security challenge for Beijing in recent years, as illustrated in the evacuations of Chinese civilians from Libya in 2011 and Yemen in 2015. The challenge has increased under Xi's Belt and Road Initiative, which involves Chinese construction activities in unstable regions such as Pakistan's Baluchistan Province.

Beijing has a diverse set of capabilities at its disposal to address this challenge, including PLA-led non combatant evacuations, host-country support, and services provided by private security companies, but the PAP also has a role to play. In a narrow sense, the PAP will continue its mission of guarding Chinese embassies and consulates (similar to the role played by U.S. Marine guards). PAP units might also be deployed in some cases, given their training and real-world experience in handling civilian unrest with minimal use of lethal force, which the PLA lacks. Third is safeguarding Chinese maritime interests. Improved coordination between the CCG and PLA Navy will allow Beijing to improve enforcement of territorial claims, protect civilian assets (such as oil rigs and fishing fleets), and intimidate foreign naval and commercial vessels. A sign of increasingly intricate cooperation between the maritime services was the completion of initial joint navy-CCG law enforcement patrols in the Paracels and Senkakus in May and July 2018, respectively. Aside from their value in deterring rival territorial claimants, these patrols allowed naval and CCG personnel to improve interoperability, including practicing specialized terminology. The commander of the joint patrol in the Senkakus stated that "If we discover a foreign military vessel, our navy can immediately deal with it; if we discover foreign fishing vessels violating the law, our coast guard ships can enforce the law." U.S. naval planners thus have good reasons to better understand China's evolving maritime command system.

A practical issue for the United States in this context will be determining whether existing agreements on rules of behaviour for naval forces should be expanded to cover activities of the China Coast Guard. A 2014 U.S.-China agreement provided guidelines for safe encounters between U.S. and Chinese naval vessels based on the 1972 International Regulations for

Preventing Collisions at Sea and other international standards. However, with the CCG now fully under the Chinese military, a case could be made that those standards should also apply to CCG vessels (as well as perhaps U.S. Coast Guard vessels when operating under USA military authority). This broader interpretation would mean that incidents could be raised in USA China military engagements such as Military Maritime Consultative Agreement talks. Fourth, though less likely in the near future, is supporting overseas combat operations. For instance, the PAP could be called on to take part in the later stages of a PLA invasion of Taiwan. Unlike the PLA, which has had little combat experience since 1979, PAP personnel have been on the frontlines of armed clashes in Xinjiang and Tibet. Even though the geographic and operational circumstances would be quite different, such "battle-tested" PAP forces might be better suited to maintain order in Taiwan. Such a role, however, assumes that the PLA ground forces are unwilling or incapable of functioning as an occupation force and would likely require different PAP training and more effective PAP-PLA coordination than currently exists.

Conclusion

India must note that the People's Armed Police has taken an organizational leap forward as part of the larger reforms to China's armed forces. The result is a smaller PAP that is under the firmer grasp of central party leaders and better positioned structurally to accomplish its core missions which includes support to the PLA during war. This assumes greater importance due to the Chinese intrusions in Galwan(Ladakh) during Jun 2020.How durable these reforms prove to be will depend on Xi's continuing grasp on power as well as a consensus among CCP elites that a more centralized PAP is desirable. It is worth considering that the nature of authority over the PAP has fluctuated many times since the 1930s; the pendulum may ultimately swing back toward decentralized management. Local officials, and those wary about an overconcentration of power in the hands of one individual, might support a relaxation of control—or an interpretation of new guidelines that gives flexibility to the localities—but there is little evidence of any such momentum at present. In the absence of a catalytic event, such as a calamity attributed to Xi, the more muscular, centrally managed format of PAP authority appears destined to remain for many years.

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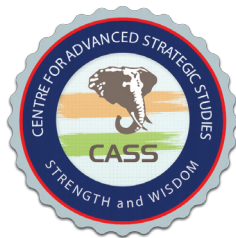
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