INDIA' DEFENCE TECHNOLOGIES

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NATIONAL SECURITY V. NATIONAL DEFENCE

Conceptual Dimension

NATIONAL SECURITY - MEANING

Dynamic and Evolving Concept – susceptible to multiple interpretations

Walter Lippmann (1943) - "A nation has security when it does not have to sacrifice its legitimate interests to avoid war, and is able, if challenged, to maintain them by war."

Harold Lasswell (1950) - "The distinctive meaning of national security means freedom from foreign dictation.“

Arnold Wolfers (1960)- "National security objectively means the absence of threats to acquired values and subjectively, the absence of fear that such values will be attacked."

Harold Brown – US Def Secy - "National security then is the ability to preserve the nation's physical integrity and territory; to maintain its economic relations with the rest of the world on reasonable terms; to preserve its nature, institution, and governance from disruption from outside; and to control its borders."

National Defence College, India (1996) - National security is an appropriate and aggressive blend of political resilience and maturity, human resources, economic structure and capacity, technological competence, industrial base and availability of natural resources and finally the military might


Power
Military Strength
Diplomacy
National Security
National Defence
Resources
Force

NATIONAL SECURITY

Framework for describing the means in which a country provides security for the states and the citizens

Outlines the core interest of a nation

Sets guidelines for addressing the current and prospective threats and opportunities

Hierarchically superior to defence and military strength

Narrow understanding – Security from external and internal threats

A typical security policy seeks to integrate and coordinate contributions of national security actors in response to interests or threats deemed most important

Safe-keeping of nation as a whole

National Security entails both national defence and protection of a series of geo-political, economic & other interest – therefore it not only affects defence policy but foreign and other policies as well

Security

- Political Security
- Economic Security
- Homeland Security
- Energy and Natural Resources Security
- Cyber Security
- Human Security
- Environmental Security

NATIONAL DEFENCE

- Defence is the action of defending, of protecting from attack, danger or injury while security is (uncountable) the condition of not being threatened, especially physically, psychologically, emotionally, or financially.
- Defence – Core of National Security System - functioning and effective defence sector is vital to national safety and security
- Defence – Means to an End – Security – End
- Purpose of National Defence - -credible military forces needed to deter war and protect the security of our nation
- Objectives –
  - Defending the homeland from attack;
  - Sustaining Joint Force military advantages, both globally and in key regions;
  - Deterring adversaries from aggression against our vital interests;
- Responsibility of the Citizens - moral and physical commitment of the population, and the realization of the defence requires the acquisition of civic adhesion

NATIONAL DEFENCE – BASIC FUNCTION

- The basic functions of defense are:
  - deterrence of a potential aggressor,
  - defense of territory in case of aggression,
  - protection of the population and of material goods, and
  - amelioration of the consequences following an act of aggression,
  - organizing non-armed revolt against an aggressor,
  - ensuring the functioning of political and other social subsystems in times of war.

EVOLUTION OF INDIA'S DEFENCE INDUSTRIAL BASE

PHASE I - INDIA's DEFENCE INDUSTRIAL BASE– The British Touch!

- **Current DIB – British Inheritance – Purpose –**
  - est support system for advanced armaments, platforms & technology which is procured from England;
  - est industrial base for perishable items used in national defence
- the focus of the Britishers was to establish a support system to its key equipments and technologies while it would continue to procure the same from its home country
- Indigenous Production of Spare Parts - spare parts like nuts, bolts or perishable items like gun powder, etc
- **Cost Effective than importing**
  - indigenous production of spare parts and supporting machineries costed less than 50 % of the expenditure compared to its production and importation from outside

INDIA's DEFENCE INDUSTRIAL BASE– The British Touch!

- Small Scale Industrial Units set up in Presidency Towns –
  - Small mills within the fortifications at Bombay, Madras and Calcutta were established to produce gunpowder
- Smithy and carpentry yards were established to make gun carriage
- The very famous Fort William complex in the erstwhile Calcutta was further expanded by the establishment of a brass gun foundry
- Thereafter a fully developed production facility near Kashipur or Cossipore in 1802
  - Began its operation as a gun carriage manufactory (1801) and subsequently into a gun foundry
  - Considered as the very first Ordnance Factory of the country
- Despite two WW - India had merely six Ordnance Factors manufacturing gun powder and spare parts for the defence equipments – which were nothing more than quartermaster stones

INDIA's DEFENCE INDUSTRIAL BASE– The British Touch!

"Guns shots and shells fortunately do not deteriorate from climate. As a general principle, therefore, I would advocate that guns, shots and shells and small arms of all kinds should be obtained from England and that the manufactures from India should be limited to the supply of what may be called perishable articles, such as gunpowder, laboratory stores, gun carriages and wagons, harness and saddlery etc

Dhirendra Committee report – had quoted a statement made by the then Commander in Chief – Sir Hugh Roses -

Hence our defence industrial base could never move beyond a mere support system leading to the heavy reliance of the country on imports and procurement.

PHASE II – 1947 – 1960s
INDIA's DEFENCE INDUSTRIAL BASE– Post-Independence!

- Post – Independence – DIB – a series of support systems
- Inherited set of 18 Ordnance Factories
- India's 1st Industrial Policy 1948 – development of critical infrastructure
- India's Policy – Peaceful Co-existence and Non-Alignment
  - maintain peace by fostering good and peaceful relations with its neighbouring countries and taking an active decision not to align itself with any warring country
  - Focus on building a stable governance framework and stabilize economy
- This period also witnessed the establishment of an aircraft plant, Hindustan Aircraft Factory, which was set up in Bangalore in 1940 by the visionary industrialist Walchand Hirachand with the objective of promoting aviation industry in India.

PHASE II – 1947 – 1960s
INDIA's DEFENCE INDUSTRIAL BASE– Post-Independence!

- Nonetheless, dependent on Soviet Union for Defence Needs
  - Hence undeniably its economic policies and geographical proximity saw India tilting towards USSR for its military requirements
  - **Indo-Soviet Treaty of Peace, Friendship and Cooperation 1971**
    - Emphasized on establishing and building a '*reliable nature of relationship*' thereby supporting each other politically.
    - One of the earliest bilateral agreement that India entered for the purposes of strengthening its military capability through international support.
- strategic partnership fostering between United States and Pakistan and the Indo-China border dispute in the early 1950s – reiterated the significance for developing the industrial base of the Indian defence sector

PHASE III –1960s – 1980s

INDIA's DEFENCE INDUSTRIAL BASE– March towards Self Sufficiency

- Need to upgrade DIB – enhanced after a series of war and instances of external aggression that India witnessed within the first two decades of independence.
- Nobel Peace Prize awardee Prof. P.M.S. Blackett recommended to adopt a twofold strategy wherein ***[Self-Sufficiency Model]***
  - Phase – I – Short Term - procure the requisite technology and equipments to handle any coup or aggression which is restricted within the country.
  - Phase – II - for aggression or any form of war which is of relatively large scale, the country needs to procure more sophisticated armaments and technology which can aid in licensed production
- He suggested to build this capacity in a phased manner and at the same time focus on strengthening the diplomatic relations of the country with other nations.

PHASE III –1960s – 1980s

INDIA's DEFENCE INDUSTRIAL BASE– March towards Self Sufficiency

- Blackett's recommendation - to engage into large-scale manufacturing of the items that the 18 ordnance factories were competent in i.e., 'Non-Competitive Weapons'
- E.g., light anti-aircraft guns, 25-pounder field guns, light tanks, motor transport, naval escort aircraft, transport aircraft and trainers.
- Strategic aim –
  - ensuring that this could lead into a long-term plan for producing high-performance and complex ('competitive') weapons including jet fighters, bombers, airborne radars, high altitude anti-aircraft guns and heavy guns.
  - bulk production of simpler weapons would plough back finances required for R&D which can eventually lead towards manufacturing of high-end systems.
- Aeronautics remained one of the core focus areas of these production – est of HAL (1951) - which initiated aircraft assembling under license including Prentice, Vampire, De Havilland and Pushpak trainers.
- However, this strategy did not contribute towards large scale R&D as envisaged. - Between 1950-51 and 1960-61, the share of defence expenditure in the central government expenditure was reduced by more than half from 33 per cent to less than 16 per cent.

PHASE IV –1980s – 2000s

INDIA's DEFENCE INDUSTRIAL BASE– Self Sufficiency – Self Reliance

- Establishment of Defence Research and Development Organization (DRDO)
- New initiatives were undertaken:
  - Integrated Guided Missile Development Programme (IGMDP) at the initial cost of Rs 388.83 crore to develop four missile systems – Prithvi (surface-to-surface), Akash (surface-to-air), Trishul (naval version of Prithvi) and Nag (anti-tank) – and a Technology Demonstrator, Agni.
  - In the same year, the government also sanctioned the Light Combat Aircraft (LCA) at a cost of Rs 560 crore to develop an indigenous fighter aircraft.
- given the fact that the indigenous capacities of the defence industrial base were still at its nascent stage, there were inordinate delay in design and production outlay of these initiatives.
- instances of external and internal aggression were also on the rise
- the government had to look for alternatives to meet the immediate needs of the armed forces which includes seeking assistance from external sources – Caveat – Alternative means to enhance capabilities.
- defence sector to enter into co-development and co-production agreements with foreign companies instead of going ahead with direct off-the-counter purchase – India-Russia – Co-production Agreement for Brahmos Missile.
- India and Russia signed in 2007 two inter-governmental agreements for co-development and co-production of a Multi Role Transport Aircraft (MTA) and a Fifth Generation Fighter Aircraft (FGFA). India's investment share in both projects would be 50 per cent.

PHASE V –1980s – 2000s

INDIA’s DEFENCE INDUSTRIAL BASE– Self-Reliance through Defence Indigenization

- Considering the potential of procurement to serve catalyst in development of indigenous capacities of the Indian defence industrial base, the government resorted to the aforesaid methodology in order to bring in the much-needed boost to the Indian defence sector
- government resorted to licensed production by way of co-development / co-production agreements which till date remains one of the primary means to build and develop the indigenous production capabilities
- the private sector has also been allowed to invest in critical defence infrastructure areas in a staggered form
- attempts were made to revamp the normative framework governing defence procurement procedure and the offset process in order to enable and facilitate the private sector participation in defence contract

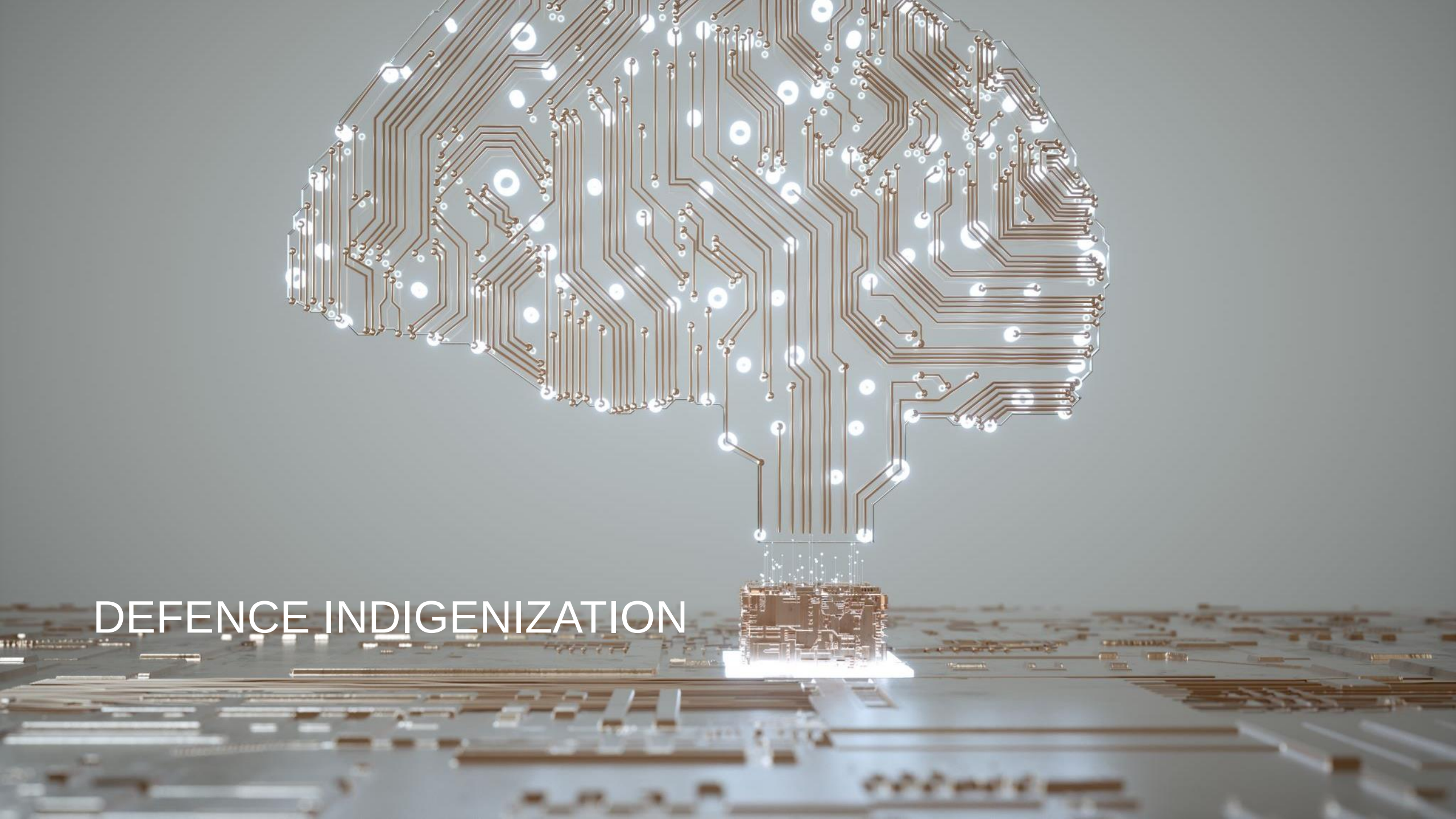
INDIA's DEFENCE INDUSTRIAL BASE– Fostering Growth through DPP

2001- 'Committee of Group of Ministers on reforming the National Security System' - suggesting an institutional and substantive framework to regulate the procedural matters concerning the defence procurement

2002 – First ever DPP 2002 - to be followed while procuring products which have an operational or functional interface with the defence sector of the country and which would be purchased under the procurement category called as 'Buy' as will be decided by the Defence Acquisition Council

2003 – amendments - Substantive amendments were brought to this policy framework in the very next year enhancing the scope of application of the same to a newly introduced category called as '*Buy and Make*' i.e. the category of '*Licensed Production*' which encompasses those procurements undertaken by the government wherein technology transfer takes place with the assistance of which defence related weaponry and equipments are manufactured subject to certain limitations.

Frequent amendments - 2005, 2006, 2008, 2009, 2011 and 2013, enhancing the scope to include 'Make', 'Buy and Make (Indian)' categories, concept of 'Offsets' and Ship Building procedure.


DEFENCE INDIGENIZATION

DEFENCE INDIGENIZATION: Key Focus of Policy Framework

- Indigenization is the capability of developing and producing any defence equipment within the country to achieve self-reliance and reduce the burden of imports. It involves creating an ecosystem to design, develop and manufacture different types of equipment indigenously.
- A country like India with its immense potential and strategic location requires to be self-reliant, hence it is important to pursue the idea of indigenisation for:
  - Self-defence: The presence of hostile neighbors like China and Pakistan makes it improbable for India to boost its self-defence and preparedness.
  - Strategic advantage: Self-reliance will make India's geopolitical stance strategically stronger as a net security provider.
  - Technological advancement: Advancement in the defence technology sector will automatically boost other industries hence catapulting the economy further ahead.
  - Economic drain: India spends around 3% of GDP on defence and 60% of that is spent on imports. This leads to an immense economic drain.
  - Employment: Defence manufacturing will need the support of numerous other industries which generate employment opportunities.

DEFENCE INDIGENIZATION:

- India has one of the largest defence industrial complexes in the developing world.
- Currently, it consists of 39 ordnance factories, 9 defence public sector undertakings under the administrative control of the Ministry of Defence (MoD); and 150-odd companies in the private sector.
- In addition, there are 50-odd dedicated research laboratories and establishments under the umbrella of the Defence Research and Development Organization (DRDO), the premier research and development (R&D) wing of MoD.
- India is one of the few countries to have designed and produced a fourth-plus generation fighter aircraft, nuclear submarine, main battle tank, and intercontinental ballistic missile with a range of more than 5000 km.
- the goal of self-reliance has propelled India to nurture and expand its defence industrial
- Currently, India's self-reliance is hovering at around 35-40 per cent

DEFENCE INDIGENIZATION:

- Policy framework on Defence procurement – DPP / Offsets / Industrial Licensing / FDI / Taxation – primary focus is to build indigenous design, development and manufacturing capabilities of the Indian defence sector.

Frequent revisions of DPP & DOP	Procurement Categories and prioritising domestic procurements
Mandatory Indigenous Content in Foreign Procurements	Provision for Development of Govt fund technology – prototype followed by preferential purchase
Strategic Partnerships with private sector	Encourage procurement of Maintenance Infrastructure
Indigenization Plan	Providing for Co-Production Arrangements
Mandatory discharge of offset obligations	Collaboration with IOPs for discharge of offset obligations
FDI to 74 % in defence sector	Provision of Multipliers when offset obligations being discharged in MSME
Ban on defence imports of specific items	Enhanced thrust on Defence Exports

- Despite these feats, India continues to be overwhelmingly dependent on arms and equipment imports.
- India's arms dependency on foreign sources still hovers on our ability to become self-sufficient in the future.

DEFENCE INDIGENIZATION:

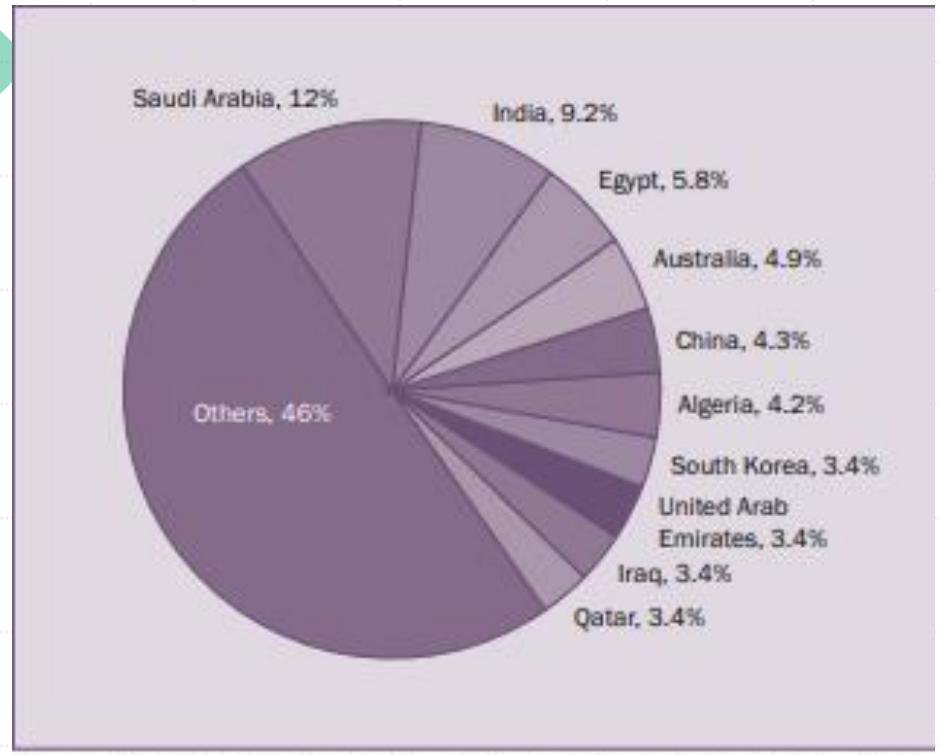
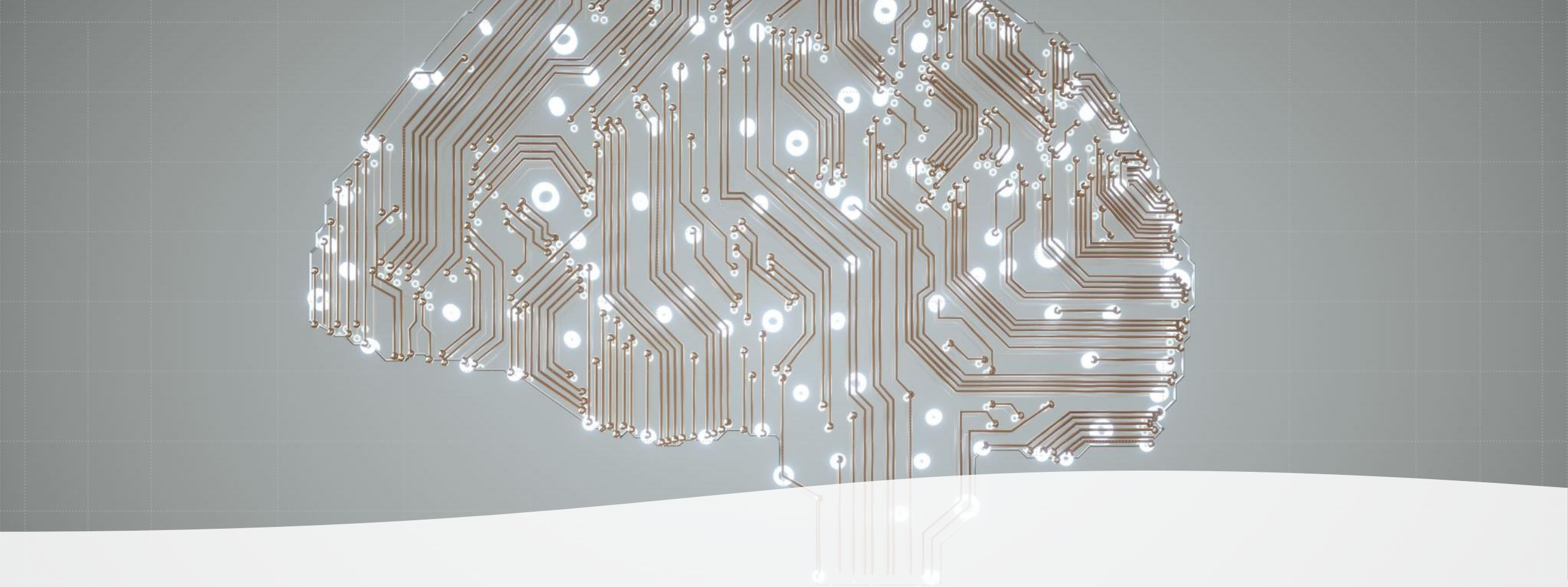


Figure 4. Global share of major arms imports by the 10 largest importers, 2015–19

Source: SIPRI Arms Transfers Database, Mar. 2020.

- India – 3rd & 2nd highest importer of arms between 2010 – 14 & 2015 – 19 respectively.
- Russia is the largest supplier of the Indian Defence Market – 50% to 60 % followed by US
- Imports from Israel and France have enhanced by 175 % & 715 % respectively
- Heavy thrust on emergency procurement following the border disputes
- exposing our inherent ability to independently face a conflict situation
- Adverse financial obligations



ARTIFICIAL INTELLIGENCE IN MILITARY OPERATIONS

Growing Significance of Artificial Intelligence

- AI has seized the imagination of people across the globe.
- Basis of contemporary technologies leading global markets.

speech recognition in digital assistants		consumer behavior prediction	
Siri	Cortana	Amazon	Google

- Positive Contribution towards development of society.
- AI – Critical role to play in military operations as well.
- Ability to exceed human intelligence and capabilities.
- AI and Military Systems – Lethal Autonomous Weapon Systems (LAWS) – those systems which once activated, can select and engage targets without further human intervention.
- Question - Should Human Intervention in Military Application be waived off?
- 2013 Campaign - Campaign to Stop Killer Robots - a global coalition of 64 NGOs launched with an aim to preemptively ban fully autonomous lethal weapons – supports the view that - *retaining human control over the use of force is a moral imperative and essential for promoting compliance with international law and ensure accountability.*

ARTIFICIAL INTELLIGENCE AND MILITARY SYSTEMS

- Arguments supporting the ban - autonomy in the critical functions of 'select and engage' would be in violation of International Humanitarian Law (IHL), and specifically its principles of distinction and proportionality.
- Other school of thought –
  - This would lead to the saving of human lives - without the driving motivation for self-preservation, LAWS may be used in a self-sacrificing manner, saving human lives in the process – devoid of emotions that cloud human judgement. Eg: Autonomous systems designed to disarm improvised explosive devices (IEDs)
  - Can be used in those spaces where civilian presence in minimal - question of legality depends on how these weapons are used, and not on their development or existence
  - saving own soldiers from the lethality of war would yield rich dividends to any military force, especially in conventional conflicts
- 2013-2016 – Deliberations @ United Nations Office of Disarmament Affairs (UNODA)
- A Convention / normative framework re-iterating -
  - states must ensure accountability for lethal action by any weapon system used by them in armed conflict;
  - acknowledging the dual nature of technologies involved, the Group's efforts should not hamper civilian research and development in these technologies; and,
  - there is a need to keep potential military applications using these technologies under review

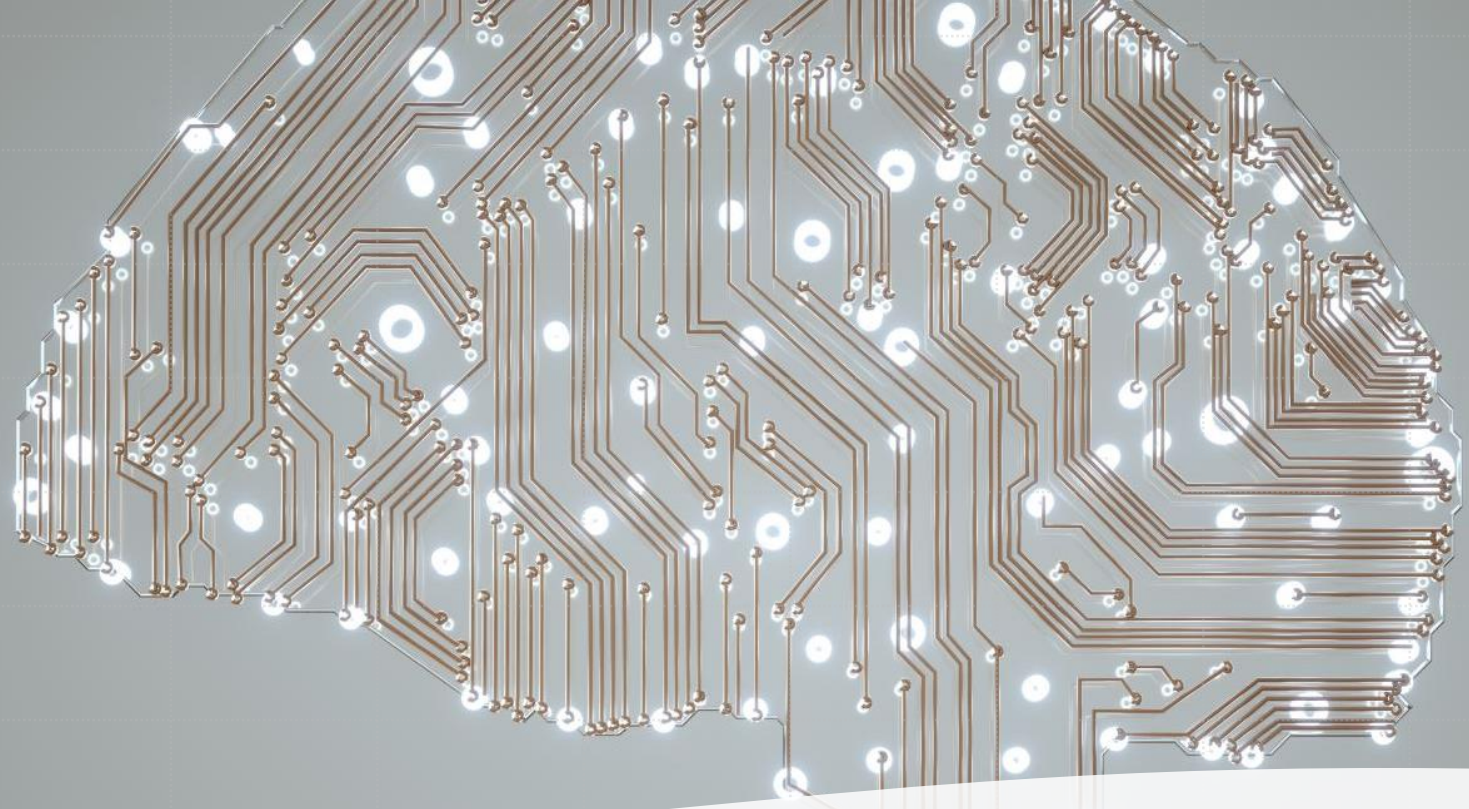
ARTIFICIAL INTELLIGENCE AND MILITARY SYSTEMS

- Prominent Examples of AI in Defence –
  - Missile defence systems such as the Iron Dome of Israel and the Phalanx Close-In Weapon System used by the US Navy.
  - Fire-and-forget systems, such as the Brimstone missile system of the United Kingdom (UK) and
  - Harpy Air Defense Suppression System of Israel, also function in an autonomous manner.
- Countries are exploring the use of AI in defence system

UNITED STATES	CHINA	Russia
3rd Offset Strategy - Future Years Defense Program – 18 Billion - a substantial portion of which has been allocated for robotics, autonomous systems and human-machine collaboration	Labelled AI – National Priority - character of warfare is fundamentally changing due to unmanned platforms and autonomous systems	whichever country leads the way in AI research will come to dominate global affairs. Without doubt, Russia is pursuing the development of LAWS in earnest, in order to keep pace with the US and China in this new arms race.
UK, France and Israel, amongst others, are expected to be significant players in this contentious new field		

Artificial Intelligence and Military Systems – Indian Context

- Presently there appears to be a void in terms of doctrines and perspective plans when it comes to the exploitation of AI/ Robotics technologies.
- Occasional interactions by the defence establishment with the DRDO's Centre for AI and Robotics (CAIR) and other agencies are inadequate to spur the latter into producing timely and meaningful results.
- R&D in these technologies is being driven by the private commercial sector rather than the defence industry.
- Private defence sector of India is at a nascent stage
- After decades of false starts, AI/ Robotics technologies today appear to be at an inflection point, making rapid advancements which are considered significant enough to usher in a new revolution in military affairs.
- Notwithstanding the world-wide concern about the development of LAWS from the legal and ethical points of view, it is increasingly clear that, irrespective of any conventions that may be adopted by the UN, R&D by major countries is likely to proceed unhindered.
- Given India's security landscape, perhaps there is a need to adopt a radically different approach for facilitating the development of LAWS



DATA DISSEMINATION IN BATTLEFIELD

Data Dissemination

Data Dissemination during battlefield

Tactical Level	Media Communication	Information Supremacy
The commander can directly monitor the progress of the war through a variety of information techniques.	Media updates	commanders can also restrict or hinder the enemy to receive the battlefield information by technical means

- battlefield transparency has a strong psychological deterrent capability; it can suppress the morale of the enemy.
- E.g.: Continuous posting of images of US Army destroying enemy's camps proved as a psychological deterrent ……. *Hutchinson, 2006, p. 213*
- Increase in usage of Surveillance Technologies both during peace-time and war.
- Legal – Privacy especially surveillance during peace time v. necessity nexus.
- Risk of network interruption and interception