



Adaptive Defence for Emerging Security Challenges

For Prelims: [Adaptive Defence](#), [Artificial Intelligence \(AI\)](#), [Drones](#), [Emerging Technologies](#), [Chief of Defence Staff](#), [Make in India](#), [Aatmanirbhar Bharat](#), [Lethal Autonomous Weapons](#), [Hypersonic Weapons](#), [Radar](#), [South China Sea](#), [AIRAWAT](#), [IndiaAI Mission](#), [Global Partnership on Artificial Intelligence](#), [Virtual and Augmented Reality](#), [National Strategy on Blockchain](#), [National Mission on Quantum Technologies and Applications \(NMQTA\)](#), [Drone Hub Vision](#), [Anti-Satellite \(ASAT\)](#).

For Mains: Need of adaptive defence, Role of emerging technologies on national security.

[Source: TH](#)

Why in News?

Recently, India's Defence Minister advocated to create an "[Adaptive Defence](#)" in the country to counter the **new security challenges** posed by the **fast-changing world**.

- He also said India is working on **emerging technologies** in face of diverse challenges.

What is Adaptive Defence?

- **About Adaptive Defence:** It is a strategic approach where a nation's **military and defence** mechanisms **continuously evolve** to counter emerging threats.
 - It focuses on **anticipating future threats**, rather than merely reacting to past or current ones.
- **Key Elements of Adaptive Defence:**
 - **Situational Awareness:** The ability to **understand and respond** to dynamic environments.
 - **Flexibility:** Both at strategic and tactical levels to ensure **timely and effective responses**.
 - **Resilience & Agility:** The ability to **recover and adapt** quickly to changing circumstances.
 - **Integration with Emerging Technologies:** Emphasising the need for adaptive defence to **incorporate [emerging technologies](#)**.
 - **Joint Military Vision:** Evolution of **joint military strategies** to address future threats, involving not just national military forces, but also **strategic international cooperation**.
- **Evolution of Warfare:**
 - **Grey Zone & Hybrid Warfare:** Traditional notions of war are changing due to new threats such as [cyber-attacks](#) and [terrorism](#). Modern warfare now includes non-traditional elements, demanding **continuous adaptation**.
 - **Technological Transformation:** Emerging technologies like [Artificial Intelligence \(AI\)](#), [drones](#), and **swarm technologies** are reshaping warfare and defence strategies.
 - **Swarm technology** allows **drones, satellites, or spacecraft** to work together in a **coordinated** way using **decentralised control, automation, and self-**

organisation.

- **Psychological Warfare: Manipulating, disrupting, or controlling information** to influence public opinion, deceive, or disrupt the decision-making processes of governments.
- **Government Initiatives for Adaptive Defence:**
 - **Institutional Strengthening:** Creation of the [Chief of Defence Staff](#), promoting jointness among services, and reforming training curricula.
 - **Focus on Self-Reliance:** Strengthening India's defence capabilities through initiatives like the [Make in India programme](#) and the [Aatmanirbhar Bharat](#) campaign.
 - **Drone Hub Vision:** India aims to become a **global hub for drones**, with initiatives supporting the domestic drone industry and fostering innovation.
 - **Theaterisation of Armed Forces:** It will integrate the **army, air force and navy** into one architecture, ensuring tri-services synergy and jointness.
 - [Positive Indigenisation List](#)
 - [Increased FDI in Defence Sector](#)
 - [Technology Development Fund \(TDF\)](#)
 - [iDEX Scheme](#)

Note:

- **Grey Zone Warfare:** It involves tactics and strategies that are **below the threshold of full-scale conflict** but still pose **significant risks** to national security. E.g., **cyberattacks, covert influence operations, and espionage.**
- **Hybrid Warfare:** It integrates both **kinetic (physical) and non-kinetic (psychological, cyber, economic)** means of warfare to achieve strategic goals. E.g., a mix of regular **military forces** (conventional) and irregular forces, such as **insurgents, mercenaries, or proxy forces** (unconventional).
- **Asymmetric Warfare: Terrorist groups, insurgents,** and other **non-state** actors often rely on unconventional tactics, like **guerrilla warfare and suicide bombings**, to challenge superior military forces. E.g., **Hamas attack on Israel.**

What are New Security Challenges for India?

- **Emerging Technologies:**
 - **Artificial Intelligence (AI):** AI in military applications can manipulate [early warning systems](#), and develop new weapons.
 - **Synthetic Biology:** Combination of **biology, engineering, and technology** can design and develop [biological weapons](#) or even new life forms with harmful effects.
 - **Cybersecurity:** Cyberattacks can debilitate [critical infrastructure](#) such as **nuclear facilities**, military systems, and intelligence networks.
- **Autonomous Weapons:**
 - **Lethal Autonomous Weapons (LAWs):** [LAWs](#) can independently **identify, target, and engage threats** without human intervention using **AI and machine learning.**
 - **Unmanned Underwater Vehicles (UUVs):** They are capable of **military surveillance, mine detection**, scientific research, and underwater mapping.
- **Hypersonic Missiles:** [Hypersonic weapons](#) can avoid [radar detection](#) and adjust their own path, making them hard to defend against.
- **Space Warfare:** [Space militarisation](#) could disrupt or destroy satellite systems and other space based services like **communication, navigation systems** etc.
- **Terrorism:** Drones can bypass traditional defence systems **surveillance, targeted attacks, or the delivery of explosives.**
- **Geopolitical Tensions:** China-US tensions, [Ukraine War](#), nuclear threats in hotspots like Korea and the [South China Sea](#) can have significant implications for regional stability.
- **Environmental Security:** Rising temperatures, [sea-level changes](#), and extreme weather events can lead to new security challenges, including the **displacement of populations** and resource-based conflicts.

- **Global Security Architecture:** The traditional dominance of the **United States** is being challenged by the rise of **China**.
 - It could lead to a **power vacuum**, encouraging instability in various regions, especially in the **Middle East, Africa, and Eastern Europe**.

What are India's Initiatives in Promoting Emerging Technologies?

- **Artificial Intelligence (AI):**
 - **AIRAWAT (AI Research, Analytics, and Knowledge Dissemination Platform):** **AIRAWAT** provides a **common compute platform** for AI research across various sectors, facilitating access for **technology hubs, start-ups and research labs**.
 - **IndiaAI Mission:** The **IndiaAI Mission** aims to democratise AI access, develop indigenous AI capabilities, and attract top AI talent through initiatives like **AI Compute Capacity, and AI Innovation Centers**.
 - **Global Partnership on Artificial Intelligence (GPAI):** India is a founding member of **GPAI**, an initiative focused on the **responsible development of AI** with an emphasis on **human rights, inclusion, and innovation**.
- **Internet of Things (IoT):** **IoT Centres of Excellence** have been established at **Bengaluru, Gurugram, Gandhinagar, and Visakhapatnam** to support start-ups and enterprises in **IoT, Big Data, AI, and Robotics**.
- **Virtual Reality and Augmented Reality (VR/AR):** The **Centre of Entrepreneurship for Virtual and Augmented Reality (VARCoE)** has been established at **IIT Bhubaneswar** for VR/AR innovation and skill development.
- **Blockchain Technology:** **National Strategy on Blockchain** has been formulated to create a **secure, transparent digital service delivery** to citizens and businesses.
- **Robotics:** An **Inter-Ministerial Committee for Robotics** was constituted to support the domestic robotics industry.
- **Quantum Technology:** **National Mission on Quantum Technologies and Applications (NMOTA)** was launched to develop **intermediate-scale quantum computers with 50-1000 physical qubits in 8 years**.

Way Forward

- **Technological Integration:** Integration of AI and related technologies into defence systems will enhance India's ability to **foresee threats and respond** to new threats faster and more efficiently.
- **Cybersecurity:** Establishment of a robust **cyber defence framework**, regular **cybersecurity drills** and updates to military systems can help prevent cyberattacks.
 - Establish a **dedicated cyberforce** like **China's Cyberspace Force** to deal with cyberattacks.
- **Resilience Against Hybrid Warfare:** Educate the public to recognise **fake news and propaganda**, especially during conflicts, by using social media and other platforms to promote **truthful, fact-based information** and counter hostile narratives.
 - **Militaries** should establish **dedicated units** for **countering disinformation and propaganda**.
- **Autonomous Systems:** India should increase investment in **anti-drone technologies and drone defence systems**, as well as continue to expand its **Drone Hub Vision**.
- **Space Warfare:** India should continue to enhance its **anti-satellite (ASAT) capabilities** and focus on strengthening satellite resilience.
 - Develop **Space Force** on the lines of **United States Space Force (USSF)** to secure **space-based infrastructure**, and assets from potential threats.

Drishhti Mains Question:

With the rise of hybrid and grey zone warfare, how should India evolve its defence strategies to handle the convergence of cyber-attacks, misinformation, and traditional military threats?

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q. Which one of the following is the context in which the term “Qubit” is mentioned?

- (a) Cloud Services
- (b) Quantum computing
- (c) Visible light communication technologies
- (d) Wireless Communication Technologies

Ans: (b)

Q. With the present state of development, Artificial Intelligence can effectively do which of the following?(2020)

1. Bring down electricity consumption in industrial units
2. Create meaningful short stories and songs
3. Disease diagnosis
4. Text-to-Speech Conversion
5. Wireless transmission of electrical energy

Select the correct answer using the code given below:

- (a) 1, 2, 3 and 5 only
- (b) 1, 3 and 4 only
- (c) 2, 4 and 5 only
- (d) 1, 2, 3, 4 and 5

Ans: (b)

Mains

Q. What are the areas of prohibitive labour that can be sustainably managed by robots? Discuss the initiatives that can propel the research in premier research institutes for substantive and gainful innovation. (2015)