



Perspective: India-US iCET Cooperation

For Prelims: [India-U.S. initiative on Critical and Emerging Technology \(iCET\)](#) [India's National Security Advisor \(NSA\)](#) , [U.S.-India Strategic Technology Partnership](#), [Semiconductors](#), [Telecommunications](#), [Artificial Intelligence](#), [Quantum](#), [STEM](#), [Biofuel](#) [Biopharma](#), [Biotechnology](#), [Critical Minerals](#), [Biotechnology](#), [Critical Minerals](#), [Rare Earth Mineral](#), [Clean Energy](#) [National Security Council](#), [QUAD](#), [NATO](#), [5G](#), [6G](#) [OpenRAN network](#), [Indo-Pacific Region](#), [Intellectual Property Rights \(IPR\)](#), [Machine Learning \(ML\)](#), [UN Food and Agriculture Organization \(FAO\)](#)

For Mains: Significance of Bilateral Groupings & Agreements regarding India's Strategic Interest and Emerging Technologies.

Why in News?

Recently, the **2nd review meeting** of the [India-U.S. Initiative on Critical and Emerging Technology \(iCET\)](#) was chaired by **India's National Security Advisor (NSA)** and his US counterpart in **New Delhi**.

- A **joint fact sheet** underlining the vision for the next chapter of the [U.S.-India strategic technology partnership](#) was also issued after the meeting.

What are the Key Outcomes of the Meeting?

- The significant progress made by India and the US toward deepening and expanding strategic cooperation across key technology sectors including **space**, [semiconductors](#), **advanced telecommunications**, [artificial intelligence](#), [quantum](#), [STEM](#), [biotechnology](#), [critical minerals](#) and [clean energy](#) was discussed in the meeting.
- They also discussed the way forward to further facilitate **mutual collaboration** and address outstanding barriers in **trade, technology, and industrial cooperation**.
- In the **factsheet new areas of cooperation** like [biofuel](#) and [biopharma](#) have been added. Also, some **new funds** have been set up and money has been released for the same.

What is iCET?

- **About:**
 - The **iCET** was announced by India and US in May 2022 with an objective to ensure greater collaboration between **India and the US** in areas of **critical technologies**.
 - It was officially launched in January 2023 and is being run by the [National Security Council](#) of both countries.
 - Initially, under **iCET**, both countries have identified **six areas** of cooperation which would include co-development and co-production, that would gradually be expanded to [QUAD](#), then to [NATO](#), followed by Europe and the rest of the world.
 - Under **iCET**, India is ready to share its core technologies with the US and expects Washington to do the same.
- **Focus Areas of the Initiative:**

- AI research agency partnership
- Defense Industrial Cooperation, Defense Technological Cooperation, And Defense Startups
- Innovation Ecosystems.
- Semiconductor Ecosystem Development.
- Cooperation on Human Spaceflight
- Advancement in [5G](#) and [6G](#) Technologies, and Adoption of [OpenRAN network](#) Technology in India.
- Recent inclusions into iCET- [Biotechnology](#), [Critical Minerals](#), [Rare Earth Mineral Processing](#) and [Digital Technology](#).

What is the Significance of iCET?

- iCET is the **centrepiece** of **India-US defence and energy cooperation** as it would forge closer linkages between government, academia and industry of the two countries.
- India has emerged as a **strategic partner** of the US to contain China specifically in the [Indo-Pacific Region](#), thus this cooperation would further strengthen ties.
- The objective is to provide **cutting edge technologies** to the rest of the world which are affordable.
- The launch of the ambitious iCET dialogue is seen as “**an alignment of strategic, commercial and scientific approaches**” in the field of technology.
- This is eventually likely to be mirrored in the progress made in **Quad**, the informal grouping of four countries, **Australia, Japan, India and the United States**.

What are the Challenges?

- **Complex process:** Technology cooperation among industries is a complex process due to various cross border **trade and technological challenges**, eg. accusing India of **discriminatory treatment of non-domestic solar panel and module manufacturers** through its mandatory domestic content requirement, US moved the **WTO Dispute Settlement Body**.
- **Export Control:** Export restrictions are a big challenge especially with countries like the US that have flagged protectionism in recent years, e.g. import duties on steel imports from India.
- **Issue of IPR:** If there is joint funding then there should be an understanding in what proportion [Intellectual Property Rights \(IPR\)](#) should be shared. New start-ups should get their due share and recognition in IPR of new joint projects.
- **Supply Chain Reliability:** There should be **supply chain reliability** so that projects and cooperation on agreed areas does not get disrupted in due course.
- **Lack of Funding:** Despite the government's initiatives to boost funding for research and development (R&D), India still lags behind global leaders in allocating funds for emerging and critical technologies. The current level of investment, around **0.7% of GDP**, is significantly lower than the 2-3% typically allocated by leading nations.
- **Infrastructure and Skill Gap:** Advancing technologies like **Quantum Computing, AI, and Semiconductor** manufacturing require robust infrastructure and a skilled workforce.
- **Limited Private Sector Involvement:** While government initiatives like [IDEX](#) aim to support startups and encourage innovation, there is a need for greater involvement from the private sector in R&D.

Critical and Emerging Technologies (CET)

- **Quantum Technology:**
 - **Quantum Technology** is based on the principles of **Quantum mechanics** that was developed in the early 20th century to describe nature in the small scale of atoms and elementary particles.
 - **Conventional computers** process information in ‘bits’ or 1s and 0s, however, [Quantum computers](#) compute in ‘qubits’ (or quantum bits).
- **Artificial Intelligence (AI):**
 - AI is the ability of a computer, or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and judgement.
 - The ideal characteristic of [AI](#) is its ability to rationalise and take actions that have the best

chance of achieving a specific goal. A subset of AI is [Machine Learning \(ML\)](#).

- **Deep Learning (DL)** techniques enable this automatic learning through the absorption of huge amounts of unstructured data such as text, images, or video.

- **Semiconductors:**

- **Semiconductors** are materials which have a conductivity between conductors and insulators. They can be pure elements like **silicon and germanium** or **compounds like gallium, arsenide and cadmium selenide**.
- Indian semiconductor industry in 2022 was USD 27 Billion, with over 90% being imported, and therefore a significant external dependence for Indian chip consumers.

- **Clean Energy:**

- **Clean energy** is energy that comes from **renewable, zero emission** sources that do not pollute the atmosphere when used, as well as energy saved by energy efficiency measures. Some examples of clean energy sources are solar, wind, hydro, and geothermal energy.
- **Clean energy** is important because it can help reduce greenhouse gas emissions, combat climate change, and improve air quality.

- **Green Hydrogen:**

- [Green hydrogen](#) is a type of hydrogen that is produced through the electrolysis of water using renewable energy sources such as solar or wind power.
- The electrolysis process splits water into hydrogen and oxygen, and the hydrogen produced can be used as a clean and renewable fuel.

- **Bioeconomy:**

- As per, the [UN Food and Agriculture Organization \(FAO\)](#), Bio-economics could be defined as the production, use, and conservation of biological resources, including related knowledge, science, technology, and innovation to provide information, products, processes, and services to all economic sectors with the aim of moving towards a sustainable economy.

Way Forward

- **Resolving bilateral issues:** Both countries should work to resolve bilateral trade and technological issues by removing trade barriers.
- **Technology Protection Toolkits:** Both sides agreed in fact to adapt each other's technology protection toolkits and prevent leakage of **sensitive and dual use technologies** to the countries.
- **Adapting Regulatory Framework:** Technology is a **double edged sword**, so establish a dynamic regulatory framework that can swiftly adapt to technological advancements while ensuring ethical standards and addressing potential risks.
- **Clarifying Intellectual Property Rights:** Develop clear and transparent policies on **intellectual property rights** to provide certainty and encourage investment in R&D.
- **Boosting Investment In R&D:** Implement policies to incentivize both **public and private sector investment** in research and development, particularly in emerging technologies. Encourage collaboration between **industry, academia, and research institutions** to leverage expertise and resources.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Recently, the USA decided to support India's membership in multi-lateral export control regimes called the "Australia Group" and the "Wassenaar Arrangement". What is the difference between them? (2011)

1. The Australia Group is an informal arrangement which aims to allow exporting countries to minimize the risk of assisting chemical and biological weapons proliferation, whereas the Wassenaar Arrangement is a formal group under the OECD holding identical objectives.
2. The Australia Group comprises predominantly of Asian, African and North American countries whereas the member countries of Wassenaar Arrangement are predominantly from the European

Union and American Continents.

Which of the statements given above is/are correct?

- (a)** 1 only
- (b)** 2 only
- (c)** Both 1 and 2
- (d)** Neither 1 nor 2

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