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सत्यमेव जयते
Government Of India

Azadi Ka Amrit Mahotsav

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VIKASIT BHARAT-REACHING THE LAST MILE

04 THEMATIC MEAL

EMERGING TECHNOLOGIES

5-7 जनवरी 2023 | नई दिल्ली
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Second National Conference of Chief Secretaries

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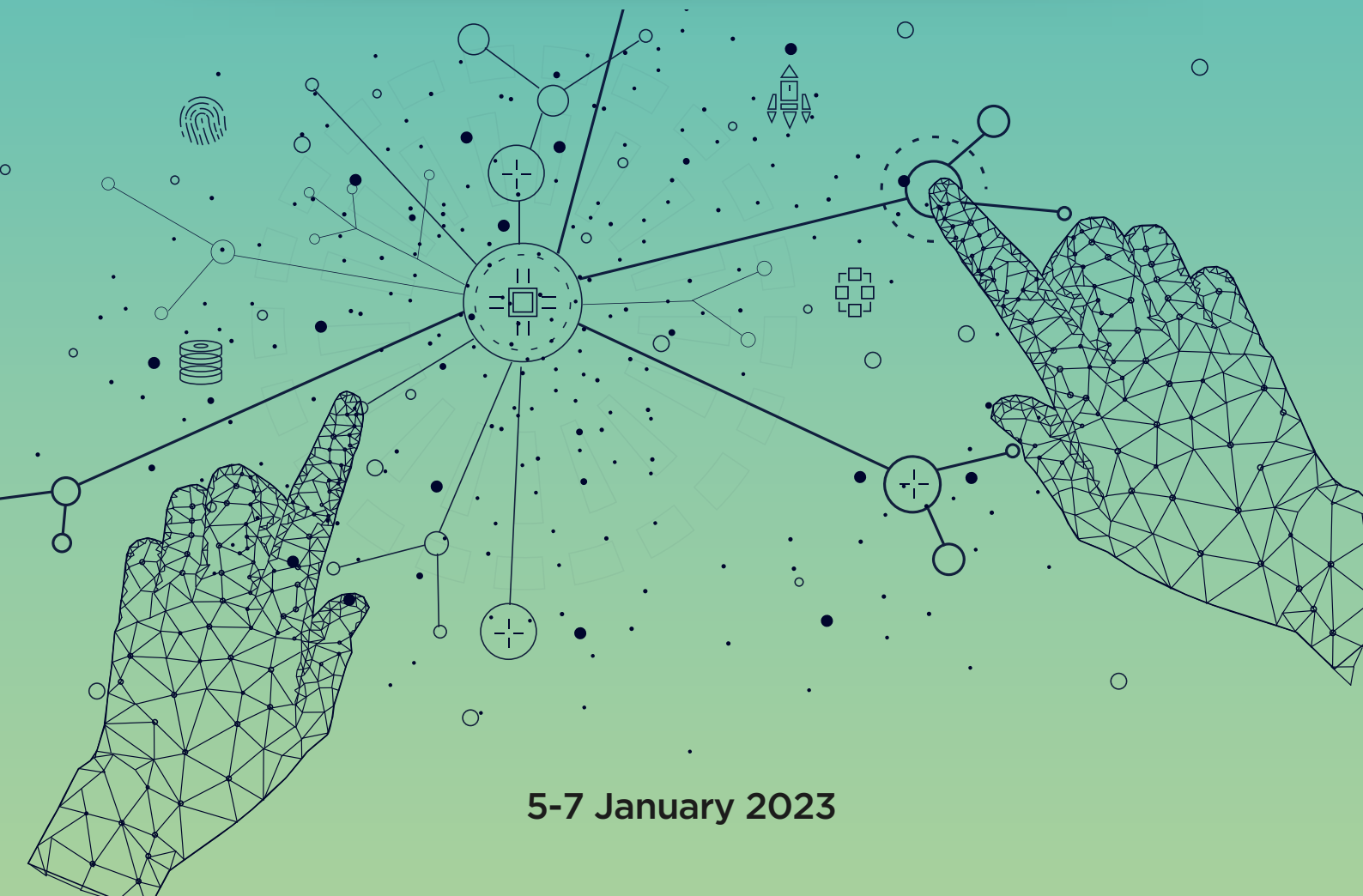

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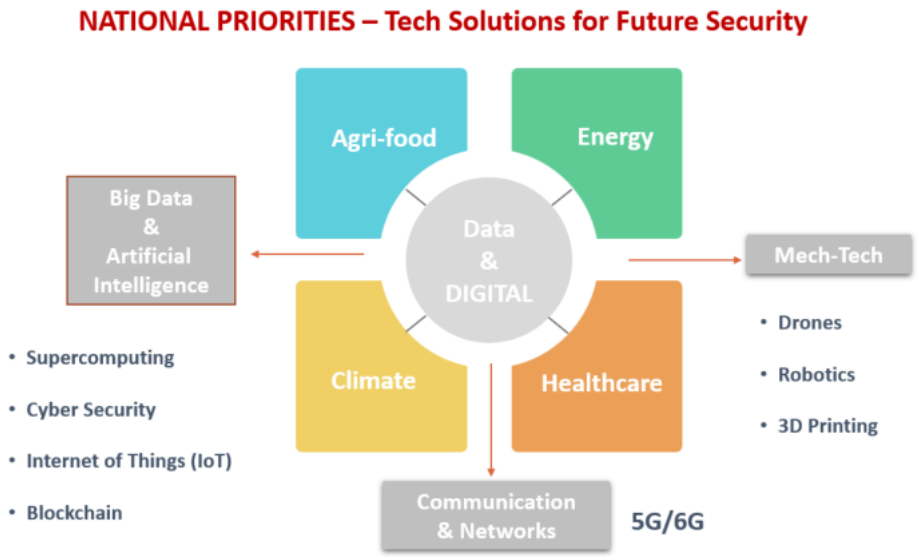
INTRODUCTION

Emerging technologies are expected to generate $1 trillion in economic value for India, spearheading the $5-trillion-economy ambition by contributing 20 per cent to the country's nominal GDP and sustaining 60-65 million jobs by 2025. Information technologies such as AI, Blockchain, AR/VR/XR, etc., communication technologies such as 5G, IoTs and new manufacturing technologies such as 3D, Additive etc., have a major role in digital transformation of economic verticals.

Technologies that are likely to transform India's lifestyle, business and employment landscape are energy, Agriculture/Food, Climate, Healthcare, Information and Communication Technologies. Scientific Ministries like, MEITY, DOT, DRDO, DST, DBT, DHR, DARE, etc., have undertaken several initiatives to enable the development of technologies and facilitate harnessing the transformative power of emerging technologies to augment efficiency in public service delivery and data-driven decision-making.



Hon'ble Prime Minister while strongly pitching for technology transformation on 15th Aug 2022 said: **" ..... But in this new phase Amritkal now it is imperative to add jai Anusandhaan that is "hail innovation". Jai Jawan, Jai Kisan, Jai Vigyan, Jai Anusandhaan".** Hon'ble Prime Minister has hailed technology as the vehicle in his speech at the Digital India week in July 2022: **"This decade is going to greatly enhance India's capabilities in digital technology and its share in the global digital economy. That's why top experts are looking at this decade as India's Techade."**

State Governments have a crucial role in supporting the development, piloting and incentivising and upscaling transformational technologies of the future. States/UTs participation in technology deployment is critical as part of the whole-of-government approach in:

i. **leveraging emerging technologies to enable growth with job creation and inclusive human development.**

ii. **Piloting and deploying emerging tech in e-Governance to provide faster, efficient and affordable services to citizens.**

iii. **Facilitate deep tech innovations and support businesses that develop Indian designed products and solutions for the World.**

This covers certain technologies that cut across all/many sector sectors, being the ones that can lead to fast transformation. Opportunities may lie in many other technologies as well.

A. Emerging Information Technologies

Emerging technologies have played a major role in fuelling the growth of the Indian economy. The use of big data, cloud computing, and artificial intelligence has helped businesses in India to become more efficient and productive. Emerging technologies, including AI, have the potential to add up to an entire percentage point to the annual economic growth rate of the country. Indeed, AI alone is expected to raise India's annual growth rate by 1.3 percentage points by 2035—in a scenario of intelligent machines and humans working together to solve the country's most difficult problems. The 5G High Level Forum assessed that the cumulative economic value of 5G could be to a tune of $1 Trillion to India by 2035. As India is going to preside over the G20 grouping in 2023, one of the critical agenda items that India can set is emerging technologies. India's digital economy could contribute 18–23% to the overall economic activity by 2025, with more than half of it through scaling up new and emerging digital ecosystems.

1. **Artificial Intelligence:** Artificial Intelligence (AI) is expected to change the way we work and live. The Government of India has also envisioned to support research and development and adoption of such technologies. These include stimulating economic growth, enhancing global health and well-being, improving cyber security and improving efficiencies in imparting education. AI has the potential to add US$957 billion, or 15 percent of India's current gross value in 2035. Use of AI and Machine Learning has transformed Governance and business across the world.

   India has won the responsibility of Incoming Council Chair of the Global Partnership on Artificial Intelligence (GPAI) in November 2022. India will serve as the Incoming Chair in 2022, then subsequently Lead Chair in 2023, and Outgoing Chair in 2025. We are in a leading position to influence Global businesses and Governments.

   MeitY is implementing the National Program on Artificial Intelligence (NPAI) through a whole-of-government approach and active involvement of state governments is essential to its successful implementation. Key pillars of NPAI are:

   - **Data Management Office (DMO):** The proposed DMO aims to improve access, quality, and use of public sector data to catalyse data-driven governance, decision-making and create an ecosystem for data-based innovation and research.
   - **National Centre for AI (NCAI):** The National Centre for AI has been strategized as a sector-agnostic entity that will source problem statements from Central Ministries and State Departments to scale the solutions for the national-level rollout to deliver large-scale social impact.
   - **Responsible AI:** With the accelerated adoption of AI in developing digital solutions, there are mounting cases of bias and discrimination of AI against individuals and social groups. An institutional mechanism to drive Responsible AI adoption is being envisioned to enable proactive mitigation of risks through creation of framework, guidelines, etc.

- **Skilling in AI:** MeitY aims to transform 250 industrial training institutes /polytechnic for creating an AI-ready workforce. The programme also aims to train 1.5 lakh students for L1 level AI jobs upskilling 1200 Government officials to enhance employability.

To foster innovation through research, government has established four Centres of Excellence on AI & IOT with the objectives to enable India emerge as a innovation hub in AI & IoT through democratization of innovation and realization of prototypes. Centres of Excellence on AI & IoT connect various entities such as startups, enterprises, venture capitalists, government and academia.

2. **Additive Manufacturing** (AM): Additive Manufacturing (AM) has immense potential to revolutionize India's manufacturing and industrial production landscape through digital processes, communication, imaging, architecture and engineering. To cater next-generation digital manufacturing and mitigate immediate disabilities of local industries, Ministry of Electronics & Information Technology released "National Strategy on Additive Manufacturing" in February 2022. The Government of India aims to capture five per cent of the global market share in additive manufacturing or 3D printing with expectations to add nearly USD 2-3 billion to the GDP in the next 2-3 years.

   The strategy identified the need to establish the "**National Centre for Additive Manufacturing (NCAM)**", in collaboration with Telangana State Government at Hyderabad. Further, three centers for promoting additive manufacturing have been established for electronics, photonics, and medical devices.

3. **Blockchain:** Blockchain technology has the potential to revolutionize interactions between governments, businesses and citizens in a manner that was immeasurable just a decade ago. Blockchain has the potential to revamp currently existing processes to unlock new sources of efficiency and value, including security. It is estimated that government-related blockchain projects could add $5.1 billion to India's GDP in 2032. States/UTs may consider supporting blockchain in e-Governance.

   The National Strategy on Blockchain lays out the overall vision and the strategies for development and implementation of a national blockchain platform covering the technology stack, legal and regulatory framework, standards development, collaboration, human resource development and potential use cases. MeitY has also initiated a multi-institutional national level project called the "Design and Development of Unified Blockchain Framework" for offering national blockchain services and creation of ecosystem. The development of a unified blockchain framework is in progress. One COE on Blockchain has been created to provide support with collaboration, attract investors and ultimately strengthen the startups community.

B. Emerging Communication Technologies

1. **5G Technology:** Taking India's digital transformation and connectivity to new heights, the Hon'ble Prime Minister launched 5G services in India in October 2022. 5G Connectivity with its extreme capabilities is envisaged to enable new business opportunities and services across socioeconomic verticals. This will unlock huge possibilities for India with high-tech technology and paves the way to bring transformation in crucial areas including agriculture, health, education, Transport, logistics, smart cities, Industry 4.0

and financial inclusion etc. As per the report by NASSCOM, 5G networks are expected to power up to 2% of India's GDP, amounting to $180 billion by 2030 on the back of increasing market penetration, a strengthening economy, and sectoral reforms.

The 5G driven IoT, V2X, massive machine type communications and especially Captive Enterprise Networks for Industry 4.0 would have significant impact on e-Governance and enterprises. Department of Telecommunications has constituted an Inter-Ministerial Committee with 20 Central Departments and agencies across sectors. The sectors include Agriculture, Health, Education, Power, Railways, Ports and waterways, Heavy Industries, Transport, Commerce, Mines, Tourism, Water Resources, Sports, Fintech. DoT is organising state level 5G use case workshops to ideate, pilot, and proliferate the 5G applications across the verticals.

2. **Low Earth Orbit / Medium Earth Orbit (LEO/MEO) Satellite based Broadband:** SatCom can provide inclusive connectivity to propel education, healthcare, ATM, online banking etc. for in the most difficult to reach areas. Leveraging this media, the benefits of Digitisation can reach to the far-flung, sparsely populated areas in hilly, island States/UTs including NER and they are able to avail various Government services which their peers in city use. Recently, a VSAT operator by utilising the indigenous **High Throughput Satellites** has commenced broadband VSAT services in the North-East, J&K and other areas. Fishermen, people living in remote and hilly areas, cross country truck operators and railways, service providers in logistics, power, water sectors needing data acquisition from such remote locations can use Satellite NB-IOT technologies for safety, communications, effective management of assets etc.

   Low Earth Orbit and Medium Earth Orbit (LEO and MEO) satellites – respectively orbit at an altitude below 2,000km/1,243 miles above mean sea level, while MEO satellites orbit in the region between LEO and GEO (geostationary) satellites – 2,000-35,800km/1,243-22,245 miles. LEO satellites are commonly deployed for communications purposes and the transmission of scientific data, while MEO satellites cover a variety of uses including communications, navigation and the exchange of geodetic/space environment data. One of the main advantages of NGSO satellites over GEO satellites is significantly higher broadband speeds and considerably lower latency. Government of India has issued Letters of Intent to 2 companies. It is expected that LEO/MEO based sattellite broadband services may be available of end of 2023.

C. Drone Technologies

Drones offer tremendous benefits to almost all sectors of the economy, including – agriculture, medical supplies, disaster relief, geo-spatial mapping, surveillance, project monitoring, defence and law enforcement to name a few. Drones can be significant creators of employment and economic growth due to their reach, versatility, and ease of use, especially in India's remote and inaccessible areas. Given its traditional strengths in innovation, information technology, frugal engineering and its huge domestic demand, India has the potential of becoming a global drone hub by 2030.

Indian drone industry is expected to reach Rs. 15000 crores 2026. Currently, the use of drones is limited to mostly the infrastructure and agriculture sectors. The drones and drone components manufacturing industry may see an investment of over **INR 5,000 crore** over the next three

years. The annual sales turnover of the drone manufacturing industry may grow from INR 60 crore in 2020-21 fold to over **INR 900 crore** in FY 2023-24. The drone services industry (operations, logistics, data processing, traffic management etc.) is far bigger in scale. It is expected to grow to over **INR 30,000 crore** in next three years. The drone services industry is expected to generate over **five lakh** jobs in three years.

Liberalised Drone Rules, 2021 has been notified on 25th August 2021. Drone Airspace Map has been published on 24th September 2021, opening up nearly 90% of Indian airspace as a green zone for drone flying up to 400 feet. Production-Linked Incentive (PLI) scheme for drones has been notified on 30th September 2021. UAS Traffic Management (UTM) Policy Framework has been published on 24th October 2021. Drone certification scheme has been notified on 26th January 2022, making it easier to obtain type certificate by drone manufacturers. Drone import policy has been notified on 9th February 2022, banning import of foreign drones and freeing up import of drone components

Increasing number of drone applications coupled with release of government regulations; a growing number of startups who are engaged in identifying new applications for drones are among the primary reasons why the drone industry is expected to continue to grow. Drone technology is also going to play an important role in making the life of the farmer in the village more convenient and prosperous. The PM Svamitva Yojana is also an example of how drone technology is becoming the basis of a big revolution. Under this scheme, 65 lakh property cards have been generated in the country so far with the help of drones. Drones can revolutionise transportation of goods in difficult terrains, especially during disasters.

D. Green Hydrogen Technologies

We need to transform India into an energy independent nation by 2047 where green hydrogen will play an active role as an alternate fuel to petroleum/ fossil-based products. Government of India has launched the Hydrogen mission and released a Green Hydrogen Policy to aid India meet its climate targets and making India a green hydrogen hub. Hydrogen can replace fossil fuels by powering vehicles, industry, power generation, etc. State Government may facilitate and incentivise green and blue hydrogen production and incentivise use of green fuels.

E. Challenges

1. Artificial Intelligence (AI)

- Lack of an institutional framework for data governance
- Limited technical capacity in data management in government
- Absence of e-Governance and data standards

2. Additive Manufacturing (AM)

- Creating indigenous 3D-printing technologies and integrating with local supply chains
- Establishment of supply chains for AM machinery and material in India
- Reduction of import dependency for AM supply chains and promotion of distributed manufacturing for export-oriented solutions

3. Blockchain

- Non-standard blockchain platforms

4. 5G Technologies

- Right of Way in buildings and public roads
- Alignment with Right of Way Rules 2016/2022

F. Opportunities for State Governments

1. **Artificial Intelligence:** States/UTs may ensure
   a. Alignment of their policies and initiatives with the GoI Data policies.
   b. Contribution of curated public datasets to the India Datasets Program.
   c. Integration of datasets from their existing platforms with the India Data Platform (IDP).
   d. Support National Program on AI for the roll out of successful solutions.
   e. Adopt standardized data governance and accessibility frameworks and guidelines and collaborate with the GoI on data interoperability standards (meta-data, data quality, API) SOPs, anonymization standards, technical methods for sharing data, etc.

2. **Blockchain**
   a. Awareness workshops may be organized to sensitize various stakeholders and government departments to use new innovative use cases of blockchain.
   b. State data centres may be equipped with appropriate resources specific to blockchain requirements and can be encouraged to be part of the National Blockchain Framework and network.
   c. Successful use-cases can be shared and replicated across other States.

3. **Communication Technologies**
   a. Encourage State Departments, PSUs and Utilities to adopt 5G & Satcom based IoT/M2M/NB-IoT innovations to enhance efficiency and setup 5G use-case labs.
   b. Rapid utilisation of Bharatnet for enabling e-Governance services in villages and piloting use cases of FTTH in rural governance.

4. **Drone Tech**
   a. Pilot drone use cases in Agriculture, Insurance and Credit through Cooperatives, Urban Development etc.

5. **Green Hydrogen Tech**
   a. Support setting up Green Hydrogen Manufacturing Zones.
   b. Incentivise and facilitate production and use of Green hydrogen.
   c. Pilot Green hydrogen buses.

6. Human Resources

a. Facilitate and Incentivise R&D by faculty and students within Engineering colleges and other institutes of Higher learning

b. Raise the capacity of major colleges in Government and private sectors for PhD courses in emerging Technology domains

c. Set up 5G and drone use-case labs in all key Engineering colleges and Polytechnics

d. Set up Optic Fiber and 4G/5G/Mobile handset maintenance courses in Industrial Training Institutes

e. Skilling programmes may be conducted to meet the requirements of blockchain application development

f. Build an AI-ready workforce in Tier II and Tier III cities and build the digital capacity of State government officials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