New programme to boost research in emerging technologies under single platform

New programme on Technology Fusion & Applications Research has been initiated by Department of Science & Technology (DST) to address the ever increasing technological requirements of the society and taking into account the international trends of next generation technologies.

The programme will boost research for fusion, convergence and application of emerging technologies like Quantum Enabled Science & Technology, Imaging Spectroscopy, Epidemiology Data Analytics and Indian Heritage in Digital Space.

The TFAR programme, a national initiative with pan India applicability is to be implemented by the DST at a total outlay of Rs 250 Crore for a period of three years.

The programme is being operated in the knowledge generation domain, and its beneficiaries are slated to be mainly researchers, scholars and students. However, the technology outcomes and innovations could lead to start-ups and technology-driven economic growth. Such technologies would be of benefit for the general public.

A slew of advanced technologies are shaping our lives, arguably at a rate of change never seen before. However, no single technology vertical can address or solve challenges that we face today. The fusion and convergence of various technologies is the need of the day.

Impactful road ahead

All the advanced technologies in TFAR are continually evolving beyond the boundaries of single disciplines, thereby generating innovations. Resulting patents can feed into a Start-up ecosystem and help employment generation. It can also create specially trained human resource & skilled workforce. These technologies are highly prominent today and compiling them on one platform could serve those engaged in R&D, translational research, policy and technology management, and accelerate the process of technical developments and societal problem solving. The TFAR would also establish outcome-based research collaborations within India

and with International academic institutions for the advancement of interdisciplinary research in the country.

Broad research areas under TFAR and related details

1. Quantum Enabled Science & Technology(QUEST)
2. Imaging Spectroscopy & Applications Research Initiative (ISARI)
3. Epidemiology Data Analytics Research Initiative (EDARI)
4. Indian Heritage in Digital Space Research Initiative (IHDS)

1. **Quantum Enabled Science & Technology (QUEST):** The research in Quantum field would lead the development of quantum computers, Quantum Communication, Quantum Key Distribution, Cryptography and Cryptanalysis. Quantum computing, the next generation computational paradigm, has many applications like drug discovery, nuclear research, space applications, Numerical weather predictions, aerospace engineering and many advanced Science & engineering areas. The advancements in Quantum Communication and Cryptography provides us with an edge in safeguarding our critical communication networks; protect our critical infrastructure, financial networks and services. Technology development in both fibre-based and free space communication technologies are envisaged in this initiative.

2. **Imaging Spectroscopy & Applications Research Initiative (ISARI):** This area of research has potential to develop technologies for national issues like mineral exploration, water quality estimation & quantification, forest growth, crop loss assessment, pollution estimation and so on. Applications like soil health cards, management of emissions, crop health monitoring, river rejuvenation and other spatio-temporal analysis require research in advanced remote sensing technologies. Imaging Spectroscopy is an emerging area and the government has recognised its potential. Investments are committed for research in this area.

3. **Epidemiology Data Analytics Research Initiative (EDARI):** This area aims to create a scalable data-oriented open platform for public health epidemiology in India and to gain a systems view of the spectrum of population health challenges. EDA will identify, collate, clean and analyse diverse data that reflect the health of a larger rural or urban population in varied locations across India. It will also create the digital platforms and tools that enable such work. It will also lead to the

creation of an open public health data platform with built-in tools for epidemiology data analytics, visualisation and analysis.

4. **Indian Heritage in Digital-Space Research Initiative (IHDS):** India is known for her rich historical and cultural heritage enshrined in its monuments, architecture as well as written, visual, and performing arts and craft forms. Wars and conflicts have led to partial destruction of its monuments, while evolving tradition of higher art has kept their history and origin unknown to many people. The task of documenting, archiving, and sharing India's heritage is monumental, and despite dedicated efforts by many people and the government, it still remains a challenge. We live in an age of technologies for digital storage and recreation. These technologies can protect memories of the past against the destructive forces of time, nature and man-made events. Already there are Digital Library projects underway to capture the written documents and manuscripts in digital form. These projects hold the promise of being able to preserve the wealth in these documents for many years and also to make them available to use by people from around the world. The Indian Heritage in Digital-Space (IHDS) Research Project aims to extend the power of digital technologies for storing and sharing historical, architectural and cultural data and knowledge. Besides, emerging technologies in computer vision, graphics, audio and video technologies and user interface design offers the prospect of creating vivid experiences of the heritage for common users. It also can provide analytical tools for art historians, architects and scientists interested in conducting scholarly studies on related subjects.