

PRIME MINISTER'S SCIENCE, TECHNOLOGY AND INNOVATION ADVISORY COUNCIL (PM-STIAC)

The Prime Minister's Science, Technology and Innovation Council is an overarching body which assesses the status of specific S&T domains, comprehends challenges, formulates immediate, mid and long term interventions and presents a roadmap to the Prime Minister. The Principal Scientific Adviser co-ordinates to facilitate and ensure implementation of major interventions by concerned Government Departments, Agencies and Ministries.

Chairperson: Prof. K Vijay Raghavan, Principal Scientific Adviser to the Government of India

Members:

- Dr. V. K. Saraswat, Member, NITI Aayog & former Chairman, DRDO
- Dr. A. S. Kiran Kumar, former Chairman, ISRO
- Prof. Ajay Kumar Sood, Professor, Indian Institute of Science, Bengaluru
- Maj. Gen. Madhuri Kanitkar, Dean, Armed Forces Medical College, Pune
- Professor. Sanghamitra Bandyopadhyay, Director, Indian Statistical Institute, Kolkata
- Professor Manjul Bhargava, Professor, Princeton University, USA
- Professor Subhash Kak, Professor, Oklahoma State University, USA
- Shri Baba Kalyani, Chairman and Managing Director, Bharat Forge, Pune

Amongst the terms of reference of the Council are to formulate, converge, collaborate, coordinate and implement multi-stakeholder policy initiatives, mechanisms, reforms and programmes aimed at:

- Synergizing S&T covering fundamental to applied research in collaboration with multiple stake holders both in central and state governments
- Enabling future preparedness in emerging domains of science and technology
- Formulating and coordinating major inter-ministerial S&T missions
- Providing an enabling ecosystem for technology led innovations and techno-entrepreneurship
- Driving innovation and technology delivery towards solving socio-economic challenges for sustainable growth
- Fostering effective public-private linkages for driving research and innovation
- Developing science, technology and innovation clusters with multiple stakeholders including academia, industry and government
- Skilling in current and futuristic technologies.

The PSA's office held 4 meetings of the PM-STIAC beginning October 2018 and key national missions emerged from the discussions and are being driven by the Office of the PSA. Each mission will be led by a lead Ministry and will engage international and national institutional partners, young scientists and industry.

MISSION 1: Natural Language Translation

Objective

To make opportunities and progress science and technology accessible to all, this mission aims to remove the barrier that the requirement of high-level of facility in English poses today. Using a combination of machine and human translation, the mission will eventually enable access to teaching and research material bilingually i.e. in English and one's native Indian language.

It is planned to set up an eco-system which involves, central and state-government agencies and start-ups who will work with scientists and build implementable solutions.

Lead Agencies

Ministry of Electronics and Information Technology
Ministry of Human Resource Development
Department of Science and Technology

MISSION 2: QUANTUM FRONTIER

Objective

This mission aims to initiate work in control of the quantum mechanical systems, with a large number of degrees of freedom, as one of the great contemporary challenges in fundamental science and technology. Building excellence in the quantum frontier through this mission will also be essential for national security and in the development of quantum computers, quantum chemistry, quantum communication, new materials, quantum sensors and quantum cryptography.

Lead Agencies

Department of Science and Technology
Department of Space
Department of Atomic Energy
Defence Research and Development organisation
Ministry of Electronics and Information Technology

MISSION 3: ARTIFICIAL INTELLIGENCE

Objective

There are now incredible advances in data collection, processing and in computation power. Intelligent systems can now be deployed in a variety of tasks and decision-making to enable

better connectivity and enhance productivity. The Artificial Intelligence (AI) mission will focus on efforts that will benefit India in addressing societal needs in areas such as healthcare, education, agriculture, smart cities and infrastructure, including smart mobility and transportation.

This mission will work with extensive academia- industry interactions on developing core research capability at national level which will include international collaborations. It will push technology frontiers through the creation of new knowledge and in developing and deploying applications.

Lead Agencies

NITI Aayog
Department of Science and Technology
Ministry of Electronics and Information Technology
Department of Biotechnology

MISSION 4: NATIONAL BIODIVERSITY MISSION

Objective

This mission will include a comprehensive documentation of India's biodiversity with the potential for cataloguing and mapping all lifeforms in India including associated cultural and traditional practices; assessment of the distribution and conservation status of India's biodiversity; development of a cadre of professionals adept at handling large sets of environmental data for management and monitoring of biodiversity; expansion of knowledge in ecosystem functioning that will inform restoration efforts; establishment of a vibrant biodiversity based economy on a solid foundation of reliable information; engagement with the public; enhanced options for agricultural production and livelihood security and the general well-being of society.

Lead Partners

Ministry of Environment, Forests and Climate Change
Department of Biotechnology

MISSION 5: ELECTRIC VEHICLES

Objective

This mission is critical for India to reduce fossil fuel consumption and mitigate emissions. Electric Vehicles (EVs) are a major component of India's mobility plans. For EV's to become economically viable and scalable, focused research, development and innovation are needed to build indigenous capability. Vehicles need to be energy efficient, use light and efficient batteries that function well in our conditions with materials that are recyclable. Developing vehicle sub-systems and components for Indian requirements including rare earth based

electric motors, Li-ion batteries, power electronics etc. will be addressed using academia-industry collaboration.

Lead Agencies

Department of Science and Technology
Department of Heavy Industries
Ministry of New and Renewable Energy
Ministry of Power,
NITI Aayog

MISSION 6: BioScience for Human Health

Objective

The diversity of Indians and of our environment requires a large-scale study of human genomes specific to our lifestyle and how this impact health and disease patterns. The mission will make use of healthy- and disease- samples to understand the impact of nature and nurture on health. The primary goal of the mission is to construct comprehensive reference maps of genomes and to understand the dynamics of how exposure to different environments have impact on our bodies.

The mission will focus on the genomic study of populations of humans to identify and unravel the genetic basis and prevalence of rare and inherited diseases. The outcome will help stimulate better diagnosis and treatment that can feed into the health care system of the country.

Lead Partners

Department of Biotechnology
Department of Health Research
Department of Health
Department of Science and Technology
Department of Atomic Energy

MISSION 7: WASTE TO WEALTH

Objective

The goal of the Waste to Wealth mission is to identify, develop and deploy technologies to treat waste to generate energy, recycle materials and extract worth. The mission will also work to identify and support development of new technologies that hold promise in creating a clean and green environment.

The mission will assist and augment the Swachh Bharat and Smart Cities project by leveraging science, technology and innovation to create circular economic models that are financially viable for waste management to streamline waste handling in India.

Lead Agencies

Department of Biotechnology
Department of Science and Technology
Ministry of Environment, Forest and Climate Change
Ministry of Urban Development
Swachh Bharat Abhiyan

MISSION 8: DEEP OCEAN EXPLORATION

Objective

The purposes of this mission is to scientifically explore the deep oceans towards improving our understanding of the blue frontier. The information from this mission will address issues arising from long term changes in the ocean due to climate change. The focus areas cover the development of technologies for deep sea exploration and exploitation of living (biodiversity) and non-living (minerals) resources; development of underwater vehicles and underwater robotics; development of ocean climate change advisory services; technological innovations and conservational methods for sustainable utilisation of marine bio-resources; offshore based desalination techniques; and renewable energy generation.

Lead Agencies

Ministry of Earth Sciences
Department of Biotechnology
Department of Space
Ministry of New and Renewable Energy
Oil and Natural Gas Corporation
Defence Research and Development Organisation
Geological Survey of India
National Hydrographic Office
National Biodiversity Authority

MISSION 9: AGNIi

Objective

This mission launched by the O/o PSA aims to support the national efforts to boost the innovation ecosystem in the country by connecting innovators across industry, individuals and the grassroots to the market and helping commercialise innovative solutions. It will provide a platform for innovators to bring their technology ready products and solutions to industry

and the market thereby helping propel techno-entrepreneurship which can usher a new era of inclusive socio-economic growth.

The mission includes services across the techno-commercialization chain required to support and upscale market-ready indigenous innovations. The initiative includes working with government R&D laboratories and academia to help commercialise their innovations; collaborate and value add to existing innovation programs; training and capacity building of scientists, innovators, technology transfer offices and technology license offices. Linking specific needs of industry to research laboratories to enable development of cost-effective marketable solutions is another focus of the AGNli program.

Lead Partner

Invest India

Other major projects of the Office of the Principal Scientific Adviser

Research Clusters

Objective

Several cities have seen major investments both in research infrastructure and trained scientific manpower people in establishing high-end institutions in the scientific and technological sector. Similarly, knowledge industry has also grown as enterprise in these cities. Yet, the connect between R&D institutions, academia, including state universities and industry is weak. The aim of the city cluster is to provide a platform to leverage the complementary strengths through effective collaboration and cooperation by developing a functional connect. The clusters will serve as hubs, which will interact with the broader city ecosystem including the state university, colleges, medical schools and local administration. Another major effort involves the development of research programmes in the state university system by providing the enabling eco-system.

Earth Museum

Objective

The Indian subcontinent has a unique and large geological heritage. It is important to preserve this as it provides the link of the present to past. India was a cradle for the evolution of many biotic elements and their subsequent dispersal to other continents. Thus, fossils and geological features form an important component of India's natural heritage besides their role in understanding past and present-day climate system and in the exploration of natural resources. It is important that our unique geological heritage should be showcased in an exemplary manner which is both scientific and educative through establishing a state-of-the-art Earth Museum.

The Earth Museum will not only serve as a national repository for specimen fossil preservation and conservation, but will be also designed as a major centre for research in geological and other natural sciences. This will help to educate students and citizens about the exploration, conservation and preservation of our natural heritage, along with its academic and scientific significance.

Brahmaputra River System

Objective

The Brahmaputra river basin forms a critical ecological lifeline of flora and fauna for the north-east states of India. There is a need for multi-disciplinary applied approach for policy, planning and development and to provide R&D based validated scientific input for river basin planning, management and development (scientific modelling, simulation, prediction) for Brahmaputra river. This can be done through robust scientific data collection and sharing, integrate satellite imagery and use such scientific data for sustainable and integrated development of NE Indian states.

I-STEM- Indian Science Technology, and Engineering Facilities Map

Objective

To ensure access through a regularly updated national portal of publicly funded R&D facilities and equipment, installed and working in R&D and academic institutions across the country. This web-based access will foster efficient and optimal use of equipment and capabilities as well as enable cooperation and collaboration in the R&D community, both academic and the industry. The I-STEM Web Portal will provide the effective gateway for linking researchers with resources.

Energy Security

Objective

Considering the national mission of Electric Mobility an expert Committee for exploration and procurement of critical minerals required for this sector has been set up in consultation with Ministry of Mining to examine the reserves of Lithium, Cobalt, etc. in the country as well as possible tie-up with mining sector of other countries for sourcing these. KABIL, a joint venture of MECL, NALCO and HCL has initiated preliminary discussions for possible agreement on sourcing Lithium and Cobalt from countries like Australia, Argentina and Bolivia. Last month, KABIL team visited Argentina to conduct a primary survey of different mines in Argentina. Follow-up activities are underway to boost the availability of these critical minerals.