MEETING REPORT

STI ecosystem for Atmanirbhar Bharat*

India is a kaleidoscope of cultures that includes myriad variations in location, language, community, resources, food, clothing, and religious beliefs and traditions. All the States and Union Territories (UTs) in the country have a unique diversity which has both challenges and opportunities.

The demands of the 21st century, including improved access to sufficient food, clean water, sustainable energy and health care, can only be met by advancements in application based research.

Robust and sustained investments across the full spectrum of the scientific enterprise are essential for developing the science and technology (S&T) ecosystem in order to improve the human condition and drive economic growth.

The progress can be amplified with effective collaboration across sectors and disciplines. New avenues for contextual interaction between basic and applied research must be explored. The programmes and policies should be designed and developed with broader participation and wider outreach in the states from every sector and demography to meet today's needs and help invent for the future.

Since 1971, the Department of Science and Technology, Government of India (GoI), has helped strengthen the network of state S&T councils in the country. Each of the state S&T councils is unique in its approach and methodologies in creating a scientific ecosystem in the respective state.

Science, technology and engineering are major forces of socio-economic change which cause humanity and its social and natural environment to evolve rapidly. Therefore, they shoulder responsibility and accountability. The state S&T councils are playing a major role in taking science closer to the community with a network within each state.

Scientific endeavour is as much about us as it is for us. Its place in society, therefore, is not to unfold quietly at the sidelines, but to become a fundamental part of the game. Now more than ever, science must engage with us, and we must engage with science. It tells us about the past, helps us with the present, and creates ways to improve our future.

During the COVID-19 pandemic, each state S&T council played a proactive role in both spreading awareness and analysing the situation. The councils conducted a series of programmes and outreach activities to benefit the people at large, which helped tackle the pandemic.

Further, as a part of the Azadi Ka Amrit Mahotsav, the network of state S&T councils conducted a virtual 12-month long programme, 'Vigyan Utsav (celebration of science)' on the central theme of science, technology, innovation (STI) ecosystem for Atmanirbhar Bharat. The programme started from 2 September 2021 to 31 August 2022.

For each month, there was a specific component of the STI ecosystem, which was hosted by one state S&T council on the first day of the month, followed by other state S&T councils on subsequent days on a virtual platform. The entire programme was an exhilarating experience in terms of competency, coordination and collaboration of the all-state S&T councils, both inside as well as outside of the respective state. The programme was inaugurated by Jitender Singh (Minister of Science and Technology, GoI) and was attended by more than six lakh stakeholders through various digital platforms.

The annual review meeting of the state S&T councils was hosted by the Madhya Pradesh Council on Science and Technology (MPCOST) during 29–31 August 2022. A total of 27 state S&T councils participated in the three-day brainstorming session at Bhopal. DST, Government of India had a group of expert members, from IIT, Mumbai, ICAR, New Delhi, National Innovation Foundation, Gandhinagar, Innovation Cell, Ministry of Education, Government of India, Banaras Hindu University, Varanasi and Centre for Cellular and Molecular Biology, Hyderabad, as members of the technical committee.

The three-day annual review meeting had presentations by each of the state S&T councils depicting the activities done over the last year on various components of the STI ecosystem, viz. (i) research and development (R&D), (ii) institutional and human capacity building, (iii) innovation, (iv) technology deployment for socio-economic development, (v) science communication and popularization, and (vi) science, technology and innovation policies.

During the inaugural session, Debapriya Dutta (DST, GoI) mentioned that 'As a part of science and technology promotion and popularization, the State councils have to focus on a comprehensive approach to address all the issues at the local level and to convert the problems into the opportunities for development.' He added that the state S&T Councils have a key role in catalysing the STI ecosystem at the state level, from promoting R&D to connecting science to the community at the grassroots level. The state S&T councils have a unique mechanism to strengthen science-based delivery systems across the states and the country. He further emphasized that the diversity among states brings several challenges on the one hand but also provides several opportunities for S&T-led solutions. Hence the prime goal of this programme was to strengthen the culture of R&D with technology development and transfer.

Satish B. Agnihotri (IIT, Mumbai) mentioned that the state S&T councils should identify the location-specific problems and explore solutions at a local level with minimizing the gap in society. The councils should also identify the local unsung heroes who have developed their expertise with experiences in working with the community for a long time.

Rashmi Sharma (DST, GoI) urged the state councils to work at the interface of science, technology and society, as S&T is the fulcrum of development at the grassroots. She added that S&T interventions could promote equity, inclusion, and societal empowerment. She requested all the participants to adopt a proactive approach in identifying state- and location-specific problems and challenges, and to expedite the solution-centric approach for societal benefits.

The Committee reviewed the progress in the work of each state S&T council and provided appropriate inputs and suggestions. It was suggested that the state S&T councils should coordinate with the central institutions in the states by integrating issues of sustainability into research, education, science–society interactions, fostering reflective thinking and supporting students

*A report on the three-day annual review meeting of the state S&T councils to strengthen STI ecosystem in the states and the nation hosted by the Madhya Pradesh Council on Science and Technology during 29–31 August 2022.

in developing skills to cope with complex problems. Intra-state, inter-state, centre–state and international collaborations must be increased to exchange scientific knowledge.

It was also suggested to establish a Technology Facilitation Cell, which may act as an interface between academia and industry. The Cell may help in linking the research requirements of industry and industry requirements of research. It was proposed to set up a central facility for establishing international linkages, where any institution can approach for assistance.

The success of the STI ecosystem relies on its human resources. Thus, it's crucial to envision career paths, promote skill development, and ensure a sense of security to unlock their complete potential.

Fostering and securing human resources in S&T is important for the STI ecosystem. All the states and UTs must ascertain the conditions for S&T human resource development in universities, graduate schools and other institutions, as well as the available career paths, including international mobility of researchers. S&T also elucidates and analyses the challenges affecting such human resource needed to advance and develop S&T in the country.

According to our Prime Minister Narendra Modi, it is time to redefine R&D as 'research for development' of the nation. The Prime Minister has ubiquitously reaffirmed his belief that reaching the lowest rung of the pyramid through S&T is prudent and imperative.

Innovation epitomizes the creation of new values in the form of technology or services for the world through the development of new technologies, business models, products and services, or new forms of social entrepreneurship. It is the key driver of long-term economic growth and improvements in quality of life.

It was also discussed in the meeting how communication skills could be enhanced among our scientists, teachers and students. It was emphasized that science communication is among the most important skills one has to provide to new scientists to enable better networking, collaboration, teaching and leading.

The deliberations during the sessions led to the following suggestions as the way forward:

- Creating a mechanism for standardizing local technologies and validating local products.
- Creating linkages for intra- and inter-state collaborations in thematic areas.
- Establishment of STI Data Centres for the inflow of data that can be utilized while framing new strategies.
- Establishment of a Technology Development and Adaption Centre (TDAC) to address need-based, location-specific problems with appropriate S&T intervention.
- Connecting industry, academia and Government departments to address societal issues.
- There is a need for the development of a national programme to support scientific research to increase domestic R&D capacity and engage in innovative activity. This will lead to Intellectual Property creation and deployment of indigenously developed technologies for the socio-economic development leading to an Atmanirbhar Bharat.
- Creating a mechanism for properly utilising bioresources, conservation and optimum industrial utilization.
- Initiating discussions at the state level and mapping the needs of the state for using cutting-edge and emerging technologies like artificial intelligence and nanotechnology for agricultural activities and development of new materials for energy storage and linking them with pertinent national programmes.

The national policies in STI and other allied areas have paved the way to realize the goal of Atmanirbhar Bharat. The execution of the policy instruments developed centrally largely depends on the localization and adaptation of the same by the states.

During the discussion, it was proposed that the mapping and implementation of state policies and budgetary allocations should be according to the Sustainable Development Goals of the United Nations. Regular review and monitoring must be done to maintain system interconnectedness along with STI governance.

Specific policy support in the areas of renewable energy and the application of technologies such as artificial intelligence (AI), machine learning (ML), quantum computing, Internet of Things (IoT), etc. were proposed.

It is also important to have a policy to support the project while having filed for a patent or developed a prototype. These porotypes need to be tested before being deployed. So policies to generate such infrastructure and support need to be promoted.

STI plays a significant role in fostering socio-economic and political development globally and benefitting all sectors through scientific and technological advances. STI acts as a key determinant in addressing socio-economic challenges related to critical sectors such as health, environment, education, food, energy, climate change and water.

The three-day review meeting enabled all state S&T councils to showcase and exchange new ideas and evolving challenges in the field of S&T applications and to adopt appropriate measures to meet the local, regional and national goals for human development and prosperity. During the session, the Compendium of Vigyan Utsav was also released, which details STI components at each state/UT level.

In his concluding remark, Agnihotri mentioned that all the state S&T councils are working well in order to achieve the set objectives of sustainable development of the society and the nation. However, there is a lot to achieve, and more thrust should be given on creating benchmark projects and initiatives from the councils for technology development and demonstration for the benefit of society.

Generating interest and excitement in science and nurturing a new generation of scientists are essential in improving the quality of life and enhancing national competitiveness. It was suggested that the state S&T councils should make the best use of information and communication technology. Each council should upload its programmes, activities, and reports in advance so that the same can be shared among all.

The review meeting concluded with a vote of thanks by Kothari.

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