DST

(May 2014 – April 2017)

Department of Science & Technology (DST)
Ministry of Science & Technology
Technology Bhawan, New Mehrauli Road, New Delhi -110 016, India

Some Key Initiatives and Achievements

The Department of Science & Technology (DST) supports and encourages the whole gamut of S&T ecosystem from seeding and capacity building in the cutting-edge research areas; translational research; technology development and deployment; innovation and startup ecosystem; and international collaborations. This is achieved by supporting S&T infrastructure, scientists and students in academic and R&D institutions across the country. Besides this, the Department nurtures the following — Science & Engineering Research Board (SERB) which is a Statutory Body that promotes extramural R&D; Technology Development Board (Statutory Body) that promotes commercialization of indigenous technologies; 20 Autonomous Institutions which undertake research in specialized domains or provide scientific services; 5 professional bodies that promote Science and Engineering related activities; and 2 subordinate offices *viz.* Survey of India and National Atlas and Thematic Organization (NATMO) which provide survey and mapping services.

During the last three years, the Department has aligned its activities with the National Agenda of the Government towards Make in India, Startup India, Digital India, Swachh Bharat, Swasth Bharat, etc. Some of the new initiatives conceptualized and launched during the past three years 2014-17 are summarized below.

Promoting Excellence in Research and Development

Ease of Doing Science

To bring greater transparency, ease of access to information and quick processing, all extramural R&D projects under Science & Engineering Research Board (SERB) have been brought under online platform from submission to peer-reviews to decision making. Efforts are going on to bring the remaining schemes under online processing as quickly as possible.

Hike in Research Fellowships: (in ₹)

Name of Fellowship	Amount in 2013	Amount since Oct. 2014
Junior Research Fellowship	16000	25000
Senior Research Fellowship	18000	28000
Research Associateship	22000, 23000, 24000	36000, 38000, 40000

Visiting Advanced Joint Research (VAJRA) Faculty Scheme: Science and Engineering Research Board (SERB) has approved VAJRA Faculty Scheme in 2016-17 for distinguished overseas scientists and academicians with emphasis on Non-resident Indians (NRIs) to create an opportunity to contribute to growth of research and development in the country. The scheme will bring the best global science and scientists to India. It is also expected to enhance global ranking of our institutions. The area of research to be undertaken by the Adjunct/Visiting Faculty should be of cutting-edge and interest to India.

The VAJRA Faculty will reside in India up to 3 months in a year and they will be provided a lump-sum amount of US $ 15000 in the first month of residence and US $ 10000 p.m. after that. The faculty would be physically available for 1-3 months in the Indian institutions but maintain an adjunct faculty/scientist status round the year and keep the collaborative lab and co-guided Ph.D. students in India for the whole term providing round the year mentoring and support to students and other researchers. Total not exceeding 1000 Adjunct/Visiting Faculty positions at any point in time starting from 2017-18 will be awarded.

Overseas Doctoral Fellowship: The fellowship scheme was formulated in 2015-16 to facilitate overseas collaborative research training for Indian Ph.D. Scholars registered in Indian institutions. Fellowships will be implemented in overseas institutions of repute and areas of importance to the country. Fellowship amount of US $ 2000 p.m. for a period of up to 12 months will be provided. One visit by the Indian supervisor to the overseas institution and overseas faculty to the host Indian institution of the student during the tenure of the fellowship will also be supported. It is estimated that 350 fellowships will be awarded for the period 2016-19. **96 fellows have been selected for the fellowship in 2016-17.**

Early Career Research Award: A new scheme viz. Early Career Research Award (ECRA) launched in 2015-16 to provide quick research support to the researchers who are in their early career for pursuing exciting and innovative research in frontier areas of science and engineering. The scheme aims to minimise the time required for the young scientist to initiate their research. The award carries a research grant up to ₹ 50 lakhs for a period of three years. **More than 600 young scientists have responded in November 2015 for the Award. 440 young faculties/scientists have been supported under this scheme.**

National Postdoctoral Fellowship (N-PDF) Scheme: In order to attract and retain young scientists and discourage brain drain immediately after Ph.D. in academic/R&D institutions, a National Postdoctoral Fellowship (N-PDF) scheme was launched in 2015-16. It aims to identify motivated young researchers and provide them support for doing research in frontier areas of science and engineering. The fellow will work under a mentor, and it is expected that the training will provide him/her a platform to develop as an independent researcher. **600-700 young scientists are supported every year.**

Expanding Scientist and Research Base - Mobility Scheme: The scheme launched in 2016-17 aims to facilitate mobility of faculty members working in a regular capacity in State Universities/ Colleges/ Academic Institutions such as IITs, IISc, IISERs, National labs, etc. located nearer to the institution where the faculty member is working. This would bring in our research stream the latent or dormant scientific manpower with modest investment and improve the potential for research and teaching in two tier institutions. Provision of fellowship amount of ₹ 5,000 p.m., contingency grant of ₹ 5 lakh per annum and overhead for a period of 3 years has been made. Maximum of 500 such awards would be granted per year.

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Scheme for funding High Risk-High Reward Research: SERB has approved a new and significant initiative in 2015-16 to support proposals that are conceptually new and risky, and if successful, expected to have a paradigm-shifting influence on the S&T landscape.

Global Research Council Meeting: SERB jointly hosted the Fifth Annual Meeting of Global Research Council (GRC)-2016 from 25th to 27th of May 2016 with the Research Councils UK (RCUK). The Global Research Council (GRC) is a virtual organization comprising of the Heads of Research Councils from around the world, dedicated to promoting the sharing of data and best practice for high-quality collaboration among research funding agencies globally. Heads of Research Councils from 44 countries were among more than 100 delegates who attended the event to share the best practices and discuss policy issues in the field of Research Funding. A Statement on 'Principles of Interdisciplinarity' and 'Actions towards Equality and Status of Women in Research' was discussed and endorsed by participants representing the global research community.

Empowering Women Scientists

Women scientists get major support through Knowledge Involvement in Research Advancement through Nurturing (KIRAN) launched in 2014 to bring gender parity in science

The programme is aimed at providing opportunities to women scientists who had a break in their career primarily due to family responsibilities. The programme includes women-exclusive schemes and encourages them to foster their career by undertaking research not only in science & engineering but also for societal benefit besides making a career through entrepreneurship and training in intellectual property management. KIRAN supports around 500 women every year in R&D, societal applications of S&T and training on Intellectual Property Management.

Two new components, viz. **'Mobility' and 'KIRAN Overseas Fellowship for Women in STEM'** have been initiated in 2016-17.

Internship training of eighth batch in the domain of Intellectual Property Rights.

Push to Digital India

National Supercomputing Mission is a visionary programme to enable India to leapfrog to the league of world class computing power nations. The NDA Government approved the Supercomputing Mission at a total cost of ₹ 4500 cr in March 2015.

The Mission envisages installing a vast supercomputing grid comprising of more than 70 high-performance computing facilities. The Mission also includes development of highly professional High Performance Computing (HPC) aware human resource for meeting challenges of development of these applications. Supercomputing capability would add a great value to realize the goals of Digital India.

The 6 supercomputing systems in Phase I are to be made operational in 2017.

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Cyber-Physical Reconstruction of Architectural Heritage of HAMPI: Development of algorithms and techniques to acquire and print a three dimensional digital replica of complex structures spread over a large area of Hampi has been demonstrated. This also allows a virtual tour of the heritage site with information. The technology has been transferred to a Start-up company which is now working in PPP mode in collaboration with Ministry of Culture for reconstruction of Ghats of Varanasi, Buddhist Circuit, Taj, Delwara, etc.

Reconstruction of Mahamantapa in Digital space using historical evidences

Greenlaw's picture of Mahamantapa

Existing Mahamantapa image

(a) Existing Mahamandapa image, (b) Reconstructed view of Mahamandapa (above)

(right)

Networked Programme on Imaging Spectroscopy and Applications (NISA) has been launched considering the potential of this emerging technology to promote research on various aspects of imaging spectroscopy and its applications with emphasis on use of satellite and ground based IR sensing based on which agriculture, forest and soil parameters can be obtained.

Interdisciplinary Cyber-Physical-Systems (ICPS): A new programme to foster and promote R&D in this emerging field of research has been launched in 2016-17. A Cyber Physical System

(CPS) is a mechanism controlled or monitored by computer-based algorithms, tightly integrated with internet and its users. It is an engineered system that is built from and depends upon the seamless integration of computational algorithms and physical components. The components covered under this programme include Artificial Intelligence, IoT, Deep Learning, Big Data Analytics, Smart Cyber enabled Materials and Sensors, Intelligent Machines and Manufacturing, etc.

Make In India — Technology Development & Commercialisation

Advanced Manufacturing Technology (AMT) Programme: Aligning with the Make in India agenda of the Government, the Department has initiated a programme to promote development of advance manufacturing technologies in the country. AMT programmme was initiated in October 2015 and **45 project proposals have been supported till date.** The second call for proposals was open till 31st January 2017 with a focus on design tools and process innovations, modelling & simulation platforms, Digital Manufacturing, Flexible scale manufacturing, Additive Manufacturing Smart Manufacturing, Advanced Robotics (AR) & Industrial Internet of Things (IIOT) wearable low power electronics including energy harvesting & sensor networks, etc.

Department of Science & Technology has joined hands with Ministry of Human Resource Development to implement IMPRINT projects to address major societal and developmental needs

Technical Research Centres: Finance Minister during his budget speech 2014-15 announced setting-up of Five Technical Research Centres (TRCs) in the existing autonomous institutions of the Department of Science & Technology. Technical Research Centres (TRCs) were established in 2015-16 in five DST institutions namely, SCTIMST, Trivandrum, ARCI, Hyderabad, JNCASR, Bengaluru, IACS, Kolkata and SNBNCBS, Kolkata. Brief achievements of TRCs are as following.

Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Trivandrum: 4 projects on Neuro-Prosthetic Devices, 7 projects on Cardiovascular Devices, 3 projects on Hard Tissues Devices, 6 projects on Biological and Combinational Products and 8 projects on Product/Material Evaluation/ Support were initiated during the year and they recorded good progress.

International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad: Activities carried out under the project were in the areas of – solar energy, energy storage, energy efficiency, energy conversion, electric/hybrid vehicle systems, etc. One Patent was filed and one more is in the process of getting filed.

Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru: Development of 7 technologies is in progress, 15 Indian and PCT applications were filed, one start-up 'Avinir' was incubated which would deal with DNA probes having potential for various applications, including diagnostics. Another start-up, which would deal with development of anti-bacterial for use in paints and surgical instruments is under incubation.

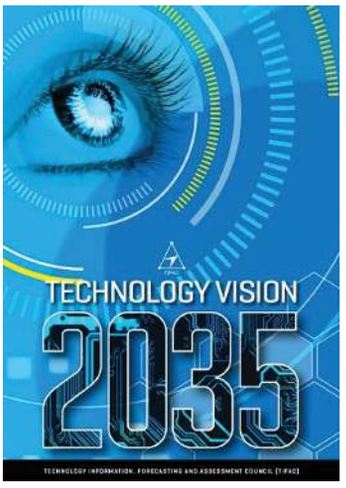
Indian Association for the Cultivation of Science (IACS), Kolkata and S.N. Bose National Centre for Basic Sciences, Kolkata: Both the institutions took steps to establish the necessary laboratory facilities for accelerating applied research.

Partnering with MHRD for Uchchatar Avishkar Yojana (UAY): SERB is partnering with MHRD for UAY projects and funds those projects identified by the Apex Committee constituted for the purpose. UAY is expected to enhance industry-academia interaction and encourage industry relevant R&D by using the best of human resource and infrastructure in our academic institutions. The share of SERB funding will be 25%, while MHRD will contribute 50% and Industry the remaining 25%. The projects funded under this scheme will be named as "UAY SERB" projects. **The first batch of 39 projects are being supported with SERB share of ₹ 30 crores.**

Collaboration in Impacting Research Innovation and Technology (IMPRINT) Project: Department of Science & Technology (DST) has joined hands with Ministry of Human Resource Development (MHRD) to implement IMPRINT projects. IMPRINT projects will address major societal and developmental needs such as healthcare, information and communication technology, energy, sustainable habitat, nano technology, water resources and river systems, advanced materials, security and defence, and environment and climate. **12 projects in different domain areas particularly in nanotechnology and Advanced Materials have been funded by SERB of DST.**

Industry-relevant R&D: Recognizing the need to facilitate increased Public Private Partnerships, the SERB has approved a scheme that provides an opportunity for collaborative research between academic institutions and industry. Upto 50% cost to be provided by DST for the project after ascertaining the usefulness and sound scientific foundations of the project. This scheme aims to bridge the gap between public funded research and industrial R&D. The new scheme seeks to target solution driven research to address industry specific problems.

Technology Vision 2035: Technology Vision 2035 document was released by the Hon'ble PM in Indian Science Congress in January 2016. As a follow-up, Technology Forecasting and Assessment Council (TIFAC), an autonomous institution of DST, is preparing a detailed roadmap for 12 key sectors of technology. In 2016, five of these were prepared and released: (a) Materials, (b) Manufacturing, (c) Information & Communication Technology, (d) Medical Science & Health Care, and (e) Transportation. It is expected that in 2017, five more roadmaps would be released. In addition action on some of the items mentioned in vision document and roadmaps have started in collaboration with relevant stakeholders.



Initiatives Towards Swachh Bharat

Waste Management Technologies (WMT) Programme: With the objective to contribute towards Swachh Bharat, a new programme viz. Waste Management Technologies (WMT) was initiated in October 2015 to come up with technological solutions for the problems faced by the country in waste

management. Areas under this include hospital waste, plastic waste, e-waste, etc. First call for proposals has received an overwhelming response and **19 projects were initiated in the first phase.** The second call for proposals was open till 31st January, 2017 with a focus on E-Waste (Electrical & Electronics Waste), Industrial Hazardous & Non-hazardous Wastes, Newer technologies for Biomedical Waste and Urban & Rural Solid Waste, including Plastic Waste.

A comprehensive assessment of available technologies for solid-waste management has also been done and shared with MoUD to aid in the future deployment of these technologies.

Collaboration on National Mission for Electric Mobility: Department has formalized collaboration with Department of Heavy Industry (DHI) on working jointly for implementation of R&D component of DHI's National Mission for Electric Mobility. A Joint Technology Platform for Electric Mobility (TPEM) has been set up in the Department of Science & Technology to implement the programme. The Call for Proposals in the priority area Ultra capacitor has already been made.

Joint R&D Initiative with Ministry of Railways (MoR): Department of Science and Technology (DST) and Ministry of Railways (MoR) worked together for shaping a joint R&D initiative to address research problems of immediate and direct relevance to MoR by taking up suitable projects within a time span of 3-5 years with well-defined deliverables. Collaboration between MoR and DST are in the area of fuel efficiency and emission control technologies, alternate fuels, fuel conservation in diesel traction etc. and to derive synergy based on mutual strengths. This collaboration would add value in Swachh Bharat Mission of the Government. Projects are being identified with MoR for R&D support.

Mission Innovation: A multilateral initiative for Clean Energy R&D—The inaugural Mission Innovation Ministerial, comprising of 20 founding Members and European Commission on behalf of the European Union as the 21st partner, was held in June 2016, at San Francisco. Dr. Harsh Vardhan, Hon'ble Minister, Science & Technology and Earth Sciences pledged to double Government funded clean energy research and development over five years and enhance international engagement in programmes

on clean energy R&D. India, through **DST, will lead Smart Grids and Innovation Challenge under Mission Innovation which was launched by Hon'ble PM along with 20 world leaders during COP21 at Paris.** Smart Grid and Innovation Challenge is one of the seven top challenges identified for multi-lateral Research Partnership to accelerate the pace of clean energy R&D innovation. This challenge will address development of future smart grids powered by affordable reliable decentralized renewable electricity system. It will lead to development and demonstration of smart grid technologies that can accommodate 100% renewable based power plants in large scale across the globe.

Mission Innovation and Clean Energy Ministerial (June 1-2, 2016) San Francisco, US. Hon'ble Minister of Science & Technology and Earth Sciences led the Indian delegation

Initiative to Promote Habitat Energy Efficiency (I-PHEE): A new national programme on "Initiative to Promote Habitat Energy Efficiency (I-PHEE)" to improve energy performance of buildings and cities was launched. It would support enhancement of knowledge and practice to save energy in design, construction and operation of buildings. **105 research proposals were received, out of which 31 have been recommended for funding.**

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Materials on Energy Storage (MES): A new programme on the Materials on Energy Storage (MES) to support R&D activities aimed at innovative materials for energy storage, and to build energy storage device with enhanced output for multifunctional applications was launched during the year. Aiming at the efficient use and further increase of renewable energy, and demonstrating its value in terms of flexibility in the energy systems are the prime objectives of the initiative. **130 proposals were received and 18 were approved for funding.**

Joint Clean Energy Research and Development Centre on Smart Grids and Energy Storage: India and the United States expanded collaboration under Partnership to Advance Clean Energy-Research (PACE-R) to include smart grid and grid storage critical importance of expanding clean energy research, development, manufacturing, and deployment, which increases energy access and reduces

greenhouse gas emissions. A Funding Opportunity Announcement (FoA) was made in July 2016 to support multi-institutional network projects using public-private partnership model of funding. Award will be made to a consortium with the knowledge and experience to undertake high-quality collaborative research programs. 7 applications have been jointly submitted by the US and Indian researchers who would be members of the Consortia based on their mutual interests, priorities and strengths.

Mission Programme on Methanol and Di Methyl Ether: The Methanol economy holds promise to help India to mitigate its petroleum import cost and at the same time counter the problems associated with global warming due to excess CO_2 emission. An International Seminar on *'India's Leap to Methanol Economy— Opportunities and Options for Energy Security'* was held for knowledge sharing and aggregation for chalking out a strategy for preparing a road map on Methanol & DME economy for the country. DST actively contributed in preparation of roadmaps for Methanol DME and Di methyl ether. A survey report on Production & Utilisation issues of Methanol & DME was finalized. DST initiated research programme on methanol and DME, which evinced great interest and 94 proposals were received.

India-UK Clean Energy R&D Centre: DST and Research Council of UK have agreed to launch India-UK Clean Energy R&D Centre in 2017 on solar energy, storage and integration with an investment of £ 5 million from each side.

Start-Up India and Innovation Ecosystem

National Initiative for Developing and Harnessing Innovations (NIDHI) is an umbrella programme initiated in 2016-17 by the Department. Inline with the PM's vision on Innovation and Start-up India, NIDHI programme aims to nurture knowledge-based and technology-driven innovative ideas into successful startups.

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NIDHI focuses on building a seamless and innovation driven entrepreneurial ecosystem. Different programmes have been designed and are being implemented to address the gaps in the ecosystem. The programs range from providing fellowships to the students opting for entrepreneurship, providing 'Proof of Concept' support for converting ideas into prototypes, providing business development support through accelerators, providing seed support to ventures and creating world class infrastructure for incubating start-ups through Technology Business Incubators and Centres of Excellence. The programme aims to provide technological solutions not only for the pressing needs of the society but also targets to create new avenues for wealth and job creation.

Six Centers of Excellence (CoE) at SINE- IIT Bombay, Venture Center-NCL Pune, CIIE-IIM Ahmedabad etc. have been recommended; establishment of 15 Technology Business Incubators (TBI) which includes TBI at IIT Patna, Mizoram University, College of Engineering - Pune etc. have been recommended. Establishing Research Park at IIT Gandhi Nagar has already been supported at a cost of ₹ 90 crore.

INSPIRE Awards-MANAK (Million Minds Augmenting National Aspiration and Knowledge): In the context of Start-up India initiative of the Government, **INSPIRE Awards** scheme has been revamped to foster a culture of scientific innovation among school children of class VI to class X. This will significantly broaden the base of our innovation pyramid to produce future entrepreneurs in large numbers. The programme has been targeted to encourage children to visualise/analyse needs of the society and inspire them to devise innovative ideas to address them. The scheme has been rechristened as **INSPIRE Awards-MANAK.**

Under the revamped scheme the thrust is on the power of relevant 'original ideas' having the potential to address societal needs through Science & Technology, especially in the context of national flagship programmes such as Swachh Bharat, Digital India, Swasth Bharat, Make in India, Energy, Environment, Sanitation, etc. Top 10 lakh ideas will be scouted from 5 lakh schools across the country in a financial year. 1 lakh top ideas will be shortlisted for an INSPIRE Award of ₹ 5000/- each, for preparation of a project/model and participation in District Level Exhibition & Project Competition (DLEPC). Out of this, 10,000 best projects will be shortlisted for State Level Exhibition & Project Competition (SLEPC) and top 1000 awardees shortlisted at State Level will be provided ₹ 20,000/- each for development of improved prototype for National level event. They will be provided mentoring support by National Innovation Foundation (NIF) in coordination with reputed academic and technology institutions of the country such as Central Universities, National Institute of Technology (NIT), Indian Institute of Technology (IIT), Indian Institute of Science Education and Research (IISER) for the purpose. 1000 best projects will be showcased at NLEPC and top 60 projects shortlisted for National Awards. These 60 best models/ projects will also be showcased at the Annual Festival of Innovations at Rashtrapati Bhawan, New Delhi.

National award winners of DST INSPIRE Award - MANAK showcased their projects at 'Festival of Innovation' at the Rashtrapati Bhawan

Swasth Bharat

Science & Technology of Yoga and Meditation (SATYAM): Responding to the clarion call made by Hon'ble Prime Minister, a new initiative namely SATYAM was launched by DST in the year 2015-16 to rejuvenate deeper scientific research in yoga and meditation. Against the first Call for Proposals, **26 strong projects out of over 500 received have been recommended** for financial support under SATYAM during 2016-17 which address issues related to study of several practices of Yoga & Meditation to treat various diseases like Schizophrenia, Epilepsy, Depression, Mild Cognitive Disorder (MCI), Parkinson's Disease, Type 2 diabetes, Chronic Obstructive Pulmonary Disease (COPD), Pulmonary function in chest trauma patients, life style diseases, etc. and also on improvement of quality-of-life. The selected teams involve clinicians, proponents of Yoga and scientists.

North Eastern Centre for Ethno Medical Research: Establishment of an Ethno Medicinal Research Centre in Manipur with budgetary support of approx. ₹ 6.00 crores has been approved. This Centre aims to undertake ethno phyto-chemical research of wild herbs available in the NE region that have unique medicinal and aromatic properties, particularly in our traditional systems. The Centre will not only provide scientific validation of traditional herbs but aims to improve quality of life and economic status of the local community through product development and better livelihood.

DST-Intel Collaborative Research for Real-Time River Water and Air Quality Monitoring has been initiated as a new joint programme at a cost of ₹ 33 cr on a 50:50 cost sharing basis in Public-Private Partnership (PPP) mode. The project will develop low cost compact smart sensors with on-board power and communication for real time analysis of water and air quality over large areas.

Improving Water Quality and Reusing Waste Water: Building upon the Thames-Ganga Partnership and recognizing the importance of clean and potable water, DST and Research Council of UK have also agreed to launch a new collaborative programme on Improving Water Quality and Reusing Waste Water.

International S&T Cooperation and Mega Science Projects

- Two new experimental stations, XRD2 and XPRESS at the Trieste, Italy based Synchrotron Elettra in partnership with the Department of Science and Technology are expected to be fully operational by September 2017. The two new energy beamlines will enable Indian researchers to undertake experiments on new materials, pharmaceuticals and biotechnologies.
- Under the India-Africa Forum Summit-III, new bilateral cooperation is expected to be initiated with Ethiopia towards partnering in building the Centres of Research Excellence in Ethiopia. A technology transfer programme for Rwanda is planned to be launched to provide affordable and accessible Indian technologies to Rwanda.

- The academia-industry projects (2+2) with Germany will be given a substantial boost through the enhanced funding provided by India and Germany to the bilateral Indo-German Science and Technology Centre.
- The S&T relationship with Japan will be further enhanced with the launch of the India-Japan Science Laboratory on cyber-physical systems and through the maiden DST-JSPS reciprocal fellowship for young researchers

The Newton Bhabha Programme will enable Indian scientists to work in the frontier areas of nano science and technology

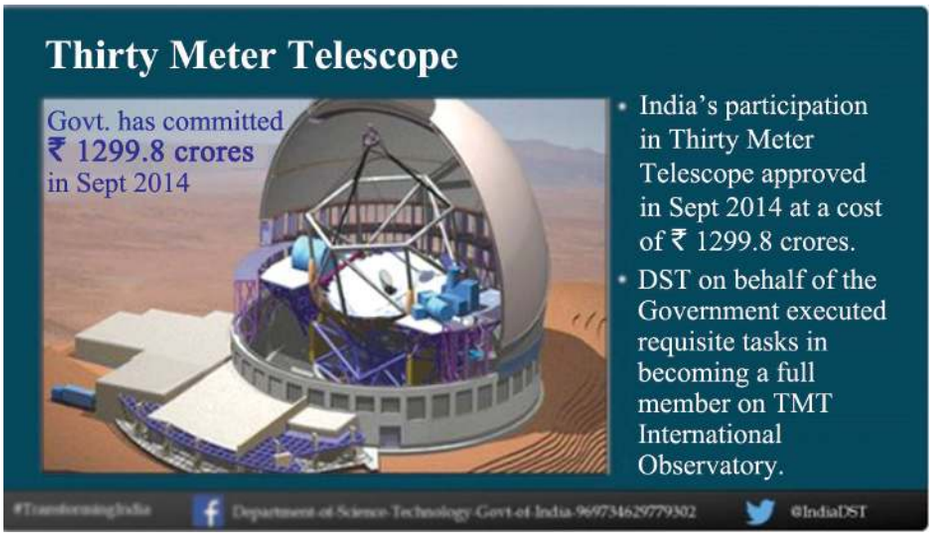
- The Phase II of the India-Canada IC-IMPACTS programme is planned to be launched to support research projects which will address technological challenges in inter-disciplinary sectors such as infrastructure, rural-urban divide, water and energy.
- New projects in the areas covering advanced manufacturing; smart cities & infrastructure technologies; lifestyle & emerging disease control; and Bio-Medical technologies will be launched with Australia under the India-Australia Strategic Research Fund (AISRF).
- Under the Newton Bhabha programme between DST and the Research Council, UK the neutron and muon source facility at the Rutherford Appleton Lab in Oxfordshire, UK will be accessible to Indian researchers. This will enable Indian scientists to work in the frontier areas of nano science and technology by access to the portfolio of high-end instruments.

Inauguration of beam-lines 'XRD2' and 'XPRESS' at the Synchrotron Facility in Trieste, Italy

MoU on Indo-UK Newton-Bhabha Programme

Thirty Meter Telescope: India's participation in the Thirty Meter Telescope (TMT) project was approved by the NDA Government at a total cost of ₹ 1299.8 crores in September 2014. The Department of Science and Technology on behalf of the Government of India executed the TMT international Observatory partnership documents becoming a full member in the project on 2nd December 2014. The other countries participating in the project are USA, Canada, China and Japan. India will contribute towards the construction phase both in cash and kind. The Indian science sector will benefit both scientifically and technologically from participation in this project. On the technology front, design, prototyping, testing, validation and manufacturing of various in-kind items will bring in know-how for new and cutting edge technologies. These will have long term spin-off advantages for the country. On the scientific front, after commissioning of TMT in 2022-23, India will get 25-30 assured observational

nights on the TMT. This will enable Indian astronomers to study front-ranking scientific problems such as formation and evolution of stars, planets and galaxies.



Devasthal Optical Telescope: A state-of-the-art world class 3.6 meter Devasthal Optical Telescope was remotely activated jointly by the Hon'ble Prime Minister of India and Prime Minister of Belgium on 30th March 2016. The telescope is installed at Devasthal near Nainital. It is the largest steerable imaging telescope in Asia which is a result of scientific collaboration between the teams of scientists from Aryabhatt Research Institute of Observational Sciences (ARIES), Nainital, an autonomous institution of DST, and Belgian scientists. The telescope will contribute to observations for frontline scientific research in astronomy and astrophysics.

Remote Technical Activation of Digital Optical Telescope located at Devasthal, India from Brussels on March 30, 2016 by the Prime Ministers of India and Belgium

UV Imaging Telescope (UVIT): UV Imaging Telescope developed by Indian Institute of Astrophysics (an autonomous institution of DST) is one of the payloads on ASTROSAT which was launched by ISRO on 28th September 2015. The images received from UVIT have better resolution than the Galex Telescope of NASA. This is a major feat of Indian scientists in development of imaging telescopes.

S&T for Rural Development

Sustainable Rural Micro-Industry Model at Malunga Village, Jodhpur: For inclusive development of the country, sustainable industrial activities using local resources in the rural areas are extremely important. DST has been paying adequate attention to benefitting the rural population through the application of Science and Technology.

One such initiative of the Department has culminated into the establishment of a Rural-Industry Complex in a plot of wasteland at Malunga village in Jodhpur district of Rajasthan during 2015-16. Integration of technology in this industry complex has been done in such a manner that it satisfies the local needs by utilization of local resources. It offers sustainable and inclusive development by converting waste to wealth by an efficient poly-generation technology. Technology deployment is environment friendly and fulfills the objectives of Swachh Bharat, Swastha Bharat and Samarth Bharat.

The industry complex offers the local farmers services of extraction of oil from castor seeds which was so far being done at far off places like Ahmedabad. The facility can crush 30 tonnes of castor seeds per day. The farmers can save money and botheration for transporting the castor seeds to distant locations. The facility uses oil cakes, which is a waste product, as a fuel for boilers. The controlled burning of the bio-mass (oil cakes) reduces the carbon emission. Farmers also get paid for the oil cake. The steam generated by the boilers is used for vapour absorption machine (VAM) based cooling system for cooling of four cold rooms. Each cold room with the capacity of 10 tonnes per day will be used by the farmers for cold storage of their produce and ripening of fruits. The trials for Banana ripening have been successfully carried out. Steam is also being used for industrial level multi effect distillation system for production of distilled water (2000 litres per hour). The distilled water can be used for industrial purposes such as battery water and with mineral additives it can be packaged as drinking water. A bottling plant is a part of the industry complex. Since Malunga area has brackish water, the facility would provide potable drinking water at affordable cost (₹ 5 per litre) to local rural population. The steam is also used for generation of 150 kilo watt of power for running various machines such as oil mill in the industry complex.

With slight customization, the model offers a big opportunity to promote rural entrepreneurship, employment generation and wealth creation for our large rural population with low carbon footprint and utilization of a variety of agricultural residues which otherwise waste.

Surya Jyoti for lighting up homes of poor and off-grid dwellings: Some one crore dwellings in India are estimated to be off-grid or under severe brown-out. In order to capture day light and concentrate the same inside the dark rooms, a low cost device named Surya Jyoti has been developed and tested with the support of a project from the Department of Science & Technology during 2015-16.

Surya Jyoti is a unique solar energy operated lighting device, which works during day time in passive mode and in the night time through photovoltaic mode. The integrated PV module fitted in the dome charges a special battery during day time which in turn provides light during night. About 1000 Micro Solar domes are now working in the slums of Delhi, Kolkata, Agartala, Guwahati, Bhopal and Bengaluru. However, demand for the product is increasing manifold as more and more people are becoming aware of the unique benefits of using the product. There are about 130 numbers of Surya Jyoti at Lalbag Cluster, New Delhi and nearby areas and around 2000 units have been field tested in different climatic zones.

In order to cater to this ever increasing demand, an entrepreneurship development programme for manufacturing and installation of Surya Jyoti was organised during 18th-22nd October, 2016 in which 25 entrepreneurs and 7 voluntary organisations from 11 States of different regions were trained. The manufacturing process of the device is labour intensive and is expected to generate huge job opportunities. It is expected that once the design of the dome is made available along with assured demand, many entrepreneurs would venture into manufacturing MSD.

Solar Micro Dome
"Surya Jyoti"

Surya Jyoti attached on a
ceiling lighting

The product has been included for subsidy under off grid and decentralized solar application scheme of Ministry of New and Renewable Energy. The present cost of the product is about ₹ 1500 and is eligible for a subsidy of ₹ 720 (Dome with 6 Watt PV panel). On upscaling the cost of the product is likely to come down to ₹ 1200. Attempts are being made to integrate Surya Jyoti for subsidy in rural and urban housing schemes, MP Local Area Development Schemes and corporate social responsibility activities of public sector enterprises. Ministry of Rural Development has informed all Principal Secretary / Secretary (Rural Development) States and Union Territory to explore the possibility of adopting this innovative technology of Surya Jyoti for the houses constructed under Prime Minister Gramin Awas Yojana.

The objective of SHRI is to promote scientific research and intervention to preserve, restore and develop new materials & tools to strengthen Heritage Science in various sectors

Science and Heritage Research Initiative (SHRI): The objective of SHRI is to promote scientific research and intervention to preserve, restore and develop of new material/methods/tools to strengthen Heritage Science in sectors such as textiles, metal works, crafts, ceramics, etc. and diffuse this to the artisan clusters.

Taking Science to the Masses

Science Express – Climate Action Special: As per the observations of Hon'ble Prime Minister, outreach activities and exhibits of the Science Express have been strengthened in the following way: (a) Number of exhibits reduced keeping in focus more important ones; (b) Platform activities/exhibits such as science quizzes and models/exhibits are mounted; (c) evening lectures organized in neighboring institutions; (d) solar panels of various kinds mounted on the train to introduce renewable energy concepts.

Science Express being flagged off by Dr. Harsh Vardhan

Phase	Flagged-Off Date & Duration	No. of Station/locations Covered	No. of Visitors
VII- Biodiversity Special	28, July 2014 – 05 Feb 2015	57	23 lakh
VIII- Climate Action Special	15, Oct. 2015 – 07 May 2016	64	24 lakh
IX- Climate Action Special	17, Feb. 2017 – 09 Sept 2017	68 (31 covered)	6.52 lakh(till 8.5.17)

The objective of IISF (2015) was exposing the fruits of Science & Technology to the masses; building strategy to instill scientific temper among the masses; showcasing Indian contributions in the field of S&T over the years; providing platform to young scientists for exchange of knowledge and ideas; and supporting flagship programmes like Make in India, Digital India, etc.

The ninth edition of Science Express and its second phase as Climate Action Special in collaboration with Ministry of Environment, Forest & Climate Change, Ministry of Railways & Department of Biotechnology, is expected to cover 19000 km, with 68 halts, and draw about 20 lakhs people specially students & teachers in 2017. Ninth edition of revamped Science Express was launched on February 17, 2017.

India International Science Festival: IISF (2015) was organised in IIT, Delhi during 4th Dec. to 8th December 2015 with the objective of exposing the fruits of Science & Technology to the masses; building strategy to instill scientific temper among the masses; showcasing Indian contributions in the field of S&T over the years; providing platform to young scientists for exchange of knowledge and ideas; and supporting flagship programmes like Make in India, Digital India, Start-ups, Smart Villages, Smart Cities, etc. Approximately 10,000 delegates from all over the country participated in the following components of the festival – young scientists conference, techno-industrial expo, science film festival, national level exhibition and project competition showcasing innovative models under INSPIRE programme of Department of Science & Technology, industry academia conclave, largest practical science laboratory demo, and interactive workshops and informative sessions.

Largest Practical Science Session with 2000 students, on 7th December 2015, working in small teams to complete experiments as part of the lesson that focused on catalysts has found entry in the **Guinness Book of World Records.**


India International Science Festival (IISF-2016): With an aim to connect the common people with science and its contributions to our day-to-day life, IISF 2016 was organized as the largest festival of science in the country with its focus on "Science for the Masses" at the CSIR-National Physical Laboratory (NPL) Campus, New Delhi during 7-11 December, 2016. The event was formally inaugurated by the Hon'ble Home Minister, Shri Rajnath Singh.

The 6th National Level Exhibition & Project Competition (NLEPC) under the INSPIRE Award Scheme was organized by Department of Science & Technology at CSIR-NPL, New Delhi during December 10th-11th, 2016 along with India International Science Festival (IISF). About 560 selected Awardes from all over the country participated in the event. The top 60 innovative projects were felicitated on December 11th, 2016 by Dr. Harsh Vardhan, Hon'ble Minister for Science & Technology and Earth Sciences during the valedictory function. Rakesh Krishna from Karnataka won the Gold Medal for his project SEEDOGRAPHER. Shiva Jyoti Choudhury from Rajasthan won the Silver Medal and Sachindra Jadhav from Maharashtra won the Bronze Medal.

Major Achievements (2014-17)

Enhancing Quality and Quantity of S&T Research and Development

- In order to attract students at an early age to study science and to promote creative thinking and innovation, 3,67,400 students were offered Inspire Award.
- 1,26,789 students of intermediate level were provided internship in 708 Inspire Science Camps.
- 39,293 **INSPIRE Scholarships have been** offered to very bright students (top 1% of +2 Board examination) for pursuing study in various science related courses like Physics, Chemistry, Biology, Mathematics, etc. at the under-graduate and up to postgraduate stage at various Colleges and academic Institutions in the country along with opportunity to engage in research activities by attaching with the Mentors during vacation period for inculcating research culture from a young age. The value of each Scholarship is ₹ 80000 per year including ₹ 20000 as Mentorship cost for research.
- **3000 INSPIRE Fellowship have been offered** to young students in the last three years for carrying out their doctoral degree programme in all areas of basic and applied sciences including Medicine, Agriculture, Veterinary, etc. for 5 years at recognized Universities/Academic Institutions/Laboratories in the country.
- 637 young researchers have been provided an attractive opportunity as an **INSPIRE Faculty** for developing independent scientific profiles. The value of each INSPIRE Faculty is ₹ 80000 per month with 3.3% annual increment along with ₹ 7 lakh per year as Research Grant for a period of 5 years.

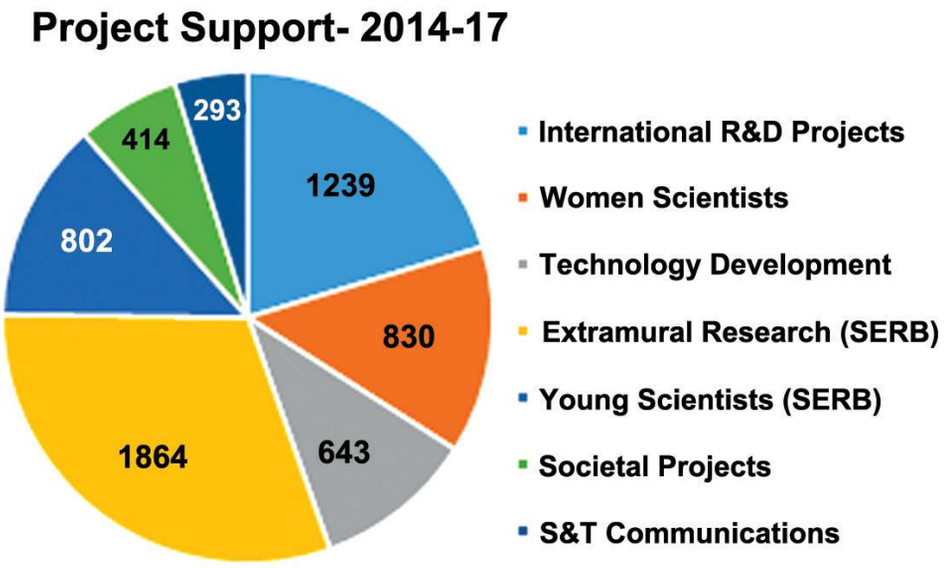
- Under the Women Scientist Scheme under KIRAN, around 830 women scientists have been supported in the last three years.
- To promote cutting edge research in Cognitive Science, around 166 R&D projects were supported in Cognitive Science Research Initiative.
- During the period of 2014-17, 68 S&T Alliances were made through signing/renewal of Agreement/MoU/Programme of Cooperation and holding of Joint S&T Committee meetings. 435 joint research projects were supported through which 740 researchers have made their networking to strengthen their research capacity.
- 1000 Fellowships/visitation (inward & outward) were offered to researchers to access international advanced R&D facilities in Japan, Italy, UK etc. 150 bilateral workshops, symposiums, exposition, brainstorming meeting, training programmes were also supported.
- Supported 50 Industrial R&D Projects linked to national initiatives like Clean India, Digital India, Smart Cities, Make in India, etc. with selected innovative nations on Innovation and Entrepreneurship using PPP model programmes.

Science and Engineering Research Board

S. No.	Schemes	Financial year	
		2011-14	2014-17
1.	Extramural R&D Projects	1424	2200
2.	Research Fellowships	154	214
3.	Overseas Fellowships	104	215
4.	Early Career/Postdoctoral/Young Scientist Programme	2242	3998
5.	Empowerment and Equity Opportunities for Excellence in Science (SC/ST R&D Projects)	91	512
6.	International Travel Support	3797	4875
7.	Seminar/Symposia	1586	2245

- A total of 725 Science Departments/Colleges were supported through “Fund for Improvement of S&T infrastructures in Universities and Higher Educational institutions (FIST)”. The programme facilitates support towards augmenting higher education and research largely in the university and academic sectors by augmenting basic infrastructural facilities for teaching as well as for conducting research in basic or applied science areas.

- 46 performing universities in the country were pro-actively supported for strengthening the R&D base with adequate financial support and associated flexibility.
- A total of 18 Sophisticated Analytical Instrument Facilities (SAIFs) Centres were supported to provide services of the facilities of sophisticated analytical instruments to researchers in general and specially from institutions that do not have such instruments.



- **Global Research Council Meeting:** Science and Engineering Research Board (SERB) jointly hosted the Fifth Annual Meeting of Global Research Council (GRC)-2016 from 25th to 27th of May 2016 with the Research Councils UK (RCUK). The Global Research Council (GRC) is a virtual organization comprising of the Heads of Research Councils from around the world, dedicated to promoting the sharing of data and best practice for high-quality collaboration among research funding agencies globally. Heads of Research Councils from 44 countries were among more than 100 delegates who attended the event to share the best practices and discuss policy issues in the field of Research Funding. A Statement on 'Principles of Interdisciplinarity' and 'Actions towards Equality and Status of Women in Research' was discussed and endorsed by participants representing the global research community.

National Heads of Research Councils in 5th Annual GRC meeting-2016 at New Delhi

- The 104th Annual Session of the Indian Science Congress was held from 3rd to 7th January, 2017 at SV University, Tirupati. It was inaugurated by the Hon'ble Prime Minister, Shri Narendra Modi, on 3rd January, 2017. The Focal Theme of 104th Session was "Science and Technology for National Development". Over 13000 scientists, teachers, students from all over the country and 6 Nobel Laureates participated in this mega science event. Large number of lectures and wide-ranging scientific discourses and discussions took place on a large variety of topics, ranging from gravitational waves and Human Microbiome to Blue Economy and Offshore Wind Farms.

Hon'ble Prime Minister at the Inauguration of the 104th Session of the Indian Science Congress, Tirupati

- **Collaboration initiated with the Rutherford Appleton Laboratory (RAL), UK** to access its neutron facility for carrying out research in Nano Science and Technology.
- **Setting up a macromolecular crystallography and high pressure physics beam line at the Elettra Synchrotron Facility, Trieste, Italy:** The twin Indian beamlines, XRD2 and Xpress were inaugurated on 20th October 2016. The beamlines are now available for scientific experiments.

The Focal Theme of 104th Session was "Science and Technology for National Development"

- **Associate Membership of CERN:** India signed the Agreement for Associate Membership of CERN at DAE Headquarters in Mumbai on 21st November, 2016. India has become an Associate Member State of CERN on 16th January 2017.
- **India and Israel agreed to step up the S&T collaboration** in the next two years by providing U.S. dollar 1 million from each side to support new R&D projects in the cutting edge areas of Big Data Analytics in Health Care and Security in Cyber Space. As a part of these projects, student exchanges will be encouraged in order to connect the next generation and sustain the pipeline of future collaboration.

- Relationship with Japan was substantially strengthened by establishing **Indo-Japan Joint Laboratories** in the areas of (i) Architecting Intelligent Dependable Cyber Physical System Targeting IoT and Mobile Big Data Analysis (ii) Security in the Internet of Things Space (iii) Data Science-based Farming Support System for Sustainable Crop Production under Climatic Change have been agreed to support. A new reciprocal fellowship programme for young researcher was agreed with JSPS, Japan.

- **Indo-US Fulbright-Kalam Fellowships in Climate Change:** In pursuance of the Joint Statement of the Government of USA and the Government of India the Fulbright-Kalam Climate Fellowship has been launched. The United States-India Educational Foundation (USIEF) has been given the responsibility to administer the Fulbright-Kalam Climate Fellowship on behalf of both the governments. The first batch of six fellows has been selected.

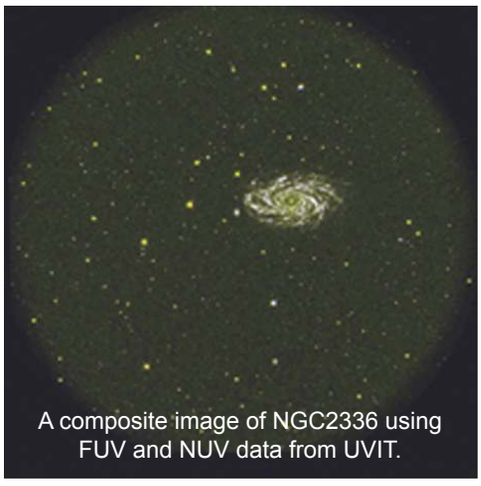
- **BRICS STI Cooperation:** To further strengthen the collaboration amongst the BRICS countries in the areas of Science, Technology and Innovation (STI), the 4th BRICS Science, Technology and Innovation Ministerial Meeting was convened on 8 October 2016 at Jaipur. Eight BRICS Funding Ministries/Agencies agreed to co-invest 10 Million USD to support R&D projects.

4th BRICS S&T Ministers Meeting

- DST has 25 Autonomous Institutions (AIs) under its administrative control which are be grouped into three classes *viz.* – (i) Research institutions (ii) Professional Bodies; and (iii) S & T Service Organizations. The research institutions pursue cutting-edge scientific research in a variety of areas, ranging from Biology, Chemistry and Nano Sciences to Nuclear Physics, Particle Physics, Astronomy and Astrophysics. The five Professional Bodies are the leading academies of the country and are engaged in a variety of policy and science promotional activities. The four S&T Service Organizations provide specialized scientific services like Technology Forecasting, Generation of Science Outreach materials, etc. During the last three years (2014-17), outputs from these AIs are summarized as;

Papers in referred journals	**6433**
Books	97
Patents Filed/Indian	458
Patents Filed/Foreign	88
Transfer of technology/Designs and other Intellectual products	66
Research Man Power Trained (other than Ph.Ds)	1631
PhD awarded	531
Technical Man Power Trained	9652

Nano Mission is an "umbrella capacity-building programme" to promote R&D in Nano Science and Technology



A composite image of NGC2336 using FUV and NUV data from UVIT.

- The Indian Institute of Astrophysics, Bengaluru had designed and built the Ultra Violet Imaging Telescope (UVIT) payload in partnership with the Canadian Space Agency, IUCAA, TIFR and ISRO and successfully integrated on board ASTROSAT satellite for flight on Sept 28th 2016.The initial results from the UVIT have been communicated to scientific community; a payload data processing centre has been set up for this purpose.
- Agarkar research Institute at Pune had recently developed 10th variety of wheat - MACS 6478 and soybean variety MACS 1188.
- Nano Mission is an "umbrella capacity-building programme" to promote R&D in Nano Science and Technology. About 140 R&D/Technology Projects were supported. On account of it, about 2500 Research papers were published in Journals or Books and 38 Patents were filed. India ranks 3rd in the global ranking in the field of Nanoscience & Technology. Following three Technologies developed and successfully/Demonstrated
  - A water purifier for arsenic and iron free drinking water, based on nanomaterials developed by IIT-Madras.
  - Automotive filter using electrospunnano fibre webs developed by IIT-Delhi.
  - Nano TiO_2 based self-cleaning nanofinish for textiles developed at IIT-Delhi.

Based on this, three Start-ups were launched/incubated.

Technology Development and Deployment

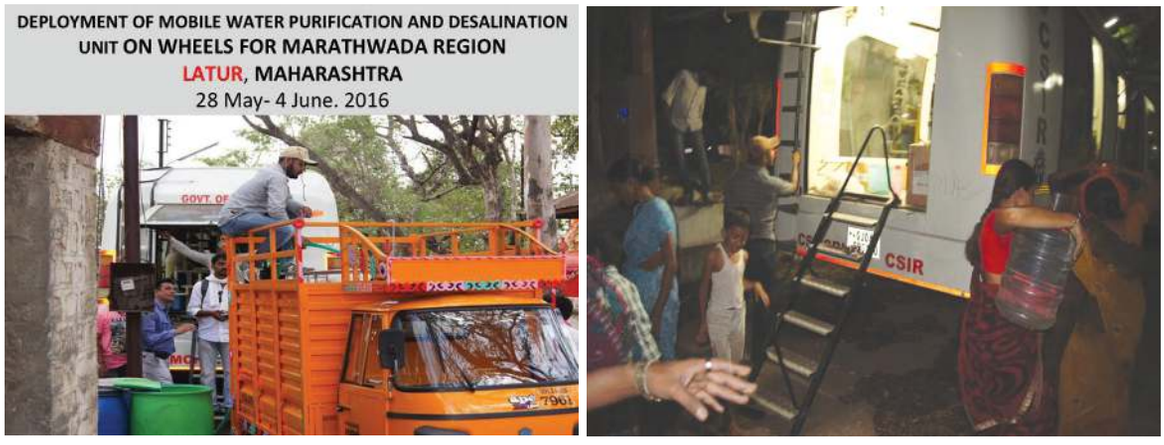
- Under Technology Development Programmes, 140 projects were supported to develop the technologies in the area of Advanced Manufacturing, Waste Management, and Devices for Agriculture, Textile, Analytical and Biomedical Applications. 30 technologies demonstrated and five were transferred to industry.
- Addressed 83 location specific problems through S&T intervention in various States.
- Through Drugs and Pharmaceuticals Research Programme (DPRP), DST promotes R&D in Drugs & Pharmaceutical Sector. Under this programme, as many as 9 collaborative projects (PPP), facility projects, providing soft loan to Indian pharma industries and grants-in-aid to Indian pharma industries for clinical trials in neglected diseases are supported. DST has sanctioned a project on Phase-III clinical trial on Kala Azar to M/s. Lifecare Innovations Pvt. Ltd., Gurgaon. The industry has identified three Multi-Center Phase III Clinical Trial sites—two in Bihar and one in West Bengal.
- **Clean Energy Research Initiative:** The Programme envisaged to support upstream end of research, where knowledge, more advanced than the current practice in the industry must have a space and to develop critical mass of researchers to meet requirement of R&D professionals for clean energy. Through a total 130 R&D Projects, 331 Energy R&D Professional were supported.
- **Solar Energy Research Institute for India and the United States (SERIIUS):** The Indo-US consortium has developed the crucial prototype test loop that demonstrates the multiscale aspects of the supercritical CO_2 Brayton cycle (s-CO_2) at IISc, Bengaluru for development of high temperature concentrated solar power in the country.
- DST and RC-UK have agreed to launch **India-UK Clean Energy R&D Centre** on solar energy, storage and integration with an investment of £ 5 million from each side.
- **Water Technology Initiative:** It aims to promote R&D activities aimed at providing safe drinking water at affordable cost and in adequate quantity using appropriate S&T interventions evolved through indigenous efforts. During 2014-17, a total of 141 R&D Projects addressing 19 site specific challenges covering 365 habitats across 23 states were supported.

Water Treatment System at Buja Buja, Nellore District, Andhra Pradesh

Under TD Programmes, projects were supported to develop the technologies in the area of Advanced Manufacturing, Waste Management, and Devices for Agriculture, Textile, Analytical and Biomedical Applications. 30 technologies demonstrated and five were transferred to industry

Water Treatment Facility & Waste Water Treatment Plant at Thirupattur, Vellore, Tamil Nadu

- **Deployment of a mobile RO unit:** DST has supported quick deployment and demonstration of a mobile water purification unit developed by CSIR-CSMCRI for producing potable water for drinking. It was demonstrated in Latur, Marathwada region which was facing severe scarcity of drinking water during year 2016 drought period.



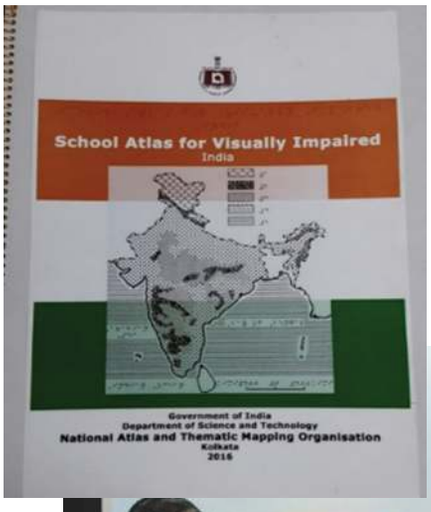
Water on Wheels: Deployment of a mobile RO unit in Latur, Marathwada

- **Dielectric Barrier Discharge (DBD) based plasma system for portable water purification:** A technology developed at CEERI Pilani through support by DST's Water Technology Initiative (WTI) for Dielectric Barrier Discharge (DBD) based plasma system for disinfection has been successfully transferred for commercialization to Turners Pvt. Ltd. Jaipur.
- **Establishment of a Water Quality Laboratory in Kohima, Nagaland:**The Water Quality Laboratory was recently inaugrated by the Hon'ble Union Minister of Science and Technology, Dr. Harsh Vardhan at NASTEC, Kohima, Nagaland, which has been established by the support of DST under WTI. The Referral Water Laboratory is fully equipped with the in house sophisticated analytical equipments for water quality analysis which is a one of its kind facility that can cater to the need for water analytical services in Nagaland and adjoining states.

The facility is creating awareness about drinking water quality deviations in the area and providing a source of an equipped water quality analytical facility

- **Setting up of a Facility for Drinking Water quality analysis and monitoring in North Coastal districts of Andhra Pradesh:** A continuous water quality analysis and monitoring facility has been established at GITAM University, Vizag, Andhra Pradesh especially for rural and tribal population. The facility is creating awareness about drinking water quality deviations in the area and providing a source of equipped water quality analytical facility.

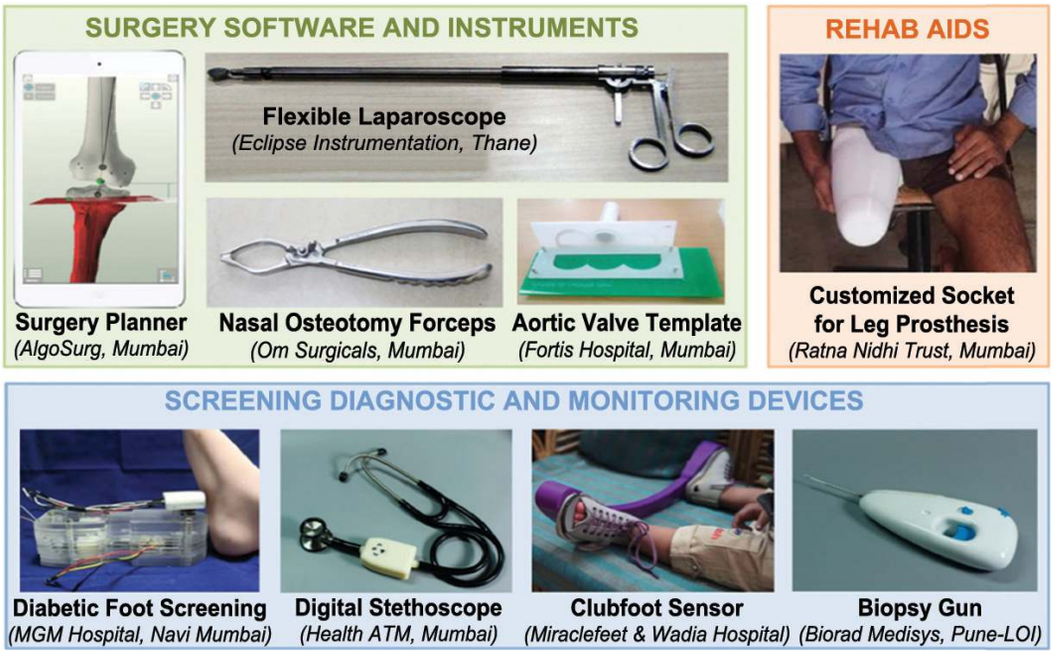
- Building upon the Thames-Ganga Partnership and recognising the importance of clean and portable water, DST and RCUK have agreed to launch a new collaborative programme on **Improving Water Quality and Reusing Waste Water.**
- **DST-Intel Collaborative Research for Real-Time River Water and Air Quality Monitoring:** Recognizing the importance of developing the online River Water and Air Quality Monitoring systems, DST and Intel have initiated a joint programme at a cost of ₹ 33 cr on a 50:50 cost sharing basis in Public-Private Partnership (PPP) mode.
- **A Networked programme on Imaging Spectroscopy and Applications (NISA)** has been launched considering the potential of this emerging technology to promote research on various aspects of imaging spectroscopy and its applications.
- Survey of India has put its 1:50000 scale topographical maps in the digital form on the web as **webfeature service**. This will facilitate users to download the maps and view it along with other imageries of Google and Bhuvan etc.
- **Survey of India (SoI) has completed 250 years of its establishment.** As a part of 250th anniversary celebrations during 23rd to 25th January 2017, SoI will organize several technical activities and launch new initiatives.



- **Braille Mapping and Atlas compilation** initiated by NATMO has been greatly appreciated and recognized by Government of India and it received the National Award for S&T Intervention in Empowering the Physically Challenged.

Innovation and Start-up Ecosystem

- A programme *viz*. **NIDHI (National Initiative for Developing & Harnessing Innovation)** to address the complete chain of innovation ecosystem right from scouting to mentoring to scaling up innovations has been launched. Under the aegis of NIDHI, a research park at IIT Gandhinagar has been supported at a cost of ₹ 90 cr besides implementation of several other components.



Products Licensed to Industry, Hospitals and Institutions by the TBI at IIT Bombay - BETiC (Biomedical Engineering & Technology (Incubation) Centre

- 39 new Technology Business Incubators have been established across the country for converting innovation to starts-ups. A total of 22 incubatees has been supported at early stage through seed support system.
- A total of 5212 Training Programmes in Entrepreneurship—[Entrepreneurship Awareness Camp (EAC), Entrepreneurship Development Programme (EDP), Women Entrepreneurship Development Programme (WEDP), Technology based Entrepreneurship Development Programme (TEDP), Faculty Development Programme (FDP)] have been supported to 359 institutions in 27 States/UT of the country. Sensitized 2.75 lakh students towards entrepreneurship through EACs 7400 teachers/trainers/resource persons trained for promoting S&T entrepreneurship and 2163 enterprise units initiated by S&T entrepreneurs.
- **PLUGIN:** A collaborative Incubation Program for Hardware and Systems Startups by DST, Intel, and SINE-IIT Bombay has been initiated. This is a first of its kind programme to support hardware and systems-based startups in India.

DST has partnered with the Texas Instruments to scout, motivate, validate and incubate engineering students driven innovative design ideas with commercial potential

- **DST-Texas Instruments "India Innovation Challenge 2016":** DST has partnered with the Texas Instruments to scout, motivate, validate and incubate engineering students driven innovative design ideas with commercial potential in the electronics, semiconductor and embedded systems domain under Make in India, anchored by MyGov platform and implemented through Indian Institute of Management, Bengaluru.

- The 22nd **DST-CII Technology Summit with United Kingdom** as country partner was organized in New Delhi during 7-9 November 2016. The Summit was inaugurated by the Prime Minister of India along with the Prime Minister of UK. The Summit saw participation with over 2500 delegates including 200 participants from UK. B2B meetings were held for exploring techno-business partnerships between the two countries. Several new India-UK R&D partnership programs were announced in the Tech Summit.

Hon. Prime Minister of India, Shri Narendra Modi and Hon. Prime Minister of UK, Ms. Theresa May inaugurating the India-UK Technology Summit

The President, Shri Pranab Mukherjee presented the 9th National Biennial Awards for Grassroots Innovations and Outstanding Traditional Knowledge, at Rashtrapati Bhavan, in New Delhi on March 04, 2017

Science for Equity, Empowerment & Development

Three pronged Socio-economic Development programmes are implemented by the Department which include (a) S&T based initiatives for societal benefits; (b) S&T led Entrepreneurship and Innovation promotion; and (c) Developing Scientific Temper in Society. Major activities and achievements of societal programmes during 2014-17 are:

- A **Standing Committee for Promoting Women in Science** has been constituted to address low representation of women in Science & Technology (S&T) domain and to provide opportunities to women scientists and technologists for pursuing research in basic or applied sciences.
- Improvised **drying-cum-storage technology for large Cardamom** has been successfully introduced and demonstrated in Ziro, Arunachal Pradesh. Flue pipe system dryer provides good colour to the capsules and perfect drying in short span of time. Now, Cardamom farmers of Ziro are getting better economic returns through the introduction of this improved drying technology as compared to traditional system.
- During the period of 2014-17, a total of 230 projects were supported under the Long Term Core Support for Technological Advancement for Rural Areas-(TARA) and other programmes *W* Technology Interventions for Addressing Societal Needs (TIASN) including Scheme for Young Scientist & Technologists (SYST); Technology Interventions for Disabled and Elderly (TIDE), Cold Desert Region (CODER) & Arid & Semi-Arid Region (ASAR) and Sustainable Agriculture Rural Transformation Holistic Initiative (SARTHI) and Technology Intervention for Mountain Eco-system (TIME) programmes.
- 25 S&T based/driven organizations supported under TARA which focus on technology development/adaptation and delivery on specific challenges in identified region; Compendium of technologies brought out and community trained & empowered in use of such technology packages.
- Under TIASN scheme, prototype for manual load carrier-head harness developed and field trials conducted. Green & blue water harvesting techniques demonstrated in tribal districts of Panchmahal and Dahod in Gujarat. About 10 prototypes of assisted devices, developed under TIDE, have been tested and ready for commercialization.
- In S&T for Women scheme,104 projects were supported countrywide, established Women Technology Parks and coordinated projects addressing drudgery reduction and occupational hazards besides their health & nutrition and enhancing opportunities for livelihood leading to better quality-of-life.
- Processing and production technology by introducing mechanized potter's wheel and pug mill, besides product diversification and value addition techniques have been demonstrated to revamp traditional pottery practices. The initiative is being integrated with the national programs/ schemes such as Skill India, Swachh Bharat Abhiyan, Unnat Bharat Abhiyaan, etc.

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Bamboo Sheath Cup Making

Extraction of Palmyra Fiber

Incinerator for used Sanitary pads

Microwavable Terracotta Pot

Secretary, DST during Review Workshop of TARA held at Pune in May 2016

- Under TITE and SCSP, 80 diverse projects implemented in different parts of the country focusing on appropriate and cost effective technology modulation and transfer, based on location-specific needs/conditions, leading to technological empowerment in related occupations of Tribal/ Scheduled Caste sections of society. Emphasis has been on creating sustainable livelihoods through use of locally-available resources & materials.
- **A Network programme to address migration and malnutrition in tribal communities** (Kolam, Korku, Katkari, Mahadeokoli, Gond and Bill) through appropriate technologies is being implemented in 11 locations in the tribal pockets of Maharashtra covering 50 villages.
- A **soybean variety MACS 1281 has been released** and notified for cultivation in the Southern Zone. The variety has determinate plant habit with medium maturity range. It is resistant to stem fly, defoliators, pod borer and leaf folder, bacterial pustule and bacterial leaf blight.
- A **new durum wheat variety MACS 3949** has been identified for cultivation under timely sown irrigated conditions in Peninsular Zone. The variety has shown significantly superior yield performance over check variety NIDW 295 in three years of testing in coordinated trials.
- **Technology Interventions for Disabled and Elderly (TIDE)** is a unique initiative aimed at promoting basic research, development and adaptation of technology for improving quality-of-life of Elderly population and Disabled People in the country. This initiative complements the Accessible India Campaign (Sugamya Bharat Abhiyan) of the Government. A wide array of technology prototypes/products for elderly and PwDs to gain access for equal opportunity, live independently and participate fully in all aspects of life in an inclusive society were developed.

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Functional Electrical Stimulation (FES) Devices
for Neuromuscular Rehabilitation

- In order to developing scientific temper in the society, specially young students, interesting aspects about the inspiration that guided 54 Indian stalwarts in Science and Technology were presented in a publication titled "**Indian Scientists: The Saga of Inspired Minds**" with a message from Hon'ble Prime Minister about the book.
- The annual National Children's Science Congress and STEM & Innovation—Demonstration, Dissemination & Popularization, are now so designed as to engage students across India, particularly those who have been left out and to be brought in the ambit by State Councils of Science & Technology and S&T driven agencies. 3750 students have participated in National Children's Science Congress. 168 projects were supported for STEM & Innovation-Demonstration, Dissemination & Popularization.

Students watching Mobile Exhibition

Student participating in Science Fair

- Under Mission Eco Next, initiatives for the youth, in Science Media & Nature related Science Communication, especially through eco media, are designed to engage and raise a dedicated & competent next generation of Change Makers, enhancing the quality-of-life, and achieve convergence with national priorities. Eco Routes, the multi-locational clusters of sub-regional initiatives, are being oriented for less-endowed or under-stress, yet eco-culturally rich regions & districts. 75 projects were supported.
- 50 Community Radio for 'Women's Health & Nutrition', are being supported to help achieve gender equity.