

DEPARTMENT OF SCIENCE & TECHNOLOGY

Name of the Key initiative/ Flagship Scheme:

SERB National Postdoctoral Fellowship

Launch Date: 01 September, 2015

Objective: To identify motivated young researchers and provide them support for doing research in frontier areas of science and engineering.

Target Beneficiary: Young researchers who have obtained (or submitted thesis) Ph.D/ M.D/M.S degree from a recognized University with upper age limit of 35 years with relaxation of five years to applicants belonging to SC/ST/OBC/Physically Challenged/Women categories

Physical Targets: Institution of 500 Fellowships in the period 2015-17.

No. of Beneficiaries: 523 Young researchers

Achievements (Year wise): Scheme is initiated in recent time and it would take considerable time to know the achievements under the scheme.

Performance in last three years: 2014-17 (each years' budget allocation and achievement)

2015-16: 2.5 crore

2016-17: 75.5 crore

Name of the Key initiative/ Flagship Scheme:

VAJRA (Visiting Advanced Joint Research) Faculty

Launch Date: April 2017

Objective:

- i. To tap the expertise of International Faculty / scientists/ technologists including Non-resident Indians (NRI) and Persons of Indian Origin (PIO) / Overseas Citizen of India (OCI) in highly competitive areas of research and development by offering them adjunct / visiting faculty positions in Indian Institutions / Universities for specific period of time.
- ii. Engaging NRI / PIO / OCIs in National R&D Programs and thereby deepen their engagement for value addition to various S&T programs, projects and missions of the Government.
- iii. To catalize possible institutional collaborations through faculty exchange.

Target Beneficiary:

Engaging active overseas scientist/faculty working with overseas academic / research / industrial organizations with proven track record of research and development benefits the Indian collaborators, the host institution and S&T landscape of the country at large.

Physical Targets: Institution of 50-75 VAJRA Faculty per year on a pilot scale basis.

No. of Beneficiaries: The Scheme will be rolled out in 2017-18.

Achievements (Year wise): The Scheme will be implemented in 2017-18.

Name of the Key initiative/ Flagship Scheme:

IMPacting Research INnovation and Technology (IMPRINT) in partnership with MHRD

Launch Date: 05 November, 2015

Objective: To address and provide solutions to the most relevant engineering challenges faced by our nation by translating knowledge into viable technology (product and processes) in selected technology domains to enable, empower and embolden the nation for inclusive growth and self-reliance.

Target Beneficiary: IMPRINT is piloted by the Ministry of Human Resource Development (MHRD) and steered by Indian Institutes of Technology (IIT) and Indian Institute of Science (IISc). DST/SERB, in partnership with MHRD on equal cost sharing supports target oriented projects in the area of Advanced Materials and Nanomaterials. The Scheme targets the Faculties / Scientists of IITs, IISERs, NITs, JNU and IISc.

Physical Targets: Supporting R&D areas under i) Nano-Technology Hardware, ii) Manufacturing, iii) Environmental Science & Climate Change, iv) Advanced Materials

No. of Beneficiaries: 17 Research Groups

Achievements (Year wise):

SERB/DST has agreed to support 17 proposals upto Rs. 19.9 crore for a period of three years which is 50% of the total project cost. Remaining 50% will be borne by MHRD.

Performance in last three years (2014-17): 2016-17: First release will be done during March 2017 only

Name of the Key initiative/ Flagship Scheme:

Uchhatar Avishkar Yojana (UAY) in partnership with MHRD

Launch Date: 31st January, 2017

Objective:

1. To promote innovation in areas those are directly of relevance to the manufacturing and design industry.
2. To spur innovative mindset in the students and faculty in premier technological institutes.
3. To bring a coordinated action between academia and the industry.
4. To strengthen the laboratories and research facilities in the premier technological institutions.

Target Beneficiary:

The projects will also contribute high quality technical personnel who would generate manpower for emerging industries, scientific departments and laboratories. The Scheme targets the Faculties / Scientists of IITs, IISERs, NITs, IISc and selected industrial group.

Physical Targets: R&D projects relevant to industry.

No. of Beneficiaries: 39 Research Groups including Industry

Achievements (Year wise): SERB/DST has agreed to support 39 proposals upto Rs. 27.1 crore for the first batch of R&D projects.

Performance in last three years (2014-17): 2016-17: First release will be done during March 2017 only

KIRAN (Knowledge Involvement in Research Advancement through Nurturing)

- 'KIRAN (Knowledge Involvement in Research Advancement through Nurturing)' an umbrella scheme specific to women scientists was launched in 2014..
- KIRAN primarily enables Women Scientists & Technologists, who had a break in their career usually due to family responsibility, to join mainstream through its Women Scientists Scheme. It provides them a platform not only to do research, primarily in cutting-edge fields and also revive their career.
- There are three major components of Women Scientist Scheme namely, i) Women Scientists Scheme-A (WOS-A) for conducting research in Basic & Applied Sciences, ii) Women Scientists Scheme-B (WOS-B) for S&T interventions for Societal Benefit and iii) Women Scientists Scheme-C (WOS-C) that enables them to become Intellectual Property Rights (IPRs) professional.
- In 2015, Government enhanced fellowship substantially under KIRAN from Rs.35000 p.m. to Rs.55000 for PhD holder. The upper age limit to apply has also

been increased from 50 years to 57 years so that they can continue research till the age of retirement.

- There has been a substantial increase in not only the budgetary allocation but also the number of beneficiaries under KIRAN as given in following Table:

Sl. No.	Financial Year	Budget (Rupees, crores) in	No of Beneficiaries
1.	2014-15	44	247
2.	2015-16	63 (RE)	288
3.	2016-17	70 (RE)	294

- 829 women scientists have been supported under Women Scientists Scheme of KIRAN in last three years.
- DST also constituted 'Standing Committee for Promoting Women in Science' on 11 March 2016 as per action point of Record of Discussions (RoD) of the meeting that Hon'ble Prime Minister of India had with Scientists on 19.08.2015. Two meetings have since been held.
- DST launched a new component under KIRAN namely 'Mobility' in 2016-17 to address relocation issue of women scientists working in government sector.
- A new initiative- 'KIRAN Overseas Fellowship for Women in STEM'- is also on the anvil and is expected to be launched in 2017.

National Supercomputing Mission (NSM): Building Capacity and Capability

- National Supercomputing Mission (NSM) was approved by the Government of India on 25th March, 2015 at a total cost of Rs 4500 crore over a 7-year period of implementation.
- The Mission is being jointly steered by the Department of Science and Technology (DST) and the Ministry of Electronics and Information Technology (MeitY) along with the Implementing Agencies viz. Indian Institute of Science (IISc), Bengaluru and Centre for Development of Advanced Computing (C-DAC), Pune.
- The mission aims to enhance the research capacities and capabilities in the country by connecting them to the Supercomputer grid.
- The Supercomputing Grid over the NKN (National Knowledge Network) would facilitate researchers in diverse and challenging areas.
- This will be the first step in building a supercomputing environment across the country.
- The NSM is going to be transformative by providing high-end training for systematic Human Resources Development in the arena of High Performance Computing (HPC).
- The mission supports the government's vision of "Digital India" and "Make in India".
- The NSM – Executive Board has approved installations of 6 Supercomputers by the end of 2017.
- From these 6 four will be with 500 Teraflops capacity and two with 1 Petaflop capacity with half of them under "build" approach and rest half under "buy" approach.

- The NSM has initiated training programmes through C-DAC and IISc and the first such programme with industry participation has just completed.

AUTONOMOUS SCIENTIFIC RESEARCH INSTITUTIONS

DST has 26 Autonomous institutions (AIs) under its administrative control which can be grouped into 3 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.

Three Year Quantitative Achievements of Different Schemes/Programmes:-

Sr. No.	Output indicators	Quantitative Achievements			Total	Major achievement /impact/Outcome
		2014-2015	2015-2016	2016-2017		
1.	Papers in referred journals	1746	2438	2249	6433	Aryabhata Research Institute of Observational Sciences (ARIES), Nainital has established the 3.6m Devasthal Optical Telescope (DOT), largest fully steerable optical telescope in Asia. 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
2.	Books	20	48	29	97	
3.	Patents Filed/INDIAN	135	220	103	458	
4.	Patents Filed/FOREIGN	35	30	23	88	
5.	Transfer of technology/Designs and other Intellectual products	25	18	23	66	
6.	Research Man Power Trained (other than Ph.Ds)	441	940	250	1631	
7.	PhD awarded	146	173	212	531	
8.	Technical Man Power Trained	72	9226	354	9652	

						<p>ISRO and successfully integrated on board ASTROSAT satellite for flight on Sept 28th 2016.</p> <p>Agarkar Research Institute at Pune had recently developed 10th variety of wheat - MACS 6478 and soyabean variety MACS 1188.</p>
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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.

National Initiative for Developing and Harnessing Innovations (NIDHI)

Launch Date : 6th September 2016

Objective: National Initiative for Developing and Harnessing Innovations (NIDHI) is an umbrella programme conceived and developed for nurturing ideas and innovations (knowledge-based and technology-driven) into successful startups. The programme is in line with the national priorities and goals and its focus is to build an innovation driven entrepreneurial ecosystem with an objective of socioeconomic development through wealth and job creation

The key components of NIDHI are –

- NIDHI Technology Business Incubator: Converting Innovations to start-ups;
- NIDHI-PRomoting and Accelerating Young and ASpiring innovators & startups (NIDHI-PRAYAS)-Support from Idea to Prototype;
- NIDHI- Entrepreneur-In-Residence (NIDHI-EIR) - Support system to reduce risk;

- NIDHI-GCC - Grand Challenges and Competitions for scouting innovations;
- NIDHI-Accelerator - Fast tracking a start-up through focused intervention;
- NIDHI Centres of Excellence (NIDHI-CoE) - A World class facility to help startups go global.
- Startup-NIDHI through Innovation and Entrepreneurship Development Centres (IEDCs) in academic institutions; encouraging Students to promote start-ups
- NIDHI-Seed Support System (NIDHI-SSS)- Providing early stage investment in the incubatees

The budget allocated for various activities under NIDHI program is Rs. 180.00 crore during 2016-17. It is expected that the budget utilization shall be 100 % during 2016-17.

During 2016-17, 10 NIDHI PRAYAS Centres have been sanctioned for establishment along with Program Management Unit at SINE, IIT Bombay. These PRAYAS centres will support 100 innovators with prototyping grant up to Rs. 10.00 lakh. Ten NIDHI EIR centres have been sanctioned for establishment along with Program Management Unit at Technology Business Incubators at NCL Pune. These EIR centres will support 100 student entrepreneurs. The National Expert Advisory Committee has recommended setting up of 15 NIDHI TBIs and 6 NIDHI CoE. The NIDHI TBIs will create a cumulative incubation capacity 300 entrepreneurial ventures. Six TBIs have been sanctioned NIDHI Seed Support with enhanced funding of Rs. 10.00 crore each for providing early stage seed investments in the incubatees.

It is planned to scale up the activities under NIDHI program to create a conducive ecosystem for innovation, startup incubation and entrepreneurship to prosper. It is proposed to support more number of women entrepreneur empowerment programs, innovative idea scouting programs and Grand challenges.

CLEAN ENERGY RESEARCH INITIATIVE (CERI)

- Mission Innovation programme was launched by Hon'ble PM along with 20 world leaders during COP21 at Paris. India will lead Smart Grids and Innovation Challenge identified for multi lateral research partnership to accelerate the pace of Clean energy R&D innovation.
- Launch of Indo-UK Cooperation Programme on "Energy demand reduction in the built environment": The research programme focus is to reduce energy demand in UK & India's built stock, both new major urban developments' currently being planned and existing built stock.
- Launch of programme to Promote Habitat Energy Efficiency (I-PHEE): The programme is focused to promote R&D activities to improve energy performance of buildings and cities. The Programme is also geared to support enhancement of knowledge and practice to save energy in design, construction and operation of human habitats
- New initiative on Energy Storage Material : It focus on R&D of Materials for Energy that can contribute to solving India centric challenges through establishing leadership in key enabling technologies such as advanced materials for energy harvesting, storage, efficiency.

- New Programme on Production and Utilization of Methanol & Di-Methyl Ether (DME) as sustainable fuel. The 'Methanol Economy' promises to help India to mitigate its petroleum import costs and at the same time counter problem associated with global warming due to excess CO₂ emissions. The production routes hitherto unexplored but having future potential and requiring R&D in development of novel catalysts, utilization of methanol in direct methanol fuel, development of engines fuelled on alternate fuels.
- Providing opportunity to the best and brightest Indian students and scientists to gain exposure and access to world class research facilities in leading United States of America institutions through Bhaskara Advanced Solar Energy (BASE) programme and Building Energy Efficiency Higher & Advanced Network (BHAVAN) programme.
- Solar Energy Research initiative is providing the platform to develop processes and products in the value chain and moving up technology readiness level (TRL) trajectories from lab to industrial scale-up, covering innovation risks and fostering public private interactions. It has resulted the success development of large area high efficiency solar cell at BHEL-ASSCP plant, Establishment of solar photovoltaic hub, Shibpur, Surya–Jyoti lighting device and development of multi-chamber vertical in line system for fabrication of front contacts of solar cell.



Development of system and devices in solar energy

PROJECT: Surya Jyoti- An affordable Lighting Device for mass application

- Surya Jyoti is a unique solar energy operated lighting device which works during daytime in passive mode and in the night time through photovoltaic mode. It can work for 16 hours continuously giving an illumination equivalent of a 60W incandescent lamp with a life of 20 years for dome structure.
- Tested from recognised Labs like Electronics Regional Test Laboratory (ERTL) Kolkata, The Energy and Resource Institute (TERI), Indian Institute of Technology- Bombay, Indian Institute of Engineering Science and Technology (IEST), Kolkata etc
- The product has been included for subsidy under Off Grid and decentralized solar application scheme of Ministry of New and Renewable energy

- Ministry of Rural Development has taken necessary to explore the possibility of adopting this innovative technology of Surya Jyoti for the houses constructed under Pradhan Mantra AwasYojna- Gramin (PMAY-G)
- Training and giving licenses to young entrepreneurs to have their own start-ups.
- Self-help groups have also been trained to make these lamps and have been given licenses
- Ideal for rural houses and urban slums



Surya Jyoti installed in rural houses and urban slums

Water Technology Initiative

- DST-Intel has launched a Collaborative Research on River and Air Quality Monitoring in PPP mode. The aim of this initiative is to develop key technologies for sensing, communication and analysis of large-scale data collected from autonomous networks of perpetual/long-lived sensor nodes, followed by integration and deployment for water and air quality monitoring in real-time
- (DST) and UK (NERC & EPSRC) has jointly agreed to launch a collaborative research programme on improving Water Quality. India and UK will be mounting a joint research initiative having special thrust on addressing threats due to emerging contaminants (PPCP) and online river water quality monitoring and sensor technology.
- A bilateral Indo-French joint initiative launched for networking proposals in the area of Waste Water treatment and Natural Water treatment have been supported under this interaction.
- For Institutional capacity building three referral Water Quality laboratories have been established under WTI in Nagaland, Uttarakhand and Andhra Pradesh.
- Global collaborations for capacity building of water managers and researchers with University of Nebraska USA initiated to support 15 fellowships and 15 interns for a period of 3 years. The selected professionals would get exposure to

relevant labs and groups at UNL for residencies for durations ranging from 3 months to one year.

DST-Intel Collaborative Research on River and Air Quality Monitoring in PPP mode



SATYAM (Science and Technology of Yoga and Meditation)

- SATYAM (Science and Technology of Yoga and Meditation) is a new initiative launched in 2015 in response to the clarion call of Hon'ble Prime Minister of 1st International Yoga Day on 21 June 2015.
- SATYAM program is aimed to promote research for scientific validation of benefits of yoga and meditation.
- Against two calls for proposal under SATYAM, 45 projects are being given budgetary support.
- The projects sanctioned under SATYAM deal with study of various 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 etc. and also on improvement of quality-of-life.

Science Express- Climate Action Special

- 'Science Express- Climate Action Special (SECAS)' was Flagged Off on 15 October 2015, to commemorate first birth anniversary of Dr. APJ Abdul Kalam after his death. It halted at 64 locations till its culmination on 7 May 2016 and received 23.24 lakh visitors, mostly students & teachers.
- Second phase of SECAS was launched on 17 February 2017 from Delhi Safdarjung by Hon'ble Ministers of Science & Technology and Earth Sciences as well as Environment, Forest and Climate Change while Minister of Railways was present through video conferencing. In its journey of over 19,000 kms, it will cover 68 locations till 8 September 2017.
- SECAS is a unique collaborative initiative of Department of Science & Technology (DST), Ministry of Environment, Forest & Climate Change (MoEFCC), Department of Biotechnology (DBT), Ministry of Railways, Govt of India; Wildlife Institute of India (WII) and Vikram A Sarabhai Community Science Centre (VASCSC). The state-of-the-art exhibition on board the SECAS aims to contribute towards increasing understanding of science of

climate change, observed and anticipated impacts, and different possible responses.

- At each halt, activities are planned to engage visitors to reinforce SECAS message through exciting and much sought-after Outreach which is conducted in local schools/institutions.
- Visitors waiting for their turn to enter this train are kept engaged with interesting information displayed on window panes besides several hands-on activities on platforms.
- Informative take-away material is made available for wider distribution amongst schools.
- A team of Science Communicators explain and interpret exhibits, answers queries, facilitate visitors and conduct complementary activities.
- For the first time, scientific activities on explaining myths and superstitions are also being held on Railway Platforms and in schools.
- Some key features of SECAS are as given below:

Science Express	Date of Launch	Date of Culmination	No. of Halts	No. of visitors
SECAS-I	15.10.2015	07.05.2016	64	23.24 lakh
SECAS-II	17.02.2017	08.09.2017	68	Expected over 20 lakh
