

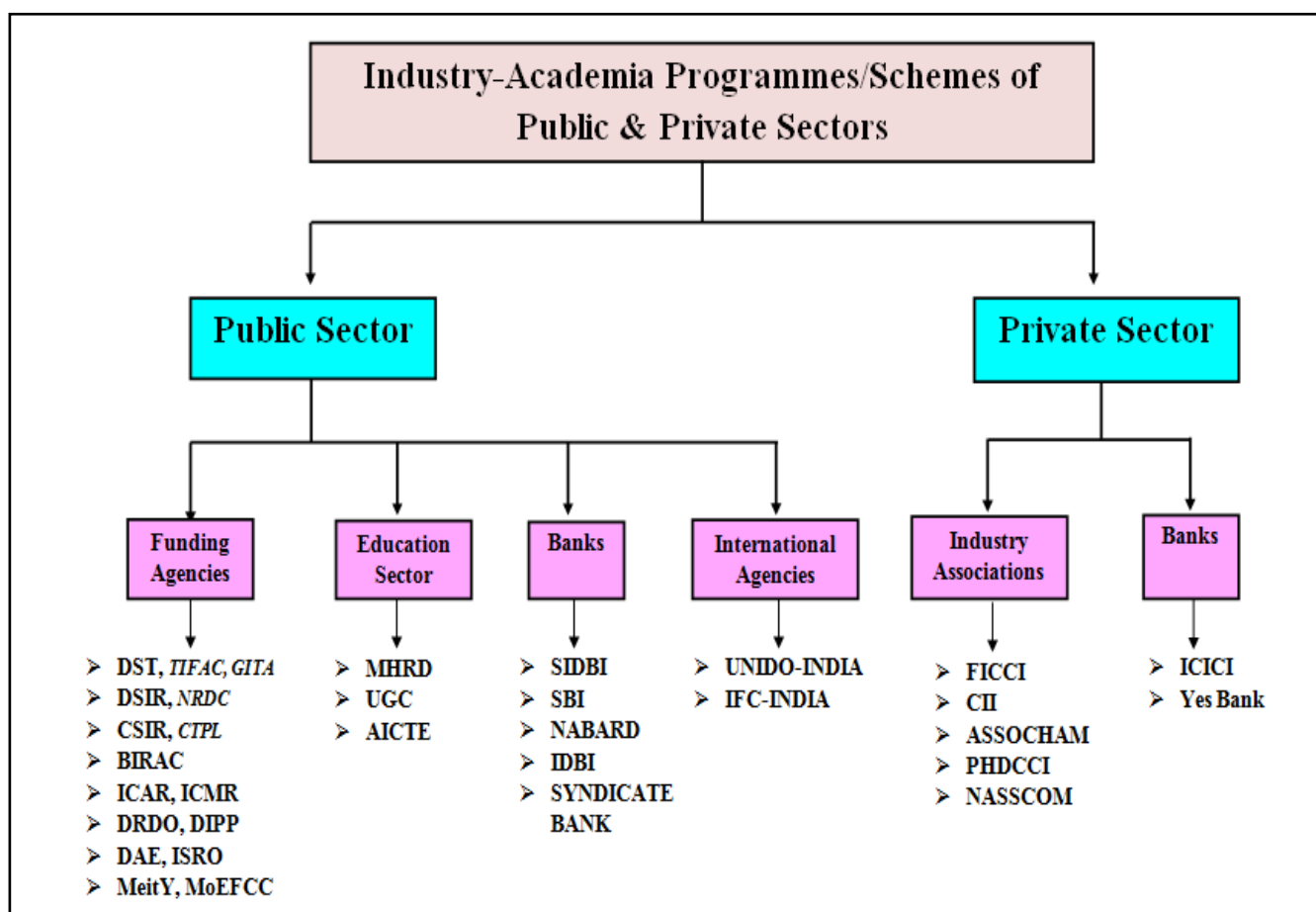
## DST-Centre for Policy Research at PU, Chd.

(DST/PRC/CPR-03/2013)

### REPORT-1

(May, 2015-Aug., 2016)

## *Industry-Academia Programmes/Schemes of Public and Private Sectors*



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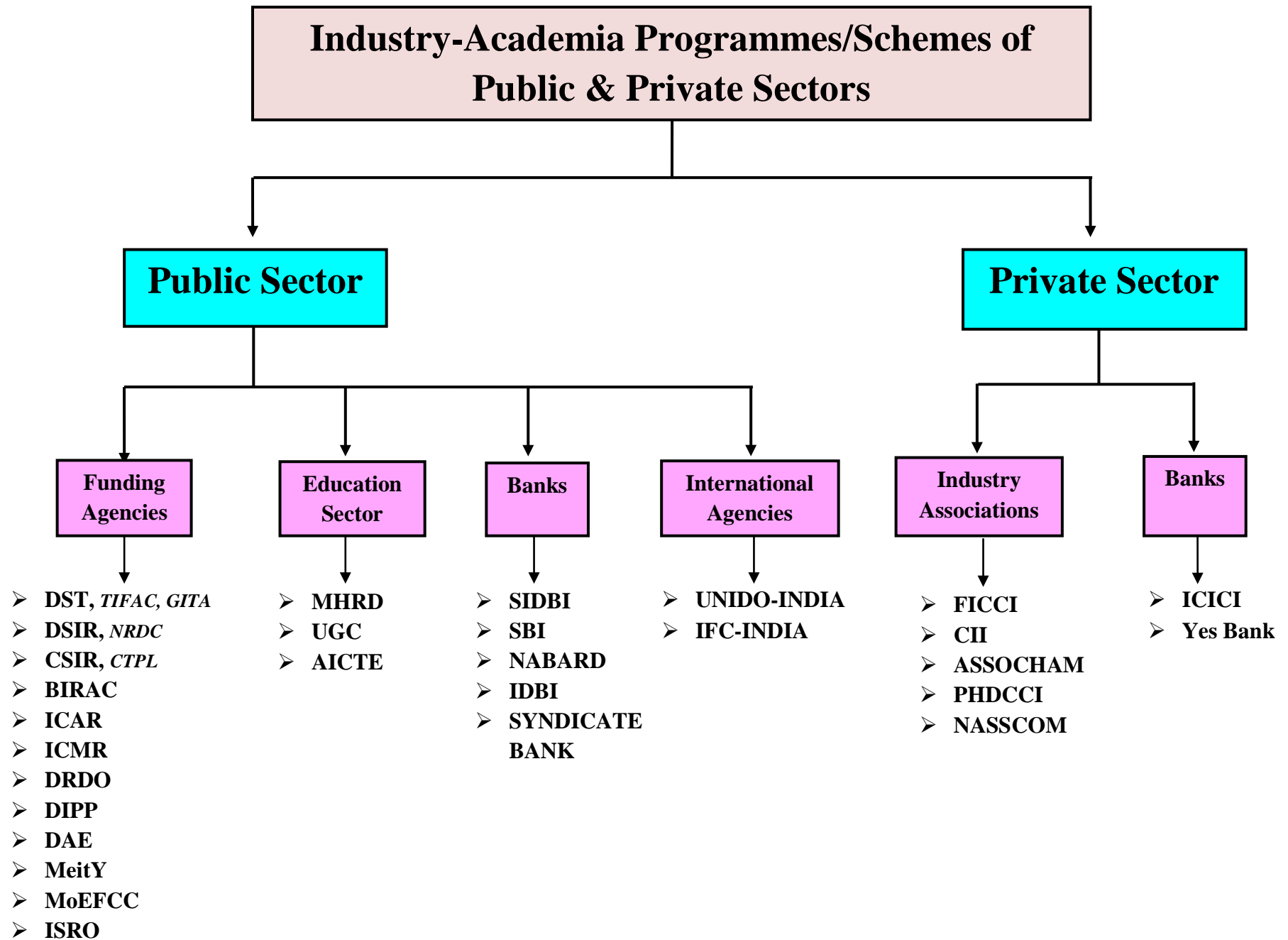
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## **1. Introduction**

In the current century, the economic prosperity of a nation is associated with its scientific and technological competence. To achieve success in these parameters, it is imperative that academia and industry should forge a strong link to overcome the limitations of each other. In developed countries, number of research partnerships between industries and universities has increased considerably in the past 20 years. However, in India, the full potential of Industry-Academia (I-A) partnership is far from being exploited due to vital differences between industry and academia. Academicians give less priority to applied research and are not much inclined to leave the comfort zone of pure teaching. Academia is largely ignorant of national needs and industry desires and thus unable to commercialize/market its innovative research adequately. Industry, in general, has apathy for the tunnel vision of academia. Also, it is insensitive to the enormous academic resource potential and is dependent on foreign technologies which are easily available.

However, I-A synergy is a win-win situation for both the sectors and also for the progress (economical & societal) of the nation. Government, through its various organizations/agencies, have floated many programmes to promote I-A interactions leading to innovative research, technologies and patents. Private sector has also started acknowledging the importance of I-A collaborations and has initiated steps to promote collaborative R&D for commercial gains and addressing the scientific needs of the nation.

In India, a plethora of information exists on the I-A R&D regime of public and private sectors of India, but there is no single platform where all such information is available. DST-Centre for Policy Research at Panjab University, Chandigarh has made an attempt to compile information on programmes/schemes of different agencies promoting I-A collaborations. Figure 2.1 represents various public and private organizations that have floated I-A programmes/schemes in India.



**Figure 2.1: Industry-Academia Programmes/Schemes of Public and Private Sectors**

*For meaning of abbreviations, please see symbols and Abbreviations (Page 68-72)*

## 2. I-A Programmes/Schemes of Public Sector

### 2.1 Funding Agencies

#### A. Department of Science and Technology (DST); [www.dst.gov.in](http://www.dst.gov.in)

DST is a nodal agency that connects science sector to the government verticals. It was established in 1971 following the success of ‘Green Revolution’ that signified innovative deployment of scientific methodologies. Table 1 enlists the industry related programmes of DST.

**Table 1: Industry Related Programmes/Schemes of DST**

S. No.	Programme/Schemes	Brief Details
1.	<b>Technology Development Board (TDB)</b> <a href="http://www.dst.gov.in/technology-development-board">http://www.dst.gov.in/technology-development-board</a>	This programme focuses on accelerating the development and commercialisation of indigenous technologies. Through TDB, adoption of foreign technologies to address domestic problems is also promoted. TDB provides financial assistance (equity, soft loans, or grants). It is also promoting industry to enter into hi- risk and hi- tech areas of R&D.
2.	<b>Technology Systems Development Programmes (TSDP)</b> <a href="http://www.dst.gov.in/technology-systems-development-programme-tdsp">http://www.dst.gov.in/technology-systems-development-programme-tdsp</a>	New technologies in identified areas are promoted, developed and integrated. Promotion of advanced technology for valuable addition to the products having high demand is carried out by TSDP.
3.	<b>National Science and Technology Entrepreneurship Development (NSTED)</b> <a href="http://www.nstedb.com/">http://www.nstedb.com/</a>	Promotes entrepreneurs by providing hands-on training in field of indigenous technologies for enhancing commercial exploitation of technologies. NSTED has started number of training programmes: <ul style="list-style-type: none"> <li>• Entrepreneurship Awareness Camp (EAC)</li> <li>• Entrepreneurship Development Programmes (EDP)</li> <li>• Faculty Development Programme (FDP)</li> <li>• Technology based EDP (TEDP)</li> </ul> It has also promoted development of different institutions (mentioned below) for fostering entrepreneurship culture. <ul style="list-style-type: none"> <li>• Innovation and Entrepreneurship Development Centre (IEDC)</li> <li>• S&amp;T Entrepreneurship Development Project (STED)</li> <li>• S&amp;T based Entrepreneurship Development (i-STED)</li> <li>• S&amp;T Entrepreneurs Park (STEP)</li> <li>• Technology Business Incubator (TBI)</li> </ul>
4.	<b>Schemes for Funding Industry Relevant R&amp;D (Under SERB)</b>	Promotes industrial research by utilizing expertise from the academic sector to address industrial and societal problems.

	<a href="http://www.serb.gov.in/home.php">http://www.serb.gov.in/home.php</a>	SERB in association with CII, initiated ' <b>Prime Minister's Fellowship Scheme</b> ' for doctoral research to encourage young, enthusiastic and result-oriented scholars to pursue industry-oriented research.
5.	<b>Drugs and Pharmaceutical Research Programme</b> <a href="http://www.dst.gov.in/drugs-pharmaceutical-research">http://www.dst.gov.in/drugs-pharmaceutical-research</a>	Aims to synergies pharma industries and publicly funded R&D institutions and to establish close linkages.
6.	<b>Start-Up Research Grant (Young Scientists)</b> <a href="http://serb.gov.in/srg.php">http://serb.gov.in/srg.php</a>	Floats schemes for promoting industrial research: <ul style="list-style-type: none"> <li>• Early Career Research Award (ECRA)</li> <li>• National Post-Doctoral Fellowship (NPDF)</li> </ul>
7.	<b>International S&amp;T Co-operation</b> <a href="http://www.dst.gov.in/international-st-cooperation">http://www.dst.gov.in/international-st-cooperation</a>	Promotes innovation and commercial R&D via I-A applied R&D projects/Public Private Partnerships (PPP) under Global Innovation and Technology Alliance (GITA) platform for facilitating tech development and its transfer in association with partner country.
8.	<b>Nano Applications and Technology Advisory Group (NATAG)</b> <a href="http://nanomission.gov.in/org_stru.htm">http://nanomission.gov.in/org_stru.htm</a>	Encourages implementation of industry oriented and application driven projects in the area of nano sciences.
9.	<b>National Initiative for Developing and Harnessing Innovations (NIDHI)</b> <a href="http://www.nstedb.com/New_Programmes/NIDHI-Accelerator.pdf">www.nstedb.com/New_Programmes/NIDHI-Accelerator.pdf</a>	NIDHI is one of the umbrella programmes of DST which is working for enhancing innovation and entrepreneurship for generating successful start-ups. Under NIDHI, following initiatives are planned to be undertaken: <ul style="list-style-type: none"> <li>• NIDHI- Grand Challenges and Competitions for scouting innovations</li> <li>• NIDHI-Promotion and Acceleration of Young and Aspiring technology entrepreneurs (NIDHI-PRAYAS)</li> <li>• NIDHI-Entrepreneur in Residence (NIDHI-EIR)</li> <li>• Startup-NIDHI through Innovation and Entrepreneurship Development Centres (IEDCs) in academic institutions; encouraging Students to promote start-ups</li> <li>• Start-up Centre in collaboration with MHRD</li> <li>• NIDHI-Technology Business Incubator (TBI)</li> <li>• NIDHI-Accelerator- Fast tracking a start-up through focused intervention</li> <li>• NIDHI-Seed Support System (NIDHI-SSS)- Providing early stage investment</li> <li>• NIDHI Centres of Excellence (NIDHI-CoE)- A world class facility to help startups go global</li> </ul>
10.	<b>Instrumentation Development Programme</b> <a href="http://www.dst.gov.in/instrumentation-development-programme">http://www.dst.gov.in/instrumentation-development-programme</a>	Through this programme the concept of ' <b>Hub</b> ' is introduced that acts as the translational platform for academics, industries and related organizations to convert laboratory level prototypes into packaged models and help in transfer of technology and knowhow to appropriate industries at a later stage for commercialization
11.	<b>Policy Research Centres (PRC)</b>	DST established five Centres for Policy Research with an

	<a href="http://cpr.puchd.ac.in/">http://cpr.puchd.ac.in/</a>	aim of making evidence based recommendations for strengthening STI policy of India. One such centre has been established in Panjab University with a mandate to strengthen I-A linkages in India.
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Source: [www.dst.gov.in](http://www.dst.gov.in)

Under the aegis of DST dedicated agencies like, TIFAC and GITA were established. These are briefed below.

➤ **Technology Information, Forecasting and Assessment Council (TIFAC);**  
**[www.tifac.org.in](http://www.tifac.org.in)**

TIFAC, an autonomous organization established in 1988 under the aegis of DST, is working with a mandate of assessing and supporting technology trajectories of various academic and private organizations. TIFAC is striving for sustainable innovations to lead technology development in the country through programmes run by TIFAC, keeping industry and academia in close association. The R&D promoting industrial programmes are enlisted in table 2.

**Table 2: Industry Related Programmes of TIFAC**

S. No.	Programme	Brief Details
1.	<b>Advanced Composites Programme</b> <a href="http://tifac.org.in/index.php?option=com">http://tifac.org.in/index.php?option=com</a>	Through this programme close linkages are promoted between various centres of excellence from all over the country and industries for promoting technology absorption, and its development and dissemination.
2.	<b>Revolving Technology Innovation Fund [under TIFAC-Small Industries Development of Bank of India (SIDBI) Programme]</b> <a href="http://www.sidbi.com/?q=tifac-sidbi-revolving-fund-technology-innovation-srijan-scheme">http://www.sidbi.com/?q=tifac-sidbi-revolving-fund-technology-innovation-srijan-scheme</a>	This programme aims to facilitate tech development, demonstration and commercialization leading to creation of new product or process and is mainly encouraging capabilities in MSMEs to bring high-risk innovations to the market.
3.	<b>Technology Refinement and Marketing Programme (TREMAP)</b> <a href="http://tifac.org.in/index.php?option=com_">http://tifac.org.in/index.php?option=com_</a>	Through TREMAP, country's innovation pool is promoted by bringing out innovative technologies from the prototype stage to market level through a network of Technology Commercialization Facilitators (TCFs).
4.	<b>Home Grown Technology (HGT) Programme</b> <a href="http://www.tifac.org.in/index.php?option=com_content&amp;view=article&amp;id=48&amp;Itemid=204">http://www.tifac.org.in/index.php?option=com_content&amp;view=article&amp;id=48&amp;Itemid=204</a>	HGT programme, a past initiative (implemented from 1992-2005) was initiated by TIFAC to support R&D institutions, academia, start-ups and SMEs to carry out their innovative technologies at pilot scale.
5.	<b>Bioprocess and Bioproducts</b>	Through this programme, TIFAC is supporting



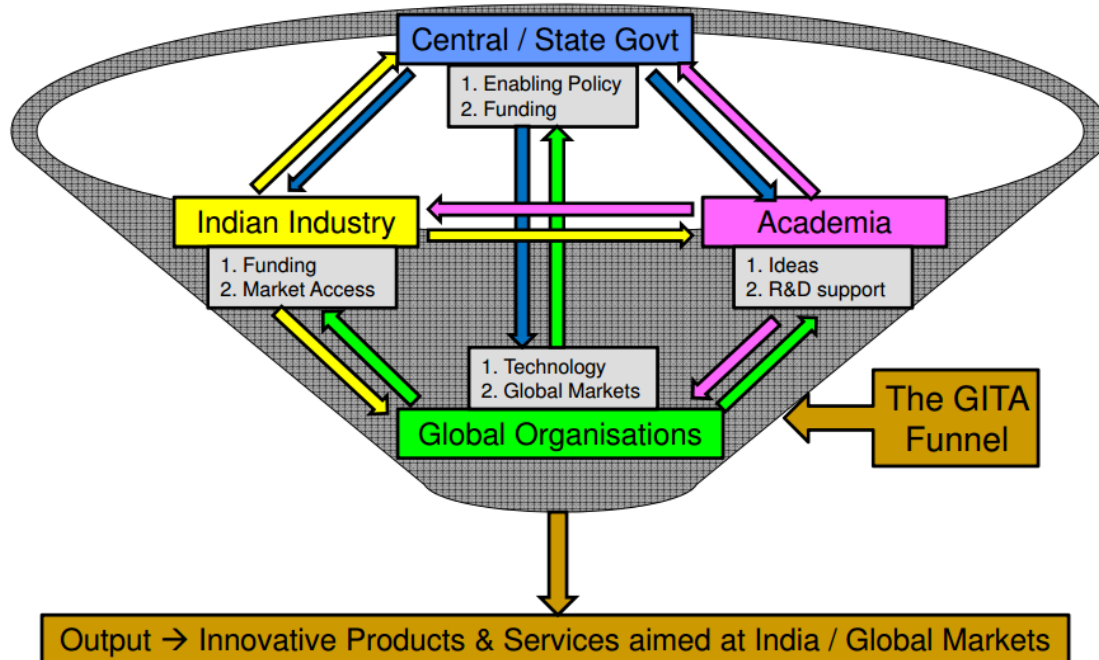
	<b>Programme</b> http://tifac.org.in/index.php?option=com_content&view=article&id=65&Itemid=96	technology development in field of biotransformation and enzyme technology in partnership with SMEs and in house R&D units, academic and research institutes.
6.	<b>Collaborated Automobile R&amp;D Core-Group</b> tifac.org.in/index.php?option=com_content&view=article&id=68&Itemid=99	This group comprise of academia, industries and state ministries to form a core-group with an aim to built user friendly database of technologies and scientists to promote technology development and commercialization in field of automobile industry.

Source: www.tifac.org.in

TIFAC has established Patent Facilitation Center (PFC) under which Patent Information Centers (PIC) has been created in 19 states namely, Andhra Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Kerala, Madhya Pradesh, Manipur, Punjab, Rajasthan, Sikkim, Tripura, Uttaranchal, Uttar Pradesh and West Bengal. These PICs aid government departments, universities and scientist for patent search free of cost. The same services are open to attorneys, industry and public sector undertakings, with a levy of nominal charges. PFC has a scheme named '*Knowledge Involvement in Research Advancement through Nurturing (KIRAN)*' for the empowerment of women in R&D in field of IPR.

➤ **Global Innovation and Technology Alliance (GITA); www.gita.org.in**

To stimulate investments in R&D sector, GITA, an innovative pilot project was commenced in 2007, by DST in collaboration with CII. DST and CII hold 51% and 49% equity respectively. GITA is an industry managed body for promoting vigorous innovation clusters along with managing national innovation fund through PPP model. GITA is actively supporting emergence of open source innovations and venture capital industry for social inclusion. It also provides knowledge know-hows for IP acquisition and licensing social goods (non-exclusive) from the government. Hence, GITA by bringing industry and academia together not only in India but globally is strongly promoting innovation culture (Fig. 2.2).



**Figure 2.2: GITA Innovation Ecosystem**

Source: [www.gita.org.in](http://www.gita.org.in)

Various programmes of GITA promoting industrial research are listed in table 3.

**Table 3: Industrial Research Oriented Programmes of GITA**

S. No.	Programme	Brief Details
1.	<b>Bilateral programmes</b>	<p>Bilateral programmes of GITA are as:</p> <ul style="list-style-type: none"> <li>• <b>Technology Acquisition and Development Fund</b> is the schemes launched by DIPP and is implemented by GITA. This scheme facilitates applicability of clean &amp; green technologies available to Indian MSMEs sector.</li> <li>• <b>India UK Collaborative Industrial Research Development Programme:</b> ₹ 1.50 crores grant available to Indian companies and upto £ 300000 to UK Companies for joint co-development of industrial R&amp;D and innovation project in the areas of cleantech, use of ESDM technologies, affordable healthcare to provide solutions to societal challenges.</li> </ul>
2.	<b>Multilateral programmes</b>	<p>Multilateral programmes consist of network of foreign entities. Some of the multilateral programmes of GITA are as:</p> <ul style="list-style-type: none"> <li>• <b>The Enterprise Europe Network (ENN):</b> ENN is a European Union initiative with an aim to provide innovation and business support to SMEs in Europe and India. In India, ENN is jointly coordinated by the European Business and Technology Centre (EBTC), GITA, CII, Federation of Indian Export Organizations (FIEO) and the Steinbeis Centre for</li> </ul>

		<p>Technology Transfer India (SCTI). Through this platform, companies who are looking for business improvement and expansion to new markets can use EEN's database of technology offers and requests, consist of ~7,000 profiles and is effectively correlating research and commercial applications together.</p> <ul style="list-style-type: none"> <li>• <b>Innovation Driven Initiative for the Development and Integration of Indian and European Research (INNO INDIGO):</b> INNO INDIGO is a horizontal ERA-Net between Europe and India, funded by the European Commission (EC) for research and technological development. INNO INDIGO has 11 consortium partners from Europe and 3 from India, namely, CSIR, DBT and GITA. Its main objective is the implementation of transnational Indo-European Joint Call for Proposals in which funding agencies from India, EU member states and associated states can participate.</li> </ul>
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Source: [www.gita.org.in](http://www.gita.org.in)

## B. Department of Scientific and Industrial Research (DSIR); [www.dsir.gov.in](http://www.dsir.gov.in)

DSIR was established in 1985 as one of the agencies of Ministry of Science and Technology, with an objective to pursue activities relating to development of indigenous technologies and subsequently promoting and transferring these technologies to commercial level. I-A linked programmes of DSIR are presented in table 4.

**Table 4: Industry-Academia Linked Programmes and Initiatives of DSIR**

S. No.	Programme/ Initiative	Brief Details
1.	<p><b>Building Industrial R&amp;D and Common Research Facilities (BIRD-crf)</b>  <a href="http://www.dsir.gov.in/12plan/bird-crf/bird-crf.htm">http://www.dsir.gov.in/12plan/bird-crf/bird-crf.htm</a></p>	<ul style="list-style-type: none"> <li>• <b>Industry R&amp;D Promotion Programme (IRDP):</b> Various research laboratories are recognized to avail different types of fiscal incentives offered by government. It recognizes In-house R&amp;D units (RDI); Scientific and Industrial Research Organization (SIRO) and Public Funded Research Organizations (PFRI)</li> <li>• <b>Common Research and Technology Development Hubs (CRTDH):</b> are working with mandate to encourage technology development and research activities carried out by MSEs in collaboration with public funded laboratories.</li> <li>• <b>Asian and Pacific Centre for Transfer of Technology (APCTT):</b> assists associated members of United Nations Economic and Social Commission for Asia and the</li> </ul>

		Pacific (UN-ESCAP) in strengthening their innovation systems.
2.	<b>Patent Acquisition and Collaborative Research and Technology Development (PACE)</b> <a href="http://www.dsir.gov.in/12plan/pace/pace.htm">http://www.dsir.gov.in/12plan/pace/pace.htm</a>	PACE is supporting industries to acquire patentable technology from within the country or overseas and also to add value to the acquired technology for commercial exploitation in Indian/foreign markets.
3.	<b>Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM)</b> <a href="http://www.dsir.gov.in/12plan/prism/prism.htm">http://www.dsir.gov.in/12plan/prism/prism.htm</a>	PRISM supports institutions/organizations to set up autonomous organization within host institutions for developing state-of-art technology solutions with an aim to help MSME clusters and individual innovators.
4.	<b>Access to Knowledge for Technology Development and Dissemination (A2K+)</b> <a href="http://www.dsir.gov.in/12plan/a2k+/a2k+s.htm">http://www.dsir.gov.in/12plan/a2k+/a2k+s.htm</a>	This scheme is working for disseminating science, technology and innovation related information to the academic sector and industrial sector such as, in-house R&D units of industry, SIROs, consultants, industry associations, techno-entrepreneurs, government departments and others.
5.	<b>Technology Development and Demonstration Program (TDDP)</b> <a href="http://www.dsir.gov.in/tpdup/tdp/tddp.htm">http://www.dsir.gov.in/tpdup/tdp/tddp.htm</a>	To make industry competitive, development and demonstration of innovative need-based technologies are undertaken by TDPP. TDPP is also contributing to strengthening the interface between industry and R&D establishments.
6.	<b>Technopreneur Promotion Programme (TePP)</b> <a href="http://www.dsir.gov.in/tpdup/tep/tepp.htm">http://www.dsir.gov.in/tpdup/tep/tepp.htm</a>	Under this programme micro technopreneurship support from DSIR are made available to budding entrepreneurs.
7.	<b>Technology Development and Utilization Programme for Women (TDUPW)</b> <a href="http://www.dsir.gov.in/tpdup/tdupw/tdupw.htm">http://www.dsir.gov.in/tpdup/tdupw/tdupw.htm</a>	Under this programme adoption of new technologies developed by women are promoted. It also promotes technological up gradation of tiny, small and medium enterprise run by women entrepreneurs.
8.	<b>Technology Management Programme (TMP)</b> <a href="http://www.dsir.gov.in/tpdup/tmp/tmp.htm">http://www.dsir.gov.in/tpdup/tmp/tmp.htm</a>	Through this scheme, creation of dedicated resource centres for technology and innovation management are initiated. TMP programme can be availed by industry and related industrial associations, academic institutes, state level agencies, research organizations and government organizations, consultancy organizations and other government departments.
9.	<b>Encouraging Development and Commercialization of Inventions and Innovations: A new impetus</b> <a href="http://www.dsir.gov.in/circulars/knowledge_equity_om_25may2009.pdf">http://www.dsir.gov.in/circulars/knowledge_equity_om_25may2009.pdf</a>	Through this programme researchers are made to avail equity share in an enterprise. It is also encouraging creation of incubation centres in the scientific establishments and promotes mobilization of researcher/faculty from academics to industry and vice versa.

10.	<b>Consultancy Promotion Programme (CPP)</b> <a href="http://www.dsir.gov.in/tpdup/cpp/cpp.htm">http://www.dsir.gov.in/tpdup/cpp/cpp.htm</a>	This programme aims to promote uptake of consultancy services between academic and industrial sectors for technology acquisition and setting up of joint ventures.
11.	<b>International Technology Transfer Programme (ITTP)</b> <a href="http://www.dsir.gov.in/tpdup/ittp/ittp.htm">http://www.dsir.gov.in/tpdup/ittp/ittp.htm</a>	ITTP is supporting activities related to promotion of international technologies and trade including export of technologies, services, projects and innovative products to enhance the reach of Indian industry.

Source: [www.dsir.gov.in](http://www.dsir.gov.in)

➤ **National Research Development Cooperation (NRDC);**  
**[www.nrdcindia.com](http://www.nrdcindia.com)**

NRDC, working under the administrative control of DSIR, was established by the GoI in 1953 with a mandate to develop and commercialize the technologies/inventions/patents generated/product and processes from various national R&D institutions/universities.

NRDC in its six decades of functioning has successfully forged strong linkages between scientific and industrial community in India as well as abroad and has also developed formal arrangements within academic and industrial segment for the commercialization of know-how developed in their laboratories. NRDC is also recognized as a large repository of technologies existing in all areas of industries.

NRDC undertakes number of activities under its structured promotional programme for encouragement and advancement of innovations, research and promotion of inventions technical and financial assistance for Intellectual Property Rights (IPRs) protection. Industry linked programmes of NRDC are listed in table 5.

**Table 5: Industry Linked Programmes of NRDC**

S. No.	Programme	Brief Details
1.	<b>Innovation Portal/ Technology Portal</b> <a href="http://www.nrdcindia.com/english/index.php/programmes/innovation-portal">http://www.nrdcindia.com/english/index.php/programmes/innovation-portal</a>	This portal is an initiative to bridge the gap between inventor, manufacturers, industry and academia that provides complete information related to the technologies in different areas.
2.	<b>Knowledge Management system for Technology Promotion</b> <a href="http://www.nrdcindia.com/english/index.php/programmes/knowledge-management">http://www.nrdcindia.com/english/index.php/programmes/knowledge-management</a>	This system is promoting development and commercialization of technologies under NRDC. Identification and evaluation of technologies is carried out by experts in self propelled mechanism for value addition leading to the complete technology package.
3.	<b>Entrepreneurship Development Programme</b> <a href="http://www.nrdcindia.com/english">http://www.nrdcindia.com/english</a>	It is working for fostering entrepreneurship culture and skill up gradation of unemployed youth and is also working for capacity building of Non

	/index.php/technology-management/innovator-s-support/entrepreneurship-development-programme	Government Organizations (NGOs) by promoting industry oriented projects.
4.	<b>Patent Search Facility</b> <a href="http://ipindiaonline.gov.in/patentsearch/search/index.aspx">http://ipindiaonline.gov.in/patentsearch/search/index.aspx</a>	Through this facility inventors/scientists/technologists/industries can identify and search for patents in patent databases at global level. It also provides abstracts and bibliographic references from different sources for detailed analysis of desired sources for complete review of specific area.

Source: [www.nrdcindia.com](http://www.nrdcindia.com)

NRDC is committed to provide IPR consultancy to interested academia, R&D organizations and industries. It also provides expert services in formulating and drafting the innovation, IP Policy and technology transfer of these organizations. In order to assist stakeholders for technology landscaping and market analysis, NRDC and Ministry of Micro, Small and Medium Enterprises (MoMSME) jointly started a project namely '**Intellectual Property Facilitation Centre (IPFC)**'. This centre aims to promote IPRs awareness and adoption by MSMEs and budding entrepreneurs. IPFC regularly organizes various training programs on explicit themes associated with IP. IPFC also commenced 'Free IP awareness talk for MSMEs' to educate and train MSMEs on 'How to protect Intellectual Property'. Numbers of IPR Services provided by NRDC are listed in table 6.

**Table 6: IPR Related Services Provided by NRDC**

S. No.	Domain	Services
1.	<b>Patents</b>	Pre filing services, prior art search, preliminary patentability assessment, patent filing support for filing with provisional specification or/and with complete specification advice for filing in other countries, advice on examination reports and queries for the patent office, post grant support, support for infringement proceedings, opposition proceedings, technology transfer agreements, patent valuation technology marketing and licensing.
2.	<b>Copyright</b>	Guidance and assistance in preparation of documents required for registration.
3.	<b>Trade Mark</b>	Guidance and assistance in preparation of documents required for registration.
4.	<b>Industrial Designs</b>	Guidance and assistance in preparation of documents required for registration.
5.	<b>Geographical</b>	Guidance and assistance in preparation of documents

	<b>Indicators</b>	required for registration.
6.	<b>General Consultation</b>	Guidance and assistance in identifying the possible IP protection for the creativity.

Source: [www.nrdcindia.com](http://www.nrdcindia.com)

### C. Council of Scientific and Industrial Research (CSIR); [www.csirhrdg.res.in](http://www.csirhrdg.res.in)

CSIR, a well known organization for pursuing cutting edge R&D activities in diverse areas of S&T, was constituted in 1942. CSIR is composed of vibrant network of 39 outreach centres, 38 national laboratories, 5 units and 3 Innovation Complexes ([www.csir.res.in](http://www.csir.res.in)). CSIR is leading in India's intellectual property regime with a strong portfolio of patents, technologies developed and licensed. Amongst Indian patents filed in US, 90% of patents-granted belong to CSIR. On average, CSIR files 200 patent applications in India and 250 in foreign countries every year. Patents from CSIR are licensed at rate of 13.86% which is appreciable at global level.

CSIR has actively endorsed the industrial research through a unique initiative namely 'New Millennium Indian Technology Leadership Initiative' (NMITLI), one of the CSIR's most impactful and largest PPP efforts in R&D domain. NMITLI was conceptualized in 2001 and has generated 100 international patents and >150 publications in high impact journals. NMITLI has contributed significantly in R&D and national innovation system of India. It aims to catalyze innovative technological development for attaining global leadership position for Indian industries. It is working for synergizing the research competencies of academia, R&D organization and industries integrated to achieve industrial growth.

This programme is unique in following 'Inverse Risk Investment Profile' through which focus is given on low investment and high risk technology areas. Subsequently, investments increases as the project develops and risk decreases leading to higher innovation. NMITLI also provides IP mapping for continuous tracking of project potential for creating IP portfolio and aids in licensing of IP. Almost all the projects under NMITLI are built in PPP mode. Through this programme, financial support is provided to institutional partners in public domain as grant-in-aid and to industrial partners in form of soft loans with 3-5% interest rates. Till date around 60 network projects have been completed, involving 280 R&D groups from various research institutes, 1750 researchers and 85 industrial partners. These projects came out be at outlay of ₹550 crores. Table 7 lists down some of the notable innovative technologies and products generated from NMITLI supported projects.

**Table 7: Notable Technologies and Products Generated from NMITLI Supported Projects**

S. No.	Technology/Product	Expertise Area
1.	Biosuite- portable software for bioanalyses	Bioinformatics
2.	Genocluster- package of software tools comprising of gene prediction software, proteome calculator and prediction software of virulent proteins	Bioinformatics
3.	Darshee- 3D visualization software for complex bioprocess	Bioinformatics
4.	SofComp and Mobilis-low cost computing platforms	Information Technology
5.	Triple Play Braodband- first internet Protocol Television service	Information Technology
6.	Weather Forecasting System- integrate software and hardware system for weather and monsoon prediction	Information Technology
7.	Psoriasis- herbal formulation to be taken orally	Healthcare
8.	Sudoterb- used for treatment of tuberculosis	Healthcare
9.	Lysostaphin- biotherapuetic for treatment of <i>Staphylococcus</i> infections	Healthcare
10.	Docosa Hexanoic Acid (DHA)- marine based nutrient product	Healthcare
11.	XCyto Screen Kit- molecular diagnostic kit for detection of ocular infection	Diagnostics
12.	Micro-Polymerase Chain reaction (PCR)- PCR system for identification of Hepatitis B Virus in situ	Diagnostic
13.	New varieties of Mentha Piperita: CIM Indus and CIM Madhuras	Agricultural Biotechnology
14.	Low lignin containing <i>Ochlandra travancoria</i> and <i>Leucaena leucocephala</i>	Agricultural Biotechnology
15.	Sugarcane Biorefinary- production of bioethanol from sugarcane bagasse	Agricultural Biotechnology
16.	Mitigation of Environment Pollution- control of pollution associated with leather processing	Biotechnology
17.	Fuel Cell- 1.00 KW polymer based electrolyte membrane fuel cell	Energy
18.	Wind Energy- 500 KW wind turbine	Energy

**Source:** <http://www.csir.res.in/external/heads/collaborations/Nmitili/NMITLI%20Brochure%20and%20selected%20achievements.pdf>

There are several research and sponsor schemes of CSIR, promoting industry oriented research, such as ‘CSIR Young Scientist Award’ and ‘Entrepreneurship Support Programme’. To assist industries, CSIR has created a knowledgebase of 642 technologies which can be readily taken up for commercialization ([http://www.csir.res.in/PDF/knowledge\\_base\\_080716.pdf](http://www.csir.res.in/PDF/knowledge_base_080716.pdf)). This knowledgebase is accessible from the CSIR website. CSIR has also supported creation of organizations for enhancing



industrial research, such as Indian Plywood Industries Research and Training Institute (IPIRTI), Bengaluru for strengthening Indian Plywood industry and Industry-Academia-Research/Government Interface (IARGI) to promote commercialization of technologies by facilitating strong I-A linkages.

➤ **CSIR-Tech Private Limited (CTPL); [www.csirtech.com](http://www.csirtech.com)**

CSIR-Tech is one of the premier R&D organizations in India. It is a Pune based private limited company established in 2011. The major partners of CSIR-Tech are CSIR (a conglomerate of public funded R&D labs), State Bank of India (a public funded financial services company) and Venture Centre (a technology business incubator). CSIR-Tech has been established to promote entrepreneurship and commercialization of knowledge economy of academia and industry. It is located in the Innovation Park of National Chemical Laboratory (NCL), Pune. NCL is one of the premier institutes of CSIR organization.

CSIR-Tech works for the commercialization of Intellectual Property (IP), know-how and technology emerging from public and private R&D labs as well as academic institutions. CSIR-Tech works closely with R&D institutions in India such as the CSIR, IITs, DAE, DST, DBT and a few private R&D labs. It helps them to commercialize their intellectual property and technologies, by facilitating technology transactions and by creating funds for their spin-out businesses. CSIR-Tech represents over 9,000 of the 25,000 plus scientists working in publicly-funded R&D labs across India.

CSIR-Tech is governed by a board of directors whose composition is as follows: Chairman (1), CEO (1) and members (8) from industries, banking sector and research organizations. Day to day functioning of CSIR-Tech is in the hands of CEO and its team comprising of 10 members which are Venture Consultant (1), Chief Business Officer (1), Technology Transfer Associates (3), Technology Transfer Analysts (3) and consultants (2).

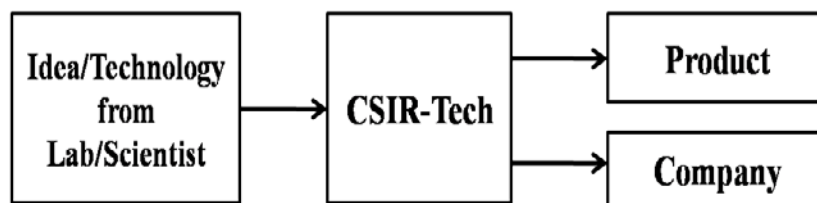
**CSIR-Tech Services**

- **Technology Venturing:** It invests in laboratory 'spinoffs' and other S&T based start-ups to capture a maximum portion of the capital generated by technology commercialization.
- A SEBI registered private equity fund which is known as India Science Venture Fund (ISVF- <http://www.isvf.in/>) is managed by CSIR-Tech.

- **India Science Venture Fund (ISVF):** This fund has been created to provide financial assistance for commercialization of lab R&D via sponsoring projects and technology transfer. This fund has been approved by Security and Exchange Board of India (SEBI) for registration, spin off businesses and science based start-ups with the target of ₹ 50 crore. ISVF targets mainly sectors belonging to Chemicals, Biomaterials, Engineering, Life Sciences and Healthcare.
- **Technology Commercialization:** CSIR-Tech Helps technology claimants to access technology assets across, India's leading academic institutions and R&D labs. CSIR-Tech catalyzes the process of technology transfer by facilitating technology appellants to build a business case and reduce time of techno-commercial negotiation with academic institutions and R&D labs.
- **Market Insights & Consultancy:** CSIR-Tech provides consulting services and market insights to enterprises, labs and government agencies as CSIR-Tech has deep understating of ecosystem of Indian R&D. CSIR-Tech helps spotter for technology, search for R&D partners, IP valuation, and technology transfer offices & create incubation centres.

### Offerings of CSIR-Tech

CSIR-Tech's output is of two folds i.e. 1) translation lab research to a commercial product 2) setting up a company (e.g. spin-off) as shown below:



**Figure 3: CSIR-Tech Output**

The main offerings of CSIR-Tech are as follows:

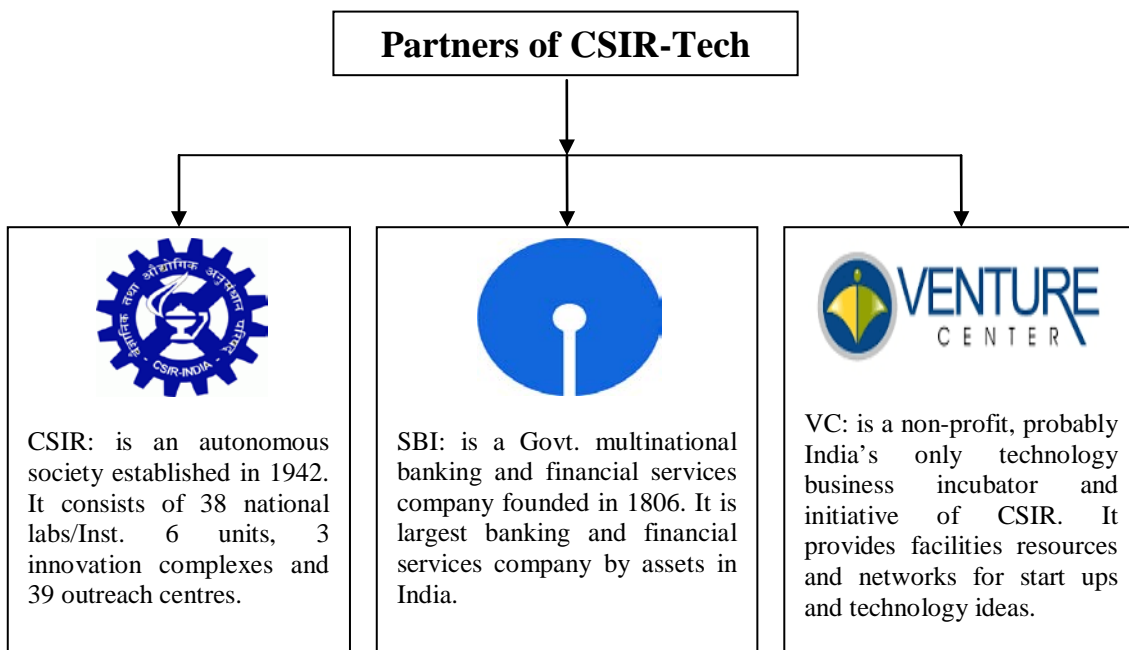
- **Technology Transfer:** CSIR-Tech promotes the technology transfer process by identifying opportunities for technologies which are emanating from labs and are commercially relevant. It also identifies and engages with suitable industry partners to act as commercialization channels.

- **IP Licensing:** CSIR-Tech helps R&D labs by identifying licensing opportunities for their patents and also support industry partner to diagnose valuable IP assets which provide a strong competitive advantage, cost and access to global market.

**Other offerings of CSIR-Tech are:**

- Technology scouting, R&D partner search
  - Market research and consulting
  - Open innovation
  - Technology/IP evaluation
  - Capacity building
  - Research
  - S&T development
  - Opportunity identification
  - Market penetration
  - Technology de-risking
  - Synthesis, aggregation and agreements
  - Business planning and raising finances
  - Virtual business incubation support
- } *Industry advisory services*
- } *Government advisory services*

**Partners of CSIR-Tech**



## **Networking with R&D Labs**

CSIR-Tech aims to aid the labs to encourage academic entrepreneurs who want to get involved in knowledge intensive ventures inculcated at their research institutes. It caters to around 60 R&D labs comprising of CSIR labs, IITs, DAE, ICAR, Industry Association and universities (public & private). As per CSIR-Tech website (<http://www.csirtech.com>) CSIR-Tech also helps out in forging partnership between Industries and academia by

- Creating greater commercial visibility for CSIR labs, their services, technologies and scientists.
- Working in synergy with business development divisions at labs to develop their efforts.
- Setting up a 'system integrator' approach for catalyzing 'lab to market' journey.
- Stimulating translation of ideas & inventions into products and services.
- Providing insights cum industry feedback and market trends to help direct R&D efforts.
- Executing, Marketing and negotiating deals in technology transfers & IP licensing to enhance revenue generation for lab.

CSIR-Tech aims to encourage entrepreneurship in the academic institutes. CSIR-Tech has taken a few initiatives, such as:

- Identifying spin-off / joint venture creation opportunities around technologies of commercial value.
- Acting as a commercialization partner to Labs to increase reach to private enterprise by several folds/year.
- Attracting entrepreneurs and industry professional to translate lab IP into technology spin-offs.
- Creating capital gains for labs via enabling them to enter into equity arrangements in these spinoffs/start-ups'/joint ventures/enterprises.
- Supporting scientists and labs in realizing business benefits.

## **CSIR-Technologies**

CSIR-Tech offers a case of innovative technologies and know-how from recognized R&D labs and academic institutes. The technology offerings cover areas of biological, chemical, physical, environment, information sciences and earth, and their corresponding engineering discipline counterparts (Table 8). Technologies transferred and technologies providers are given in table 9.

**Table 8: Industries associated with CSIR-Tech**

S. No.	Area of work	Number of Technologies
1.	Chemicals	174
2.	Drug discovery, Therapeutics	143
3.	Clean Tech	92
4.	Food and Nutrition	70
5.	Healthcare	66
6.	Agriculture	65
7.	Construction and Industrial safety	40
8.	Leather industry	39
9.	Mining and Metallurgy	32
10.	Mechanical Systems	32
11.	Electronics and Instrumentation	30
12.	Aviation and Defence	29
13.	Oil and Gas	26
14.	Automotive and Transportation	22
15.	Rural and Social technologies	20
16.	Software	8
17.	Pharmaceuticals and Drugs	4
18.	Others	13
	Total	904

Source: [www.csirtech.com](http://www.csirtech.com)

**Table 9: Technologies Providers and Technologies Transferred**

Technologies		Technologies	
Providers	Transferred	Providers	Transferred
CSIR-NCL	68	CSIR-CMERI	13
CSIR-NIIST	42	Manipal University	10
CSIR-CLRI	39	CSIR-CEERI	10
CSIR-CSIO	36	CSIR-NIO	9
CSIR-NML	32	CSIR-CIMAP	9
CSIR-IIP	32	CSIR-NBRI	9
CSIR-IICT	29	CSIR-IMTECH	8
CSIR-CSMCRI	28	CSIR-AMPRI	7

CSIR-IHBT	27	CSIR-NGRI	7
C-Camp	25	CSIR-IIIM	6
CSIR-CFTRI	24	CSIR-CDRI	6
CSIR-NAL	24	CSIR-NEIST	6
CSIR-IMMT	20	IIT Kanpur	5
CSIR-CECRI	20	CSIR-CRRI	5
CSIR-CBRI	18	Science for society	3
CSIR-IICB	16	BTRA	2
CSIR-SERC	16	R.I.T.	2
CSIR-CGCRI	16	CSIR-NEERI	1
CSIR-IITR	15	Amrita Therapeutics	1
CSIR-NPL	14	Others	4

Source: [www.csirtech.com](http://www.csirtech.com)

### Outcomes of CSIR-Tech

- Completed over 50 tech transfer deals.
- Developed database of technologies providers and technologies available in 3 major areas of a) Life science and healthcare; b) Advanced materials; c) Advanced engineering.
- Signed >45 partner laboratories.
- Access to technologies from over 8000 scientists (1/3<sup>rd</sup> of scientists from all government funded labs).

### Spinoff Success Stories

1. **A biotech spinoff focused on microbial technology for treatment of ischemic strokes.** In this venture CSIR-Tech's role, ranged from helping structure the capitalization of the venture, exploring different models of accessing technology from the R&D labs, identifying/evaluating suitable entrepreneurial teams to applaud the scientific team and designing an appropriate path to enterprise value creation.
2. **A material science spinoff focused on polymer membranes for a range of industrial applications and clean-tech.** CSIR-Tech helped this spinoff raise ₹50 lakh in seed investment, including review of the business plan, investor pitch, financial model and investment term sheet.
3. **A Bench to Bassinet (B2B) genomics start up which seeks to commercialize Indian and global technologies/products for diagnostics.** CSIR-Tech's main role is

to strategize the fund-raising plan and help raise pre - Series A investment (*Series A round is the name typically given to a company's first significant round of venture capital financing*) to help the company achieve rapid revenue growth and profitability.

- 4. A water treatment SME with ₹1cr plus revenue, seeking to grow 10 times by leveraging R&D and risk capital.** One of CSIR-Tech's contributions is to scout for significant lab technologies in the water and waste water treatment industry that can be effectively commercialized via this enterprise. Given the capital expenditure (capex) intensive nature of this business, it is helping the company raise Series A investment to scale marketing and manufacturing in and outside India.

## Success Stories

Some examples of success stories of CSIR-Tech are given below in table 10.

**Table 10: Success Stories of CSIR-Tech**

S. No.	Work area	Examples
1.	<b>Technology Transfer Group</b>	<p>Largest tech-transfer deal in the lab's history by value from DST-South India based publicly funded laboratory to Gujarat based company. Technology provides a know-how for preparation of an ultra-efficient, advanced material with broad industrial applications.</p> <p>CSIR-Tech successfully facilitated a technology transfer deal between a constituent laboratory of the CSIR and a Bangalore based private company for the process of preparation of herbal formulation, having patent in India. The technology was licensed to the licensee for the period of three years on exclusive basis restricted to one southern state of India.</p> <p>CSIR-Tech has contributed to the licensing of technology from DAE-BARC to a young SME operating in environmental technology business. The entrepreneur has initiated efforts to deploy this Clean technology into the vast network of government and public undertakings.</p> <p>A SME approached CSIR-Tech with its requirement for biogas plant technology and the technology has been licensed successfully from one of the CSIR labs.</p>
2.	<b>Technology Scouting</b>	<p>CSIR-Tech helped a global MNC to understand the technologies and capabilities available across various partner labs in specific technology domains.</p> <p>An unnoticed need in the cashew import/export market was to check for cashew rancidity. On the requirement of a MSME's, CSIR-Tech escorted for the necessary</p>

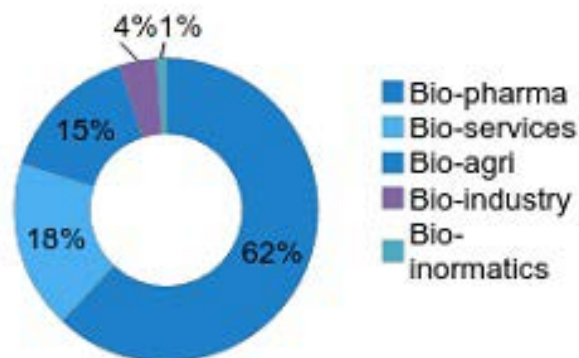
		expertise from across its network of labs which resulted into a joint development program to address the objective mentioned above.
3.	<b>Generating Entrepreneurs</b>	<p>CSIR-Tech helped an individual Gujarat based entrepreneur to understand and access the technologies available with various partner labs and shortlist the one that best fits with the entrepreneur's business goals. The innovation which relates to a food adulteration detection unit has provided the entrepreneur an opportunity to diversify his business, while the lab has been able to expand the reach and market visibility of the innovation.</p> <p>CSIR-Tech, helped a Jamshedpur based company and a Delhi based entrepreneur to jointly launch a gold and silver cleaner liquid. That new product has considerable cost advantage over existing 'jewellery cleaning' solutions since it doesn't affect jewellery design and weight unlike traditional acidic cleaners which dissolve some precious metal during cleaning.</p>
4.	<b>Advisory Services</b>	CSIR-Tech provided advisory services for a private, autonomous educational institution to market the inventions which were developed by the faculty and students. This can bring early stage research into the market.
5.	<b>Technology Validation</b>	CSIR-Tech enabled licensing of a corrosion inhibitor molecule technology for copper and silver based alloys to a Kolkata based company.
6.	<b>In-house Analysis</b>	CSIR-Tech has provided services for evaluation of technology and facilitates sample products for further in-house analysis of the technology, prior to licensing of patents to a foreign client. The client is a salt manufacturing start-up, based out of US, funded by Khosla Ventures.

Source: [www.csirtech.com](http://www.csirtech.com)

#### **D. Biotechnology Industry Research Assistance Council (BIRAC); [www.birac.nic.in](http://www.birac.nic.in)**

India's biotech sector is one of the fastest growing sectors, growing at ~16% with net size of US \$ 7 billion in the financial year 2014-15 (India Brand Equity Foundation, 2016). This fast pace growth in field of biotech in India is likely to continue as it is expected that biotech industry size will grow to ~US \$ 11 billion by 2017. Indian biotech industry market share is composed of various sectors such as Bio-pharma, Bio-services, Bio-agri, Bio-industry, Bio-informatics and others out of which Bio-pharma are the leading one (Fig. 4).





**Figure 4: Biotech Market Break-Up Based on Revenues (2014-15)**

*Source: Indian Brand Equity Foundation Report on Biotechnology, 2015  
([http://www.ibef.org/download/Biotechnology-August\\_15.pdf](http://www.ibef.org/download/Biotechnology-August_15.pdf))*

India ranks 12<sup>th</sup> in biotech destinations all over the world. Biotech sector in India is moving ahead with a strong growth trajectory and play significant role in innovation and is accountable for enhancing India’s global economy profile (India Brand Equity Foundation, 2016). Indian biotech industry holds 2% share of world’s biotech industry and it comprises of close to 800 companies with an average growth rate of 20%. Since past two decades, high demand of various biotech products has led to increase in Research and Development (R&D) activities and investment from various national and international organization/ companies to set up base in India. Increase in innovation in biotech sector was kick-started by Department of Biotechnology (DBT) under Ministry of Science and Technology in year 1986 through creation of number of biotech institutes such as National Centre for Cell Science (NCCS), National Agriculture Biotechnology Institute (NABI), National Institute for Plant Genome Research (NIPGR), Centre for DNA Fingerprinting and Diagnostics (CDFD), National Brain Research Centre (NBRC), mainly introducing various schemes for promoting biotech research in Indian Education system. Transformation of biotech research to the market bench mark required strong Industry-Academia (I-A) collaborations through which various biotech entities have been commercialized in past few years. Gradually DBT recognized the need of well built industrial partnerships for taking research through translational phase to market the product. For stimulating I-A interface in biotech sector and mounting capabilities of Indian Biotech Industry, DBT formulated National Biotechnology Development Strategy in 2007 and announced that 30% of its budget will be set aside for Public Private Partnership (PPP) via creation of separate organization in order to execute and implement PPP. Keeping this in mind, Government of India (GoI) through DBT has led to the creation of autonomous not-for-profit public organization **“Biotechnology Industry Research Assistance Council**

(BIRAC)” in year 2012. BIRAC is registered as section 8 Company, scheduled B, public sector enterprise registered Indian Companies Act 1935. It is an exclusive I-A interface agency that is working for strategic R&D activities catering to national societal needs of emerging biotech enterprise to make them globally competitive. BIRAC is working with the following mandate:

- To foster innovation and entrepreneurship
- To promote creation of affordable innovation in key social sectors of India
- To empower start-ups and small and medium enterprises
- To contribute to capability enhancement and diffusion of innovation in collaboration with different stakeholder/ partners
- To enable commercialization of discovery/ innovation and technology developed
- To ensure global competitiveness of Indian biotech enterprises

BIRAC is working to fulfil three main objectives which are:

1. Supporting early and late stage innovation research
2. Enabling services for promoting the innovation ecosystem
3. Product innovation and commercialization for addressing grand challenges of national relevance

BIRAC has taken responsibility for targeted funding for easy access to risk capital, technology transfer and management of Intellectual Property (IP). BIRAC within 4 years of its existence has strongly connected with different stakeholders, both from academia and industry, who are contributing to tremendous growth of biotech sector.

BIRAC is a unique organisation working under PPP mode. Creation of BIRAC has greatly enhanced the technology development and generation of useful products in biotech sector. It is development agency in the field of biotechnology which addresses the national needs in terms of food security and health problems through competitive grants and product development programme in collaboration with the academic and industrial sector at national and international front.

### **Organization of BIRAC**

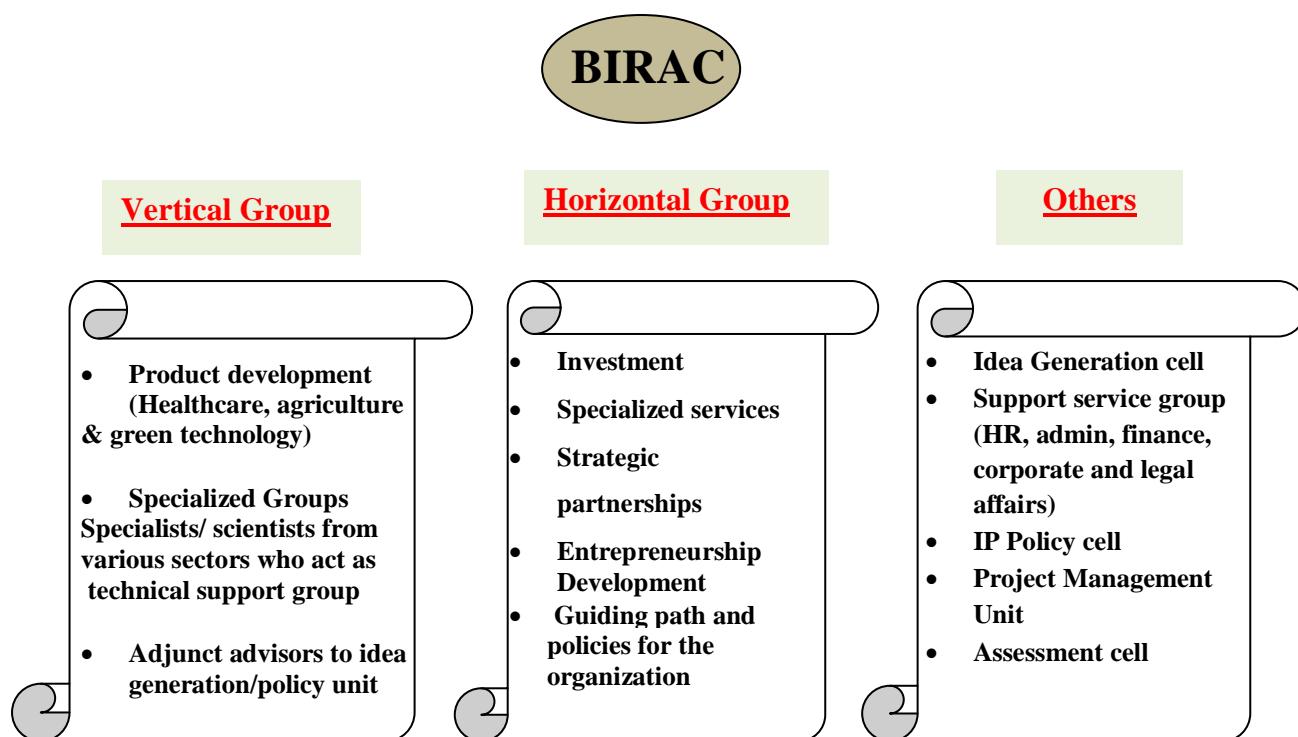
BIRAC is governed by Board of Directors comprising of stakeholders from both DBT and Industry. Secretary of DBT, is the Chairman of BIRAC. The governing body along with

chairman and managing director comprise of four non-executive independent directors, one government nominated non-executive director and one company secretary.

BIRAC's organizational structure is composed of diverse verticals with dedicated core functions that lead to its effective functioning (Fig. 5). These functioning groups are interlinked to each other to deliver the mandate of BIRAC. BIRAC has created horizontal and vertical groups to fulfil the core function of providing support for technology development and its diffusion across the country. Vertical group focuses on providing mentor and financial support at different stages of technological product development. It engages specialist/scientists from different sectors to act as technical support for creation of technology. This group works in three areas, specialized with different domains which are as, a) Health Care (drugs and therapeutics, vaccine, diagnostics, biomedical devices, clinical trials and regulation); b) Agriculture (molecular biology, marker assisted breeding, RNAi) and; c) Green technology and industrial process (enzymes, fermentation, process optimization and chemical engineering).

On the other hand, horizontal group comprising of distinctive clusters as mentioned below, that assists the core functioning of vertical group:

- Investment cluster that takes care of funding through various schemes
- Specialized services cluster comprising of IP awareness, technology transfer facilitation and technology acquisition
- Strategic partnerships cluster that has responsibility of knowledge networking, resource mobilization and establishing national and international collaborations.
- Entrepreneurship cluster for providing infrastructural support in form of incubators and simultaneously mentorship via training and workshops to budding entrepreneurs.



**Figure 5: Organization Structure of BIRAC**

*Source: <http://www.birac.nic.in/>*

BIRAC also has dedicated in house Policy and Analysis Cell (PAC). This dedicated cell analyses different proposals in field of agriculture, healthcare, industrial biotechnology mainly from techno-commercial view. This cell has responsibility of identifying priority areas in biotech sector that requires BIRAC support to address societal needs. Key areas where PAC works are as:

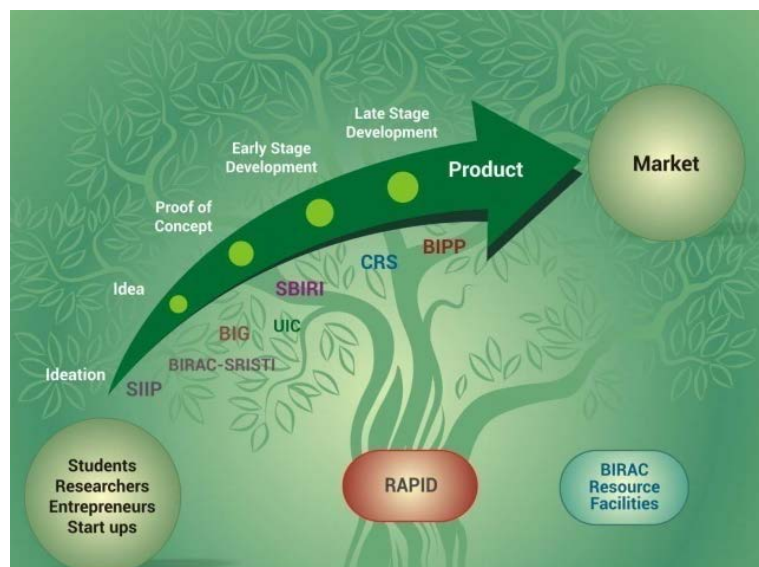
- Strategy and policy discussion with different stakeholders
- Identification of niche areas in biotechnology sector
- In-house technical and project management support for various proposals
- Creation of technology transfer unit of BIRAC
- Market analysis
- Creation of global databases in various sectors of biotechnology
- Commissioning of the reports in accordance to the needs of identified niche areas in biotech sector.

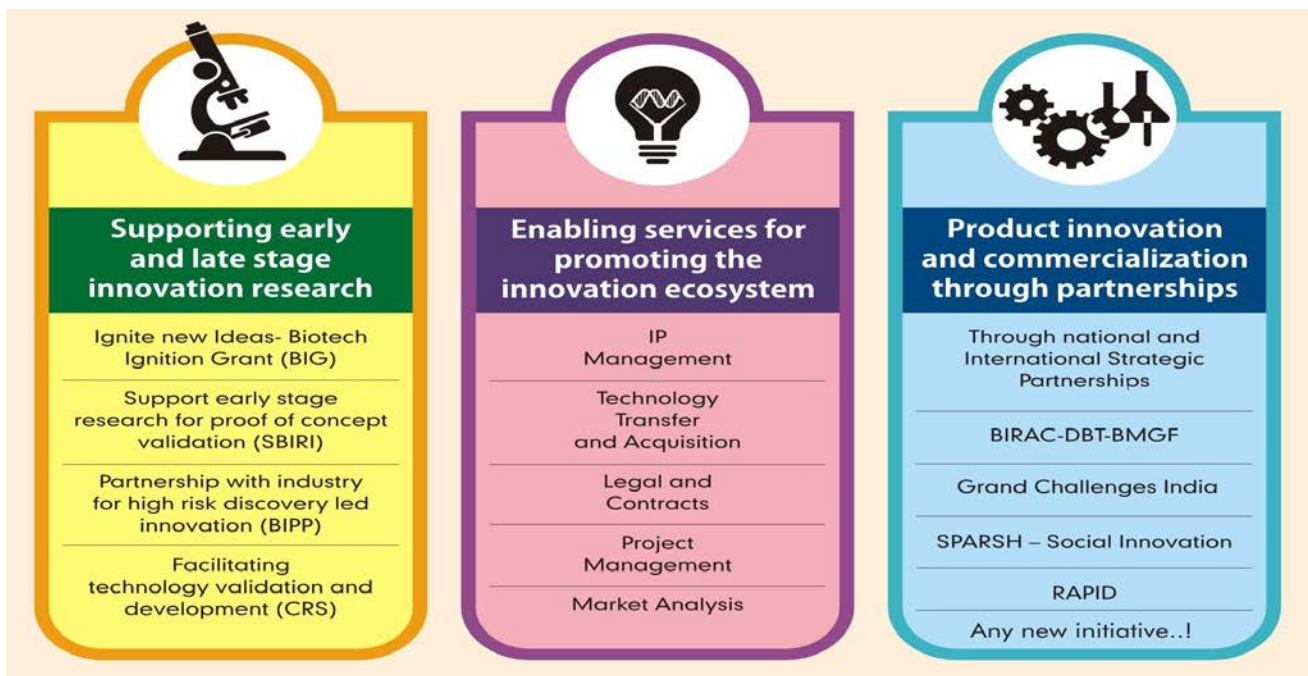
In addition, BIRAC has established Secondary Agriculture Innovation Cell (SAIC) to facilitate growth of agro based small and medium industries using modern technologies to

create a mark in international market. Main responsibility of this cell is to build successful agriculture enterprise.

### Programmes and schemes initiated by BIRAC

BIRAC is a nodal organization for developing I-A interface and it is implementing its mandate through various impact initiatives and has undertaken various schemes, built networks and created a single platform to bring academia and biotech enterprise in close association. BIRAC is involved in providing access to risk capital via targeted funding, IP management and technology transfer to make Indian biotech sector globally competitive. BIRAC is providing funding support through its different schemes to overcome intrinsic risk involved in innovation pathways right from the ideation to product development, scale up and market commercialization. Main focus of BIRAC is to a) support early and late stage innovation research; b) promotion of innovative ecosystem and; c) promoting product innovation and commercialization through partnerships. To achieve these goals BIRAC has introduced number of programmes/ schemes as presented in figure 6.





**Figure 6: BIRAC’s Support for Commercialization of Biotech Research**

*Source: <http://www.birac.nic.in/>*

*For meaning of abbreviations please see symbols and abbreviations (Page 68-72)*

Through different programmes of BIRAC, three major domains are addressed which are:

- Promotion of PPP in biotech sector
- Bridging I-A collaboration of biotech companies and academic institutes pursuing biotechnology
- Supporting entrepreneurship culture in India.

Programmes/ schemes started by BIRAC to address first two domains are described in table 11. Maximum amount of funding from industry has been obtained through SBIRI and BIPP (Fig. 7).



**Figure 7: Impact of SBIRI and BIPP on Funding and Monitoring Support to Public and Private Sectors.**

*Source: <http://www.birac.nic.in/>*

**Table 11: BIRAC's Programmes/ Schemes for Promoting PPP and I-A Collaborations**

S. No	Programme/ Scheme	Brief details
1.	<p data-bbox="292 300 596 409"><b>Small Business Innovation Research Initiative (SBIRI)</b></p> <p data-bbox="292 1115 517 1144"><b>Outcome/ Impact</b></p>	<ul style="list-style-type: none"> <li>• Scheme started to boost PPP efforts in the country</li> <li>• It has facilitated innovation, risk taking by small and medium companies and bringing together the private industry, public institutions and the government under one roof to promote the research and innovation in the Indian Biotech Sector</li> <li>• It has consistently supported early stage funding for high risk innovative research in small and medium companies led by innovators with science backgrounds to generate products of societal relevance.</li> <li>• The proposals can be submitted solely by a Company incorporated under the Companies Act, 2013 or Limited Liability Partnership (LLP) incorporated under the Limited Liability Partnership Act, 2008 or Joint Ventures either in the form of Company/ LLP by any of the above entities jointly with other private or public partner(s) (Universities or Institutes)</li> <li>• The main industry applicant should have DSIR* recognized in-house R&amp;D unit or patent granted or acquired, that will be used for the proposed project, alternatively the applicant should be incubated at an Incubation Centre/ Biotech Park which has a valid DSIR Certificate.</li> </ul> <ul style="list-style-type: none"> <li>• SBIRI is supporting 204 projects</li> <li>• Investment contribution from private company: ₹16.77 Cr.</li> <li>• Investment contribution from BIRAC: ₹16.30 Cr.</li> <li>• SBIRI till now has support 148 companies in diverse fields of biotechnology</li> <li>• Four technologies/ products developed under this scheme in year 2014-15 are               <ol style="list-style-type: none"> <li>1. A rapid test for qualitative detection of malaria antigen (infection) in humans.</li> <li>2. Technology to extract lycopene, a phytonutrient, from high yielding varieties of tomato</li> <li>3. Easier purification of <i>Escherichia coli</i> K12 strain secreting variety of recombinant proteins of industrial and therapeutic importance</li> <li>4. Production of dextranase (30000 du/ gm) using solid state fermentation</li> </ol> </li> </ul>
2.	<p data-bbox="292 1767 596 1877"><b>Biotechnology Industry Partnership Programme (BIPP)</b></p>	<ul style="list-style-type: none"> <li>• BIPP is working for setting up government partnership with industries for support on a cost sharing for innovative research that can lead to production of affordable products in accordance to societal need.</li> <li>• BIPP supports high risk led technology development for futuristic technologies.</li> <li>• Through BIPP services such as product evaluation and validation</li> </ul>

	<p><b>Outcome/ Impact</b></p>	<p>through field trial for agriculture products and clinical trials (Phase I, II, III) for health care products are provided.</p> <ul style="list-style-type: none"> <li>• The proposals can be submitted solely by an Indian Company* (Small, Medium or Large having DSIR recognized in-house R&amp;D unit) or jointly by an Indian Company and National R&amp;D Organizations and Institutions; or group of Indian Companies along with National Research Organizations.</li> <li>• In totality under this scheme 157 projects have been sponsored</li> <li>• During 2014-15, BIPP supported 64 projects out of which 20 were collaborative</li> <li>• 110 companies have received support for their high risk innovative R&amp;D projects</li> <li>• So far 134 agreements have been signed with 108 companies involving approximately 60 start-ups and Small and Medium Sized Enterprises (SMEs)</li> <li>• Investment contribution from private companies: ₹12.70 Cr</li> <li>• Investment contribution from BIRAC: ₹12.36 Cr</li> <li>• Three national patents have been filed by the companies supported under the BIPP scheme</li> <li>• Technology/ product generated through this scheme: <ol style="list-style-type: none"> <li>1. Process for albumin and intravenous immunoglobulin (IVIG) production at a scale of 2500 L with a purity of 95%. Two products launched: AlbuCel and Globuce (developed by Celestial Biologicals Limited, Ahmedabad)</li> <li>2. Novel portable Electroencephalography (EEG) system</li> <li>3. Affordable mannequin for effective Cardiopulmonary Resuscitation (CPR)</li> <li>4. Development and production of Balloon catheter</li> <li>5. Software for next generation sequencing data analysis</li> <li>6. Microfluidic based flow analyser technology for Cluster of Differentiation 4 (CD4) cell counting at point-of-care locations</li> </ol> <p>Technologies under pipeline:</p> <ol style="list-style-type: none"> <li>1. Clinical trials of polysialylated erythropoietin</li> <li>2. Clinical studies of Asia-specific 15-valent Pneumococcal vaccine</li> </ol> </li> </ul>
<p>3.</p>	<p><b>Contract Research Scheme (CRS)</b></p>	<ul style="list-style-type: none"> <li>• It aims to facilitate I-A collaborations</li> <li>• Through this scheme validation of academic research having potential of commercialization by contract research and manufacturing (CRAMS) industry is promoted.</li> <li>• Funding is in the form of grant given to both the academic as well as industrial partners. While funding is provided to the academia for in-house research which forms a part of validation of the proof of concept, funds are provided to the industrial partner for validation.</li> <li>• Although the IP rights reside with the academia, the industry</li> </ul>



	<p><b>Outcome/ Impact</b></p>	<p>partner has first right of refusal for commercial exploitation of the new IP.</p> <ul style="list-style-type: none"> <li>• BIRAC facilitates FTO search, IP management, and preparation of Material Transfer Agreement (MTA) Memorandum of Understanding, (MoU), non-disclosure and IP protection contracts and licensing agreements as well as technology transfer for the academia.</li> <li>• Academia has to be the primary applicant with one or more partners of whom at least one is a company having DSIR recognized in-house R&amp;D unit. The proposers if so required can opt for additional partners from another industry and/or academia</li> <li>• Till date 181 proposals (198 academia and 193 industries were involved) have been received and out of them 131 proposal are accepted under CRS scheme and 20 projects are presently executed.</li> <li>• Presently, 15 academia and 13 industrial partners have received grant of ₹13.48 Cr</li> <li>• Technologies/ products in pipeline: <ol style="list-style-type: none"> <li>1. Recombinant vaccine for <i>Plasmodium vivax</i></li> <li>2. Production of laccase through a Bioreactor system</li> <li>3. Development of a linkage map in castor using Genome wide SNP's</li> </ol> </li> </ul>
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*\*The Companies in the process of obtaining DSIR recognition may also apply along with the proof of application for DSIR. However, the final decision on such applications would be subject to their getting DSIR recognition.*

**Source:** <http://www.birac.nic.in/>; BIRAC Annual Report 2014-15

BIRAC has also established dedicated facility/ cells for promoting I-A linkages. These are as follows:

- **Early Translational Accelerator (ETA):** BIRAC is supporting different ETAs focussing on catalyzing young academic discoveries (publications/patents) with possible societal and commercial impact to transform into economically viable and technology oriented endeavor. Through ETAs linkages between academic investigators, industry and international public and private translation ecosystems has been successfully executed. Although commercialization of some of the early stage technologies is quite difficult task, which adds to the translational component of establish proof-of-concept/validation which is a crucial step for attracting industry to take up these technologies which are validated further in terms of development. One ETA has been set up in C-CAMP, Bangalore and has evaluated 9 proposals till date.

- **Integrated Facility for Protein Therapeutics and Peptides:** This facility has been established in INTAS Pharmaceuticals Ltd., Uttarakhand and comprises of almost all the latest instruments and facilities for pursuing high end structural and functional characterization of proteins and peptides in.

Keeping in mind the importance of entrepreneurship as national asset that needs to be cultivated and motivated to bring out innovative goods and services along with generation of employment, BIRAC has evolved programmes that support development of entrepreneurship in biotech sector which are as follows:

1. Biotechnology Ignition Grant Scheme (BIG)
2. BIRAC-Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI)
3. BIRAC AcE Fund
4. Social Innovation programme for Products: Affordable & Relevant to Societal Health (SPARSH)

BIRAC has also come forward to support entrepreneurship to young researchers and start-ups right from the idea generation to product development. It has initiated various schemes and programmes through which support in forms of grants, incubating space and mentoring to budding entrepreneurs working on idea of societal relevance is provided (Table 12).

BIRAC has also started an initiative under name “Grand Challenges” to find solutions for key global health problems of India (<http://gcgh.grandchallenges.org/>). Through this initiative, Bill and Melinda Gates Foundation funds public institutes, entrepreneurs and industries to solve problems reported in grand challenges of the world.

**Table 12: BIRAC’s Programmes/ Schemes for Promoting Entrepreneurship**

S. No	Programme/ Scheme	Brief details
1.	<b>Biotechnology Ignition Grant (BIG)</b>	<ul style="list-style-type: none"> <li>• BIG specifically provides early stage grants to bridge the gap between invention and technology development.</li> <li>• Entrepreneurs from different research institutes, academia and start ups/ registered company with functional R&amp;D Lab or must be incubatee to be eligible for this grant.</li> <li>• Currently, there are five BIG partner institutions in the country who are involved in providing mentoring, networking, business development and monitoring to BIG innovative awardees, which are:-               <ol style="list-style-type: none"> <li>1. IKP Knowledge Park, Hyderabad</li> </ol> </li> </ul>

	<p><b>Outcome/ Impact</b></p>	<ol style="list-style-type: none"> <li>2. Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore</li> <li>3. Foundation for Innovation and Technology Transfer, New Delhi</li> <li>4. KIIT Technology Business Incubator, Bhubaneswar</li> <li>5. Venture Center (Entrepreneurship Development Center), Pune</li> </ol> <ul style="list-style-type: none"> <li>• Through BIG scheme, BIRAC has provided funding support of ₹41 Cr to almost 100 entrepreneur ideas</li> <li>• Presently, BIG is nurturing &gt;150 entrepreneurial ideas (~28 women entrepreneurs) and has created 50 start-ups through its funding support</li> <li>• BIG is also supporting 104 Start-ups to bring out innovations in the product/ process range</li> <li>• BIG has led to generation of 553 employment opportunities and 65 IP</li> <li>• Important technologies/ products developed under this schemes are as: <ol style="list-style-type: none"> <li>1. Development of an aptamer based platform to detect TB</li> <li>2. Modular resilin mimetic elastomeric platform for wound healing and other uses</li> <li>3. Ezymatic maceration of mango pulp to produce wine</li> <li>4. Industrial application of a novel cancer drug screening method</li> <li>5. Development of a fucose knockout technology platform in CHO S cell line for improved biotherapeutics`</li> <li>6. Novel inhibitors of DNA gyrase for treatment of multidrug resistant infections</li> <li>7. Pharmacological evaluation of N-oxide metabolite of antipsychotic drug for Type2 diabetes</li> <li>8. Novel oncotherapeutic measles virus using eSame system</li> <li>9. Fetal ECG and Uterine Activity signa extraction from maternal ECG eliminating the need for use of conventional transducers.</li> </ol> </li> <li>• Number of Innovators/ entrepreneurs supported under BIG at different BIG Partner institutes are: <ul style="list-style-type: none"> <li>➤ C-CAMP: 47</li> <li>➤ IKP Knowledge Park: 40</li> <li>➤ FITT: 34</li> <li>➤ Venture Centre: 20</li> <li>➤ KIIT-TBI:13</li> </ul> </li> </ul> <p><b><i>Total number of support under BIG: 154</i></b></p>
2.	<p><b>BIRAC-Society for Research and Initiatives for Sustainable Technologies and</b></p>	<ul style="list-style-type: none"> <li>• BIRAC in collaboration with SRISTI located at IIM Ahmedabad encourages entrepreneurship by awarding grass root level innovations (<i>under Gandhi Young India Innovation Awards</i>) of students at the university/college level from across</li> </ul>

	<b>Institutions (SRISTI)</b>	<p>India with nurturing and grant of ₹15 lakh support in-situ. Also, ₹1 lakh to 100 young innovators was provided to take their innovations to next level.</p> <ul style="list-style-type: none"> <li>• Awardees of BIRAC - GYTI Awards <ol style="list-style-type: none"> <li>1. Flexicast: A Breathable, Washable and Customized Cast for Immobilization of Fractured Limb Innovator</li> <li>2. Rightbiotic: The Fastest Antibiotic Finder Innovator</li> <li>3. Redefined Spoon For Parkinson’s Patient Innovator</li> <li>4. Development of A Powerful New Antibiotic that kills all Drug-resistant Bacteria Innovator</li> <li>5. Real Time Wound Management System Wound Segmentation and Analysis using Image Processing on Mobile Platform (Android) Innovator</li> </ol> </li> </ul> <p><b>Some of the impactful initiatives of SRISTI are as:</b></p> <ul style="list-style-type: none"> <li>• <b>Honey Bee Network (<a href="http://www.sristi.org/hbnew/index.php">http://www.sristi.org/hbnew/index.php</a>):</b> It is a crucible of like-minded individuals, innovators, farmers, scholars, academicians, policy makers, entrepreneurs and non-governmental organizations (NGOs). This network is spanning whole country for innovative ideas and play crucial role in protection and value addition of local traditional knowledge, grassroots’ innovations and assist in protection of their IP. Till date, this network has registered 1,000,000 innovative ideas which can be taken up by public / private sector for commercialization to generate products/processes as per societal needs.</li> <li>• <b>Techpedia (<a href="http://techpedia.sristi.org/">http://techpedia.sristi.org/</a>):</b> SRISTI initiated a platform “Techpedia” with an aim of putting the problems of micro, small and medium enterprises, informal sector, grassroots innovators and other social sectors on the agenda of the young technology students across the country. Techpedia comprise of project archive consisting of academia projects, industry defined projects, grassroot innovations for augmentation, assistive technologies and children innovations for augmentation.</li> <li>• <b>Social Innovation Fund (<a href="http://sif.sristi.org/">http://sif.sristi.org/</a>):</b> Social Innovation Fund (SIF) would be to provide mentoring, financial support, fabrication, validation, and value addition facilities in labs, fields, and R and D Institutions, part of honey bee network, for nurturing creativity in culture, education, technology and governance.</li> </ul>
6.	<b>BIRAC AcE Fund</b>	<ul style="list-style-type: none"> <li>• This programme acts as co-founding model in which incubators, angel firms, business accelerators and early stage venture capitalists joined hands to provide funding (equity</li> </ul>

		<p>based) upto ₹1 Cr to entrepreneurs.</p> <ul style="list-style-type: none"> <li>This fund also provides an equity based support to entrepreneurs who have faced failure. Mentorship and guidance is also provided them to relocate their start-up business.</li> </ul>
7.	<p><b>Social Innovation programme for Products: Affordable &amp; Relevant to Societal Health (SPARSH)</b></p> <p><b>Outcome/ Impact</b></p>	<ul style="list-style-type: none"> <li>Through this programme BIRAC supports the development of innovative solutions for persisting social problems.</li> <li>SPARSH provides support to innovators in form of impact funding of biotech product innovations that can solve society problems and produce affordable biotech products [e.g. calls for solving challenges in Human Papillomavirus (HPV)]</li> <li>It also caters to creation of common platform where pool of social innovators in biotech can share their best practices and understand intricacies of business models in social innovations.</li> <li>SPARSH has initiated fellowship component [Social Innovation Immersion Programme (SIIP)] to promote entrepreneurial ideas and generating a pool of social innovators with a job to identify the specific needs and gaps in healthcare arena.</li> <li>SIIP is managed by four incubator centres [Venture Centre, Pune; Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar; <i>Translational Health Science and Technology Institute (THSTI)</i>, Faridabad and Villgro Possible, Chennai]</li> <li>SPARSH has led to initiation of 20 projects in the focus areas of maternal and child health, and 16 SIIP fellowships are granted.</li> <li>SPARSH has supported 7 individuals and 10 companies in last two years.</li> <li>Seed fund (₹113 lakhs to 695 lakhs for early translations) of SPARSH is created</li> <li>Technologies/ products under pipeline: <ol style="list-style-type: none"> <li>1. Microfluidics based On-chip RealTime PCR device for neonatal and maternal health.</li> <li>2. A novel technique for monitoring foetal growth through volume imaging of the fundus and estimating the gestational age, amniotic fluid index and intra-uterine growth abnormalities of the foetus.</li> <li>3. Non-invasive electrical device for transcutaneous iron replenishment.</li> <li>4. Electricity-free Baby Incubator.</li> </ol> </li> </ul>

Source: <http://www.birac.nic.in/>, BIRAC Annual Report 2014-15

Along with the programmes for promoting entrepreneurship, BIRAC has taken initiative to set up several incubator facilities and innovation centres of world class level in different institutes of higher education, located in different parts of India.

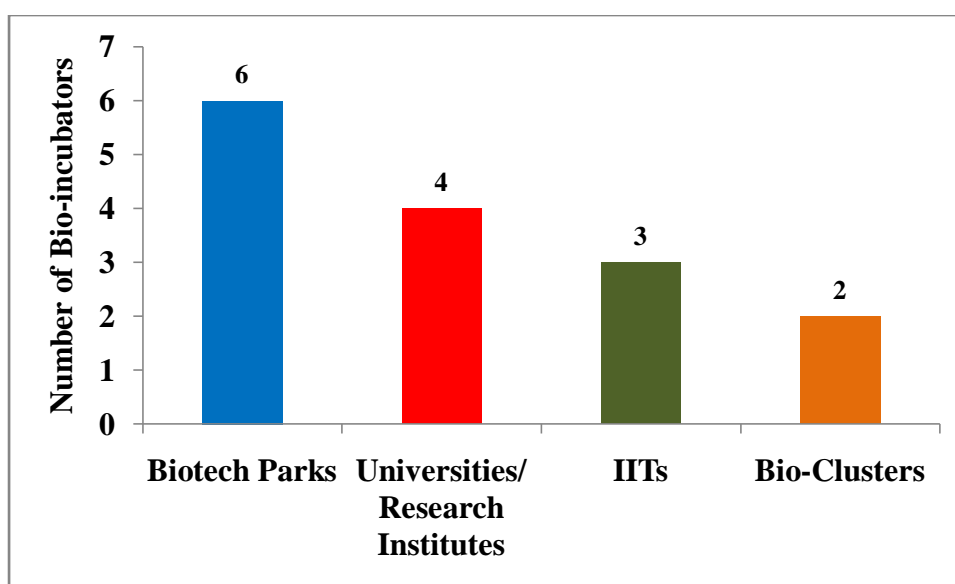
**1. BIRAC University Innovation Cluster (UIC):** In order to encourage techno-entrepreneurship in Indian education system, BIRAC has created University Innovation Cluster (UIC). UIC focuses on creating industry focused R&D by supporting postdoctoral and postmasters Innovation Fellowships in the area of biotechnology. So far, five UICs have been established at **Anna University, Chennai; Panjab University, Chandigarh; Tamil Nadu Agricultural University, Coimbatore; University of Rajasthan, Jaipur, and University of Agricultural Sciences, Dharwad.** These clusters provide pre-incubation support for translation product development to the innovators. Each UIC is composed of 5-6 students/young entrepreneurs to develop their ideas/discoveries. Through these centres, industries participation for training, mentoring and sponsored research and networking opportunities is also encouraged.

**2. BIRAC Regional Innovation Centre (BRIC) at IKP Knowledge Park:** BIRAC in collaboration with IKP Knowledge Park has set up the BIRAC Regional Innovation Centre (BRIC) at IKP to promote entrepreneurship in southern part of India. It has also facilitated network opportunities for budding start-ups with other academicians and industries.

BRIC is working for mapping regional innovations of Andhra Pradesh, Karnataka, Tamil Nadu and Kerala. It has assigned a task of developing database of technologies for in and out licensing, IP and Technology evaluation and is also fostering the entrepreneurship in different research institutes.

**3. Bio-Incubators:** BIRAC's Bio-Incubator support, harnesses entrepreneurial potential of start ups by giving access to them for proper infrastructure and mentoring and required networking for developing their ventures. BIRAC has provided support to the existing biotech parks, IITs, research institutes/universities and biotech clusters (Fig. 8). Till date, BIRAC has strengthened the existing fifteen incubation facilities in the country to develop world class bio-incubation facilities which are as ICICI Knowledge Park (IKP), Hyderabad; Society for Biotechnology Incubation Centre (SBTIC), Hyderabad; The Gujarat Biotechnology Council (GSBTM), Savli; **Kerala** State Industrial Development Corporation (KSIDC), Trivandrum; Women Bio Park, Chennai; Healthcare Technology Innovation Centre (HTIC), Chennai; Foundation for Innovative and Technology Transfer (FITT), IIT Delhi; Bio-Incubator, IIT Madras;

The SIDBI Innovation and Incubation Centre (SIIC), IIT Kanpur; Zonal Technology Management and Business Planning and Development (ZTM-BPD), Indian Agricultural Research Institute (IARI), Delhi; Kalinga Institute of Industrial Technology-Technology Business Incubator (KIIT-TBI), Bhubaneswar; National Chemical Laboratory (NCL), Pune; B. V. Patel Pharmaceutical Education and Research Development (PERD), Ahmedabad; Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore; Regional Centre for Biotechnology (RCB) Bio Cluster, Faridabad. Additionally, BIRAC has also indentified CCAM, Bangalore and NABI, Mohali for developing Bio-Incubator facility via bio-incubator support scheme.



**Figure 8: Distribution of Bio-Incubators Created by BIRAC**

*Source: <http://www.birac.nic.in/>*

**Outcome/ Impact of Bio-incubator support:**

- Through bio-incubator support ~1,24,000 sq. ft. of functional bio-incubation space is created and number of resident incubatees under them are given in table 13.
- These bio-incubation facilities have supported ~199 start-ups/entrepreneurs.
- They have provided access to cutting edge instrumentation, space for start-ups, mentorship for start-ups and aid in connecting them to different stakeholders- business and scientific advisors, angel firms and venture capitalists to bring out successful innovations.

**Table 13: Number of Resident Incubatees under Bio-incubators**

Bio-Incubator	Resident Incubatees
C-CAMP, Bangalore	6
Venture Centre, NCL, Pune	20
ZTM & BPD Unit, IARI, New Delhi	5
IKP Knowledge park, Hyderabad	22
KIIT, Bhubaneswar	5
Alexandrial Knowledge Park, SBTIC, Hyderabad	10
BBIF, IIT Delhi	7
SIIC, IIT Kanpur	6
IIT Madras Research park	10

Source: <http://www.birac.nic.in/>

### Strategic Alliances and Partnerships of BIRAC

BIRAC has undergone alliance and partnerships with various national and international authorities to boost innovations in biotech sector. These partnerships have led to the promotion of Indian innovation ecosystem at global level. BIRAC has partnered with various global organizations to bring advancements in Indian biotech (Table 14).

**Table 14: Strategic Alliances and Partnership of BIRAC**

S. No	Alliance/ partner	Description
<b>International Alliance</b>		
1.	<b>DBT-BIRAC-GATES foundation</b>	Directed research to support health research and innovation following under grand challenges of India ~200 farmers have applied improved technologies or management practise as result of programme assistance, 440 farmers are beneficiary and ~200 individuals have received food security training
2.	<b>Welcome trust</b>	Grants provided by global charity organization of UK to support innovations in traditional medicines.
3.	<b>CEFIPRA-BPI France</b>	Support high quality bilateral research and encourage Indo-French collaboration BIRAC and Bpifrance financement a public investment bank, France jointly launch joint call for joint Expression of Interest (JEOI) for Indian & French SME / startup in the area of red biotechnology upto commercialization.



4.	<b>BIRAC-USAID+IKP</b>	Grant for US to IKP to carry out innovations in Tuberculosis control in India
5.	<b>BIRAC-DBT-ICAR-USAID</b>	To support production of improved wheat for heat tolerance and climate resilience  RAPID programme for rapid development of nationally important technologies and products.
6.	<b>BIRAC-Queensland University of Technology (QUT) Australia</b>	Bio-fortification and disease resistance in Banana under grand challenges of India
7.	<b>BIRAC and Centre of Entrepreneurial Learning (CfEL) of Judge Business School, University of Cambridge</b>	Enables five BIRAC supported applicants to take part in CfEL's flagship intensive entrepreneurial boot-camp programme called "IGNITE", which is aimed at providing academics (PhDs, post-docs and scientists) entrepreneurial opportunities to explore their innovative ideas and transform them into a business project. CfEL provides one week intense mentorship and training to the BIRAC supported candidates and for second week encourage them to interact and learn from the Cambridge's entrepreneurial cluster.
<b>National Alliance</b>		
8.	<b>Department of electronics and informational technology (DeitY)-BIRAC Industry Innovation Programme</b>	<b>In year 2015, BIRAC</b> in association with Department of Electronics and Information Technology ( <b>DeitY</b> ) initiated Industry Innovation Programme on medical Electronics (IIPME) in order to generate significant investments in the medical devices sector to develop indigenous medical devices in healthcare sector. Through this scheme, BIRAC has supported more than 100 industries to develop medical devices in collaboration with DeitY and is also nurturing many ideas of young individual researchers, SME and large companies.
9.	<b>Secondary agriculture Bio-cluster (SAB)</b>	Alliance with CIAB, Mohali; PSCT, Punjab and NIFTEM, Sonapat to developed agricultural strategies for farmers.

Source: <http://www.birac.nic.in/>

BIRAC has proposed a mission programme on anti-microbial resistance (AMR) with an aim to tackle the menace of antimicrobial resistance by focussing on discovery, development and diffusion of new drugs, diagnostics, and infection-treatment options under PPP consortia for promoting innovation research.

### **BIRAC: A Successful Model**

In a short span of 5 years, BIRAC has nurtured the emerging biotech sector to take biotech industry to global excellence. BIRAC has successfully addressed the challenges of biotech industry in particular requirement of intense capital, high end infrastructure, regulatory scrutiny and long gestation phase for products to be market ready. Through various schemes and partnerships as mentioned in above sections, BIRAC has focussed on de-risking process of novel product formation. In totality, through BIRAC ~315 companies and ~89 institutes are benefitted ([http://www.birac.nic.in/List\\_of\\_Beneficiaries.php](http://www.birac.nic.in/List_of_Beneficiaries.php)). Table 15 presents the list of products generated with help of BIRAC funding having societal relevance:

**Table 15: List of Products Generated Under BIRAC Funding**

<b>S. No.</b>	<b>Product</b>	<b>Details</b>	<b>Collaborators/ Companies/ Start-ups</b>
1.	<b>Fluorescence reader to detect Multiple infection</b>	<ul style="list-style-type: none"> <li>• Detects multiple infection simultaneously</li> <li>• Ensures less medical waste in blood banks</li> <li>• Detection of HIV, HCV, HBV, Syphilis and tuberculosis infection</li> </ul>	<sup>1</sup> ICGEB, <sup>2</sup> DBT and University of Turku ( <a href="http://www.utu.fi/">http://www.utu.fi/</a> ), Turku, Finland.
2.	<b>AINA Device</b>	<ul style="list-style-type: none"> <li>• Measures blood glucose, HbA1C, lipids, creatinine and haemoglobin</li> <li>• Commercialized by Janacare Solutions</li> <li>• Company has already got pre orders for 25000 units from India</li> </ul>	Janacare Solutions ( <a href="http://www.janacare.com">www.janacare.com</a> ), <sup>3</sup> AIIMS and Narayana Hrudayalaya ( <a href="http://www.narayanahealth.org/">http://www.narayanahealth.org/</a> )
3.	<b>Optra-SCAN</b>	<ul style="list-style-type: none"> <li>• It is a digital oncopathology slide scanner</li> <li>• Offers complete digital pathology solutions with ease of operations, scalability, security and integration with software image viewed and management at affordable costs</li> </ul>	Optra Systems ( <a href="http://optrahealth.com/">http://optrahealth.com/</a> )
4.	<b>PDT Laser Systems</b>	Indigenous and low cost Photo Dynamic Laser system for cancer treatment	Vinivish Technologies ( <a href="http://vinivish.com/">http://vinivish.com/</a> )
5.	<b>Maxico</b>	Device used for execution procedure for tumour ablation	Perfint Healthcare ( <a href="http://www.perfinthehealthcare.com">http://www.perfinthehealthcare.com</a> )

6.	<b>POC Diagnostic Kit</b>	Diagnosis of multiple diseases such as malaria, dengue and typhoid	Bigtec Labs ( <a href="http://www.bigteclabs.com/">http://www.bigteclabs.com/</a> )
7.	<b>Immunodiagnostic Kit</b>	Kit for detection of autoimmune diseases	Amar Immunodiagnostics ( <a href="http://www.amarimmunodiagnosics.com/">http://www.amarimmunodiagnosics.com/</a> )
8.	<b>Malaria Detection Kit</b>	Qualitative detection of Malarial parasite antigens in human whole blood	Genomix Molecular Diagnostics ( <a href="http://www.genomixbiotech.com/">http://www.genomixbiotech.com/</a> )
9.	<b>Fibroheal</b>	Use of silk protein based cosmaceutical product for burn wound management Already in use in AIIMS	Healthline ( <a href="http://www.healthline.com/">http://www.healthline.com/</a> )
10.	<b>Autochem Ingenious</b>	Low cost clinical chemistry analyser and helps early diagnosis	Span Diagnostics ( <a href="http://www.span.co.in/">http://www.span.co.in/</a> )
11.	<b>PCR Kit for Aquaculture Industry</b>	Robust and economical indigenous single tube nested PCR Kit	Aristogene Biosciences ( <a href="http://www.aristogene.com/">http://www.aristogene.com/</a> )
12.	<b>Pandyflu</b>	H1N1 pandemic influenza vaccine using egg based technology	Panacea Biotech ( <a href="http://www.panaceabiotech.com/">http://www.panaceabiotech.com/</a> )
13.	<b>Rotavac</b>	Oral Rotavirus vaccine It is India's first indigenously developed vaccine and is included in publically funded universal immunization programme	Bharat Biotech ( <a href="http://www.bharatbiotech.com/">http://www.bharatbiotech.com/</a> )
14.	<b>Foligraf</b>	First recombinant FSH product important for development of follicles produced by ovaries	Bharat Serum and Vaccines ( <a href="https://www.bharatserums.com/">https://www.bharatserums.com/</a> )
15.	<b>OncoPrint</b>	Safe and affordable therapy to cancer patients in India.	Mitra Biotech and Anthem Biosciences ( <a href="http://www.mitribiotech.com/">http://www.mitribiotech.com/</a> , <a href="http://www.anthembio.com/">http://www.anthembio.com/</a> )
16.	<b>Maleriscan</b>	A rapid test for the qualitative detection of Malarial parasite antigens	Bhat Biotech India ( <a href="http://bhatbiotech.com/">http://bhatbiotech.com/</a> )
17.	<b>Rasburicase (Tuly)</b>	It is recombinant uricase, used to control hyperuricemia in cancer patients undergoing chemotherapy	Virchow Biotech ( <a href="http://www.virchowbiotech.com/">http://www.virchowbiotech.com/</a> )

<sup>1</sup>International Centre for Genetic Engineering and Biotechnology, <sup>2</sup>Department of Biotechnology, <sup>3</sup>All India Institute of Medical Science.

Source: <http://www.birac.nic.in/>

### **E. Indian Council of Agricultural Research (ICAR); [www.icar.org.in](http://www.icar.org.in)**

ICAR is an autonomous organisation which was established in 1929, under the aegis of Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, GoI. ICAR is composed of 101 institutes and 71 agricultural universities spread all over India, and is one of the world's largest national agricultural systems.

### ➤ **ICAR-Industry Interface in Agriculture**

In Indian scenario both the public and the private sectors have largely grown in isolation. Under the National Agricultural Technology Project (NATP) of GoI, ICAR made specific provision for funding of public-private collaborative research programmes under '*Competitive Grant Scheme*'. It has also organized various I-A meets/events/brainstorming sessions and workshops for attracting industry and private sector in R&D activities in agriculture. Some of them addressing I-A interface in Indian agricultural sector are as:

1. Inducting Indigenous Technologies for Country's Growth (2016)
2. Training Programme on Financial Analysis of Business Plans and IP Valuation (2016)
3. International Design Structure Matrix Conference (2015)

### ➤ **MoU between ICAR and ABLE for Knowledge Partnership (year 2013)**

The objective of this MoU is to promote ICAR's mandates, along with its capabilities and achievements as an important stakeholder for addressing global issues in the agriculture areas. It has resulted in exploring collaborations and partnerships with the public and the private sectors in their endeavours and forging stronger linkages between academia and industry.

## **F. Indian Council of Medical Research (ICMR); [www.icmr.nic.in](http://www.icmr.nic.in)**

ICMR was set up in 1949 and holds the responsibility of formulating and coordinating promotion of biomedical research. ICMR has 26 national institutes with an aim to promote research in areas of medicine, public health and related areas in the country.

ICMR has introduced scheme by which it has stimulated *Centres for Advanced Research* as

- **Health Systems Research Cell** (<http://icmr.nic.in/guide/nhrp.pdf>): Aimed at strengthening the Indian health systems to address the health needs of the citizen by encouraging research in health sector under public-private partnerships, public sector and NGO support.
- **Intellectual Property Rights (IPR) Unit**: Unit provides technical and legal support on IPR-related areas for ICMR sponsored intramural and extramural research. This unit holds the responsibility of displaying the list of patents and technologies ready for commercialization in form of seminars/symposiums/industrial meets/workshops. The

technologies generated in support of ICMR are also transferred/commercialized through dedicated agencies, such as National Research Development Corporation (NRDC), GoI, New Delhi and Biotechnology Consortium India Ltd. (BCIL), New Delhi.

ICMR has organized various events to address the need of strong I-A interaction in the field of medical research. Few of the meets are listed below:

1. **18<sup>th</sup> International Conference on Manufacturing Research (2016):** Key discussion with UK researchers and industrialists and Indian academicians and industrial partners were held with prime objective of enhancing I-A collaborations between both the countries.
2. **BIRAC-CDSO-ICMR Regulatory Meet (2013):** Workshop aimed at providing valuable information on regulatory and governing aspects for drug approvals in India to academic, scientists and industrial participants.

#### **G. Defence Research and Development Organization (DRDO); [www.drdo.gov.in](http://www.drdo.gov.in)**

DRDO, established in 1958 by Ministry of Defence, GoI and Department of Defence Research is dedicatedly working towards attaining self-reliance in Indian defence systems. From almost no industry base way back in the 1950s, it has now close collaboration with 1000 industries. Industry and academia linked programmes of DRDO are presented in table 16.

**Table 16: Industry and Academia Linked Programmes of DRDO**

<b>S. No.</b>	<b>Programme/Scheme</b>	<b>Brief Details</b>
1.	<b>The DRDO-FICCI ATAC Programme</b> <a href="http://drdoficciatac.com/">http://drdoficciatac.com/</a>	This programme is working to create commercial pathway for delivering technologies developed by DRDO to industries. This is one of its kind programmes instituted by DRDO in association with FICCI to promote technologies developed at DRDO at national and international level.
2.	<b>Extramural Research (ER) Scheme</b> <a href="http://drdo.gov.in/drdo/English/index.jsp?pg=grantinaid.jsp">http://drdo.gov.in/drdo/English/index.jsp?pg=grantinaid.jsp</a>	The ER scheme supports the instrumentality of Memoranda of Collaboration between DRDO laboratories, industry and academia.
3.	<b>Grant-in Aid scheme</b> <a href="http://drdo.gov.in/drdo/English/index.jsp?pg=grantinaid.jsp">http://drdo.gov.in/drdo/English/index.jsp?pg=grantinaid.jsp</a>	Aeronautics R&D board has started grant-in aid scheme to nurture the scientific talent and to develop facilities in higher education institutes and other research centers including industry.

*Source:* [www.drdo.gov.in](http://www.drdo.gov.in)

## H. Department of Industrial Policy and Promotion (DIPP); [www.dipp.gov.in](http://www.dipp.gov.in)

This department was established in the year 1995 and reconstituted in 2000 on merging Department of Industrial Development comprising of Heavy Industries and Public Enterprises (HI&PE) and Small Scale Industries and Agro and Rural Industries (SSI&A&RI). DIPP holds the responsibility of formulating and implementing industrial policy and in past few years, it is also facilitating investment and technology flows from public to private sector, along with monitoring industrial development.

Key work areas of the department are as under:

- Formulation and implementation of comprehensive IPR policy on patents, geographical indicators (GIs), designs and trademarks of goods.
- IPR awareness by means of workshops/conference in collaboration with organizations like World Intellectual Property Organization (WIPO).
- Implementation of developmental measures for the industrial sector growth especially focusing socio-economic issues and national priorities.
- Facilitation of foreign technology collaborations with Indian companies and assisting in proceedings of bilateral economic cooperation agreements.
- Supervision and stimulation of industrial growth and encouraging industrial activity in rural and underdeveloped regions of the country.

In order to facilitate industrial growth DIPP has initiated various programmes and schemes for promoting I-A linkages. Industry related programmes and initiatives of DIPP are listed in table 17.

**Table 17: Industry Related Programmes and Initiatives of DIPP**

S. No.	Programme/Scheme/Initiative	Brief Details
1.	<b>Industrial Corridor Projects</b> <a href="http://dipp.gov.in/English/Schemes/DMIC/About_DMIC.aspx">http://dipp.gov.in/English/Schemes/DMIC/About_DMIC.aspx</a>	<ul style="list-style-type: none"><li>• Central sector schemes involving industrial corridor projects such as Delhi-Mumbai corridor projects spanning six states have been initiated.</li><li>• Aims to generate strong economic base to enhance investments and accomplish sustainable development in both public and private sector.</li></ul>
2.	<b>Rajiv Gandhi National Institute of Intellectual Property Management (RGNIPM)</b> <a href="http://dipp.gov.in/English/Publications/Annual_Reports/AnnualReport_Eng_2015-16.pdf">http://dipp.gov.in/English/Publications/Annual_Reports/AnnualReport_Eng_2015-16.pdf</a>	It is a central government institute under the Ministry of Commerce and Industry, established in 2010 to create an institute at par with international levels to provide training for the IP professionals and officials.

3.	<b>Project Based Support to Autonomous Institutions</b> <a href="http://dipp.gov.in/English/Publications/Annual_Reports/AnnualReport_Eng_2015-16.pdf">http://dipp.gov.in/English/Publications/Annual_Reports/AnnualReport_Eng_2015-16.pdf</a>	<p>This scheme provides grant-in aid support to autonomous institutions in order to strengthen them and provide technical support for enhancing industry competitiveness.</p> <p>Autonomous institutions like Central Pulp and Paper Research Institute (CPPRI), Central Manufacturing Technology Institute (CMTI), National Council for Cement and Building Materials (NCCBM), National Productivity Council (NPC), National Institute of Design (NID) and Quality Council of India (QCI) are supported under this scheme.</p>
4.	<b>Invest India</b> <a href="http://www.investindia.gov.in/">http://www.investindia.gov.in/</a>	<p>It is a joint venture company (not for profit company) of DIPP, FICCI and various state governments with shareholding of 45%, 51% and 4% respectively. It holds the responsibility of facilitating investments in R&amp;D in India.</p> <p>It has also created an investor facilitation cell to assist and guide investors for their project functioning.</p>
5.	<b>Atal Innovation Mission (AIM) with Self-Employment and Talent Utilization (SETU) Programme</b> <a href="http://dipp.gov.in/English/Publications/Annual_Reports/AnnualReport_Eng_2015-16.pdf">http://dipp.gov.in/English/Publications/Annual_Reports/AnnualReport_Eng_2015-16.pdf</a>	<p>It aims to organize start-up fests to showcase innovations. It provides collaborative platforms and facilitates harnessing private sector expertise for incubator setup in association with NITI Ayog. In the year 2016, DIPP announced setting up of incubation centres and research parks by partnering with private sector for harnessing private sector expertise.</p>
6.	<b>Modified Industrial Infrastructure Upgradation Scheme (MIUS)</b> <a href="http://dipp.gov.in/English/Publications/Annual_Reports/AnnualReport_Eng_2015-16.pdf">http://dipp.gov.in/English/Publications/Annual_Reports/AnnualReport_Eng_2015-16.pdf</a>	<p>MIUS was launched in 2003 with an aim to promote growth of domestic industries by giving access to infrastructure developed under PPP mode.</p> <p>Under MIUS, some of the successful projects are as follows: Bamboo Technology Park, Guwahati; (ii) Kolhapur Foundry Cluster, Maharashtra; (iii) Marathwada Automobile Cluster, Aurangabad; (iv) Narol Textiles Infrastructure and Environment Management, Narol, Gujarat and (v) Readymade Garments Cluster, Jabalpur.</p>

Source: [www.dipp.gov.in](http://www.dipp.gov.in)

The department has also undertaken various technical cooperation programmes with WIPO for the up gradation and modernization of IPR administration and development of human resource. In addition, DIPP has issued a draft of *National IPRs Policy* on 12<sup>th</sup> May, 2016. The main mission of this policy is to foster creativity, innovation and entrepreneurship to enhance socio-economic upliftment and cultural development.

#### **I. Department of Atomic Energy (DAE); [www.dae.nic.in](http://www.dae.nic.in)**

DAE, established in 1954 under the direct charge of the prime minister, consists of five public sector undertakings, five research centres, three industrial units and service organizations. DAE is actively engaged in promoting R&D in radiation technologies in the

fields of basic and industrial research relating to agriculture, medicine and nuclear power technology. Table 18 lists the initiatives of DAE to bring R&D programmes in industry.

**Table 18: DAE’s Initiatives to Promote Industrial Research**

<b>S. No.</b>	<b>Initiative</b>	<b>Brief Details</b>
1.	<b>Nuclear Fuel Complex (NFC)</b> <a href="http://www.nfc.gov.in/">http://www.nfc.gov.in/</a>	It is the major industrial unit of DAE. This complex provides the material, nuclear fuel reactors and bundles required for carrying out research in nuclear technology by the industries involved.
2.	<b>Heavy Water Board (HWB)</b> <a href="http://www.hwb.gov.in/">http://www.hwb.gov.in/</a>	<ul style="list-style-type: none"> <li>• It is a constituent unit of mineral sector and industries which holds the responsibility of producing and supplying heavy water for research purposes to the private industries.</li> <li>• HWB also has been working with various educational and research institutions in further development heavy water based applications.</li> <li>• HWB has also been offering value added services and spin off technologies to other chemical process industries.</li> </ul>
3.	<b>Board of Radiation and Isotope Technology (BRIT)</b> <a href="http://www.britatom.gov.in/">http://www.britatom.gov.in/</a>	<ul style="list-style-type: none"> <li>• Aims to bring benefits of the radioisotope applications and associated technology to industrial sector, health sector and agricultural sector. BRIT is working in close collaboration with industries to provide various desired products and services. Several well known industries such as Apollo Agro Gujarat, Aligned Industries, Avantee Mega Food Park and Electromagnetic industries are closely associated with DAE.</li> </ul>
4.	<b>BARC Entrepreneur’s Corner- Technology Transfer and Consultancy &amp; Scientific Services</b> <a href="http://www.barc.gov.in/">http://www.barc.gov.in/</a>	<ul style="list-style-type: none"> <li>• Dedicated Entrepreneur’s Corner Cell has been established in BARC and is responsible for interaction with industries, academic and research institutes for technology transfers and consultancy services.</li> <li>• It has also instituted ‘<i>DAE Technologies Display and Dissemination Facility (DTDDF)</i>’ to display technologies developed by DAE which can be readily taken up by industries.</li> </ul>
5.	<b>Patents and Technology Transfer Cell at Indira Gandhi Centre for Atomic Research (IGCAR)</b> <a href="http://www.igcar.gov.in/pttc/">http://www.igcar.gov.in/pttc/</a>	<ul style="list-style-type: none"> <li>• This cell was established in IGCAR, Kalpakkam with an aim of displaying DAE’s technologies to the industries which can be readily take up the technologies and commercialize them.</li> <li>• The cell takes care of technology transfer mechanism, licensing and liaising with the industry and inventor for technology transfer process.</li> </ul>

Source: [www.dae.nic.in](http://www.dae.nic.in)

## **J. Ministry of Electronics and Information Technology (MeitY); [www.deity.gov.in](http://www.deity.gov.in)**

Recently in July 2016, Department of Electronics and Information Technology (DeitY) which was previously known as Department of Information Technology set up in 2000, is converted into full fledged ‘Ministry of Electronics and Information Technology (MeitY)’. MeitY is



promoting e-governance for empowering Indian citizens leading to sustainable growth of industries in field of electronics and information technology. MeitY has greatly enhanced internet governance in India due to measures taken up by it for developing human resources, promoting innovation and ensuring a secure cyber space through digital services. MeitY's programmes for enhancing I-A collaborations are listed in table 19.

**Table 19: Programmes of MeitY Promoting Industry-Academia Collaborations**

S. No.	Programme/ Scheme	Brief Details
1.	<b>Visvesvaraya Ph.D. Scheme for Electronics and IT</b> <a href="http://deity.gov.in/content/schemes-projects">http://deity.gov.in/content/schemes-projects</a>	<ul style="list-style-type: none"> <li>Through this programme, industrial organizations get an opportunity to collaborate with academic institutes of their choice for R&amp;D and to produce skilled Ph.D. candidates in the areas of their interest.</li> <li>An industrial organization and MeitY jointly funds Ph.D. candidates at academic institute, working in the research area identified by the industrial organization. The funding provided by industry and MeitY is in the ratio of 3:7</li> </ul>
2.	<b>Funding and Support to Industry and Academic Institutions through GITA</b> <a href="http://deity.gov.in/content/gita">http://deity.gov.in/content/gita</a>	<ul style="list-style-type: none"> <li>This programme supports a R&amp;D project that compose of academic, industrial and R&amp;D organization as a research partners within India or abroad for initiating joint co-development for generation of innovative products, processes or services.</li> <li>It is the combined initiative of DST, MeitY and GITA in association with foreign agencies such as Global Affairs Canada, Canada; Centre for the Development of Industrial Technology (CDTI), Spain.</li> </ul>
3.	<b>Scheme of Financial Assistance for Setting Up of Electronics and ICT Academies</b> <a href="http://deity.gov.in/content/scheme-financial-assistance-setting-electronics-and-ict-academies">http://deity.gov.in/content/scheme-financial-assistance-setting-electronics-and-ict-academies</a>	<ul style="list-style-type: none"> <li>Under this scheme financial assistance (₹148.47 crore) will be provided by MeitY for establishing 7 Electronics and ICT academies in IITs (IIT Guwahati, IIT Kanpur, IIT Roorkee), NITs (NIT Patna, NIT Warangal, MNIT Jaipur), IIIT (IIITDM Jabalpur) for enhancing technology development, up gradation of faculty and increase in employability.</li> <li>Two ICT academies have also been set up at Tamil Nadu (ICT Academy of Tamil Nadu located in Chennai) and Kerala (ICT Academy of Kerala located in Trivandrum) respectively, as not-for-profit autonomous organizations focusing to make faculty and students industry ready.</li> </ul>
4.	<b>Scheme for Financial Assistance to</b>	<ul style="list-style-type: none"> <li>Main objective of this scheme is to enhance skill</li> </ul>

	<p><b>Select States/UTs for Skill Development in Electronics System Design and Manufacturing (ESDM) sector</b></p> <p><a href="http://deity.gov.in/content/schemes-projects">http://deity.gov.in/content/schemes-projects</a></p>	<p>capacity in domain of ESDM through public and private partnerships. It will also facilitate resource sharing between the academia and industry partners.</p> <ul style="list-style-type: none"> <li>• There are many other schemes to promote skill development in association with industries. These schemes are as: <ul style="list-style-type: none"> <li>➤ Scheme for '<i>Digital Saksharta Abhiyan</i>' under 'Digital India'</li> <li>➤ Capacity building in the areas of electronic product design and production technology</li> <li>➤ Sector skill councils- Electronics, Telecom, Information Technology and its enabled services.</li> </ul> </li> </ul>
5.	<p><b>Incubators for Electronics</b></p> <p><a href="http://deity.gov.in/esdm/incubators">http://deity.gov.in/esdm/incubators</a></p>	<p>MeitY has approved setting up of an <i>Electropreneur Park</i> for development of ESDM industry. Some of the instituted incubators for technology generation and commercialization are:</p> <ul style="list-style-type: none"> <li>• <i>Software Technology Parks of India (STPI)</i>, New Delhi in association with India Electronics &amp; Semiconductor Association (IESA) and Delhi University (DU).</li> <li>• <i>Incubation centre set up at IIT</i>, Patna for development of Product and IP creation with focus on medical electronics</li> </ul>
6.	<p><b>National Portal of India</b></p> <p><a href="http://www.india.gov.in">www.india.gov.in</a></p>	<ul style="list-style-type: none"> <li>• It is the government official portal designed by the National Informatics Centre (NIC).</li> <li>• This portal acts as a single window access point for seeking information related to services offered by the government for all the stakeholders under various domains, such as agriculture, rural and urban development.</li> </ul>

Source: [www.deity.gov.in](http://www.deity.gov.in)

**K. Ministry of Environment, Forests and Climate Change (MoEFCC);**  
**[www.envfor.nic.in](http://www.envfor.nic.in)**

MoEFCC, established in 1985, is supporting environmental research in academia, research institutes and private organizations including industries via funding grant-in-aid research projects for environment protection and management. Table 20 lists the MoEFCC initiatives and programmes for strengthening I-A collaborations.

**Table 20: Programmes and Initiatives taken under MoEFCC Promoting Industry-Academia Collaborations**

S. No.	Programme/ Initiative	Brief Details
1.	<b>Creation of Indian Plywood Industries Research and Training Institute (IPIRTI), Bengaluru</b> <a href="http://ipirti.gov.in/">http://ipirti.gov.in/</a>	<ul style="list-style-type: none"> <li>IPIRTI was set up in 1962 as a co-operative research laboratory of Indian plywood industry, CSIR and MoEFCC.</li> <li>It is working with a mandate of strengthening Plywood and wood panel industry in India by working under collaborated work by private and public sector under PPP mode.</li> </ul>
2.	<b>National Natural Resources Management System (NNRMS) Programme</b> <a href="http://envfor.nic.in/division/call-proposals-under-nnrms-programme">http://envfor.nic.in/division/call-proposals-under-nnrms-programme</a>	This programme aims to support research projects utilizing optimal utilization of techniques of remote sensing for addressing environmental and ecological issues. All academic institutes, national research laboratories and DSIR certified industries can send their proposals. Under this programme, proposals with public and private partnerships are also promoted.

Source: [www.envfor.nic.in](http://www.envfor.nic.in)

#### **L. Indian Space Research Organization (ISRO); [www.isro.gov.in](http://www.isro.gov.in)**

ISRO, a unit of Department of Space, was established in 1969, and pursues a systematic policy for generation and transfer of technologies developed by the Indian Space Centres, to draw maximum benefit of 'spin-offs' that are generated from such technologies. The objectives of ISRO lie in facilitating greater contribution of Indian industry in number of space projects. ISRO has strong IPR portfolio of 270 patents, 45 copyrights and 10 trademarks. ISRO is working with an approach to facilitate commercial exploitation at maximum of its resources through proper channel of technology transfers and licensing.

The '*Technology Transfer Mechanism*' started at ISRO in early eighties and has enabled licensing of number of technologies from different ISRO centres. More than 300 technologies have been productively licensed/transferred to industries in the fields of satellite communications, broadcasting, meteorology, speciality polymer chemicals and materials, electronics and computer based systems, mechanical equipments and electro optical instruments. It has also generated ~28 space spin-offs. ISRO has developed several initiatives to aid technology transfer from ISRO to corporate houses and Indian space industry (Table 21).

**Table 21: ISRO’s Initiative to Aid Technology Transfer from ISRO to Indian Space Industry**

<b>S. No.</b>	<b>Initiative</b>	<b>Brief Details</b>
1.	<b>Antrix Corporation Limited</b> <a href="http://www.antrix.gov.in/">http://www.antrix.gov.in/</a>	<ul style="list-style-type: none"> <li>It is a commercial and marketing arm of ISRO established in 1992. It is a complete government undertaking company and aims to promote ISRO’s technologies for commercial utilization of space products. It also provides consultancy services to industries for enhancing their industrial capabilities in space technology.</li> </ul>
2.	<b>Sponsored Research (RESPOND)</b> <a href="http://www.isro.gov.in/sponsored-research-respond">http://www.isro.gov.in/sponsored-research-respond</a>	<ul style="list-style-type: none"> <li>This programme aims to provide financial support for conducting R&amp;D activities (space science, space technology and space application) to academia and industries.</li> </ul>
3.	<b>ISRO Technology Transfer Group</b> <a href="http://www.isro.gov.in/isro-technology-transfer/contact-us">http://www.isro.gov.in/isro-technology-transfer/contact-us</a>	<ul style="list-style-type: none"> <li>ISRO has established dedicated Technology Transfer Groups all over India for nurturing the industrial sector leading to advancements in space program and encouraging wider participation of industries through technology transfer and industry cooperation for commercialization.</li> </ul>
4.	<b>Space Application Centre (SAC) Industry Portal and Industry Interface</b> <a href="http://www.sac.gov.in">www.sac.gov.in</a>	<ul style="list-style-type: none"> <li>SAC is one of the major centres of the ISRO dealing with a wide variety R&amp;D activities and capacity building in space technology.</li> <li>SAC has created SAC Industry Portal for displaying its technologies developed which can be readily taken up by industries by providing business opportunities in area of outsourcing, design and development of systems, technology transfer and consultancy.</li> </ul>

*Source: www.isro.gov.in*

## **2.2 Educational Sector**

### **A. Ministry of Human Resource Development (MHRD); [www.mhrd.gov.in](http://www.mhrd.gov.in)**

MHRD was established in 1985 with an aim to promote education so as it reaches to masses. The Department of Higher Education under MHRD is working in direction to create world class institutes of higher learning with well-equipped and experienced professors for generating ample opportunities for research and skill development resulting in world’s biggest skilled workforce. Ministry has integrated various new schemes which are taken up regularly. MHRD’s programmes for promoting I-A linkages are listed in table 22.

**Table 22: Programmes of MHRD Promoting Industry-Academia Linkages**

S. No.	Programme/ Scheme	Brief Details
1.	<p><b>Council for Industry Higher Education Cooperation (CIHEC)</b>  <a href="http://mhrd.gov.in/collaboration">http://mhrd.gov.in/collaboration</a></p>	<p>The CIHEC compose of an advisory group that consist of MHRD with members from industry, academia and other stakeholder ministries.</p> <p>CIHEC aims to facilitate development of “<i>innovative instruments of collaboration between Industry and Academia</i>” as an endeavour to utilize resources to strengthen I-A linkages and to promote more of research to be taken up by students.</p> <p>Initiatives undertaken by CIHEC are as following:</p> <ul style="list-style-type: none"> <li>• Setting up of new institutions for science education and research.</li> <li>• Creation of centres of excellence and facilities in emerging and frontline areas in academic institutes.</li> <li>• Establishment of new and attractive fellowships.</li> <li>• Strengthening of the infrastructure of R&amp;D in universities.</li> <li>• Encouraging public-private partnerships.</li> <li>• Recognition of R&amp;D units and national awards for outstanding R&amp;D for industries.</li> </ul>
2.	<p><b>Research Parks</b>  <a href="http://www.itbhuglobal.org/chronicle/Report%20of%20the%20Expert%20Committee%20on%20Research%20Parks.pdf">http://www.itbhuglobal.org/chronicle/Report%20of%20the%20Expert%20Committee%20on%20Research%20Parks.pdf</a></p>	<p>This scheme aims to boost innovation ecosystem in higher education institutes in collaboration with industry and academia leading to development of cutting edge technology.</p>
3.	<p><b>Technical Education Quality Improvement Programme (TEQIP)</b>  <a href="http://mhrd.gov.in/technical-education-12">http://mhrd.gov.in/technical-education-12</a></p>	<p>This scheme aims to generate well trained post-graduate students in order to reduce the shortage of qualified faculty that can pursue industry oriented R&amp;D projects. This programme is working in association with AICTE.</p> <p>A total of 190 institutions i.e. (26 centrally funded, 127 state government funded and 37 private unaided institutions) have been selected for participation in the Project</p>
4.	<p><b>IMPRINT India</b>  <a href="http://imprint-india.org/">http://imprint-india.org/</a></p>	<p>It is a Pan-Indian Institute of Technology (IIT) and Indian Institute of Sciences (IISc) joint initiative to develop a roadmap for R&amp;D addressing major engineering and technology challenges in specific technology domains relevant to India’s societal relevance.</p>
5.	<p><b>Global Initiative for Academic Network (GIAN)</b>  <a href="http://www.sici.org/programmes/details/global-initiative-for-academic-">http://www.sici.org/programmes/details/global-initiative-for-academic-</a></p>	<p>It is the network for attracting the talent pool of budding entrepreneurs and scientific fraternity to encourage utilization of academic resources to enhance India's technological capabilities to match</p>

	network-gian-programme/	global excellence.
6.	<b>Kaushal Kendras</b> <a href="http://mhrd.gov.in/sites/upload_files/mhrd/files/lu3667.pdf">http://mhrd.gov.in/sites/upload_files/mhrd/files/lu3667.pdf</a>	This scheme led to the creation of 100 Deen Dayal Upadhyay Centres for Knowledge Acquisition and Up-gradation of Skilled Human Abilities and Livelihood (KAUSHAL). These Kendras aims to design and formulate courses at undergraduate and postgraduate level in accordance to industrial needs.
7.	<b>Rashtriya Ucchar Aavishkar Abhiyaan (RUSA)</b> <a href="http://mhrd.gov.in/">http://mhrd.gov.in/</a>	The scheme was initially started in IITs for promoting innovation as per industrial needs and thereby improving and stimulating competitive edge to Indian manufacturing sector. RUSA is now implemented in various universities and colleges.

Source: [www.mhrd.gov.in](http://www.mhrd.gov.in)

### B. University Grants Commission (UGC); [www.ugc.ac.in](http://www.ugc.ac.in)

UGC was created by Indian Union Government in 1956 under UGC Act 1956 with an aim to determine, coordinate and maintain standards of higher education in India. UGC is functioning under MHRD, New Delhi. UGC is the nodal agency to endorse teaching and research in emerging areas of science, social sciences, pure sciences, engineering, pharmacy, medical, agricultural sciences, languages, humanities and literature. Although, the government has a network of S&T institutes for R&D, the major base of research and researchers lies with the universities. Programmes under UGC for strengthening I-A interface are presented in table 23.

**Table 23: Programmes of UGC for Promoting Industry-Academy Linkages**

S. No.	Programme	Brief Details
1.	<b>University-Industry Inter Linkage (UIL) Centres</b> <a href="http://www.ugc.ac.in">www.ugc.ac.in</a>	Scheme of setting up of UIL Centres in the universities which become an effective goal oriented and enriched entity to promote collaboration with industries for skill development, employability and pursuing collaborative research.
2.	<b>The Council of Industry-Higher Education Collaboration (CIHEC)</b> <a href="http://mhrd.gov.in/collaboration">http://mhrd.gov.in/collaboration</a>	MHRD has instituted CIHEC in collaboration with UGC in order to promote innovation ecosystem and university-industry linkages in various universities all over India.
3.	<b>Global Initiative for Academic Network (GIAN)</b> <a href="http://www.sici.org/programmes/details/global-initiative-for-academic-network-gian-programme/">http://www.sici.org/programmes/details/global-initiative-for-academic-network-gian-programme/</a>	It is an initiative of MHRD, through which network for attracting the talent pool of budding entrepreneurs is created and updated for universities. GIAN aims to utilize university resources to set linkages with scientists, entrepreneurs and industries in order to promote technology development and commercialization.
4.	<b>KAUSHAL Centres</b> <a href="http://mhrd.gov.in/sites/upload_files/mhrd/files/lu3667.pdf">http://mhrd.gov.in/sites/upload_files/mhrd/files/lu3667.pdf</a>	These Centres are established to encourage skill development in higher educational institutions in accordance to the industrial needs.

Source: [www.ugc.ac.in](http://www.ugc.ac.in)

**C. All India Council for Technical Education (AICTE); [www.aicte-india.org](http://www.aicte-india.org)**

AICTE, set up in 1945, is a national level advisory body for conducting survey on status of technical education in integrated manner. AICTE is the statutory authority for planning, formulation, maintenance and implementation of norms of higher education institutes in India. Programmes under AICTE to promote I-A collaborations are listed in table 24.

**Table 24: Industry Related Programmes of AICTE**

<b>S. No.</b>	<b>Programme</b>	<b>Brief Details</b>
1.	<b>Industry Institute Partnership Cell (IIPC)</b> <a href="http://www.aicte-india.org/schiipc.php">http://www.aicte-india.org/schiipc.php</a>	IIPC acts as focal point for setting up close collaboration between industry and academia, and to reduce gap between both the sectors.
2.	<b>Research Park</b> <a href="http://www.aicte-india.org/schrrp.php">http://www.aicte-india.org/schrrp.php</a>	This scheme aims to provide financial support to institutions for setting up research park in collaboration with the industry.
3.	<b>Innovation Promotion Scheme (IPS)</b> <a href="http://www.aicte-india.org/schips.php">http://www.aicte-india.org/schips.php</a>	This scheme aims to provide financial support to institutions for accomplishing technical projects exhibition at union territory and state level. Through this scheme research activities for the industry are promoted for commercialization.
4.	<b>AICTE – Indian National Academy of Engineering (INAE) Distinguished Visiting Professorship (DVP)</b> <a href="http://inae.in/aicte-inae-distinguished-visiting-professorship-scheme/">http://inae.in/aicte-inae-distinguished-visiting-professorship-scheme/</a>	<ul style="list-style-type: none"> <li>• AICTE in association with INAE has launched DVP programme for promotion of industry-institute interaction by stimulating knowledge transfer from industry to academia and vice versa to synergize industrial experience with technical education.</li> <li>• Under this programme, distinguished visiting professors who are eminent scholars/experts in their field working with an industry or R&amp;D organization will visit the higher educational institutes to deliver mentoring sessions and lectures on the state-of-art of industry and its R&amp;D needs.</li> </ul>
5.	<b>AICTE-CII Survey of Industry-Linked Technical Institutes 2016</b> <a href="http://www.aicte-india.org/CII-15.php">http://www.aicte-india.org/CII-15.php</a>	The AICTE-CII Survey is an online survey which is hosted on the server of AICTE at <a href="http://www.aicte-india.org">www.aicte-india.org</a> . In the past, AICTE-CII survey on I-A linkages has analyzed institutes and colleges all over India for industry linkages.
6.	<b>Global Initiative for Academic Network (GIAN)</b> <a href="http://www.sici.org/programmes/details/global-initiative-for-academic-network-gian-programme/">http://www.sici.org/programmes/details/global-initiative-for-academic-network-gian-programme/</a>	GIAN an initiative of MHRD was applied to the technical institutes under AICTE for enhancement of innovation and development of technologies. It aims to build a network of talent pool of scientists, researchers and entrepreneurs to get associated with

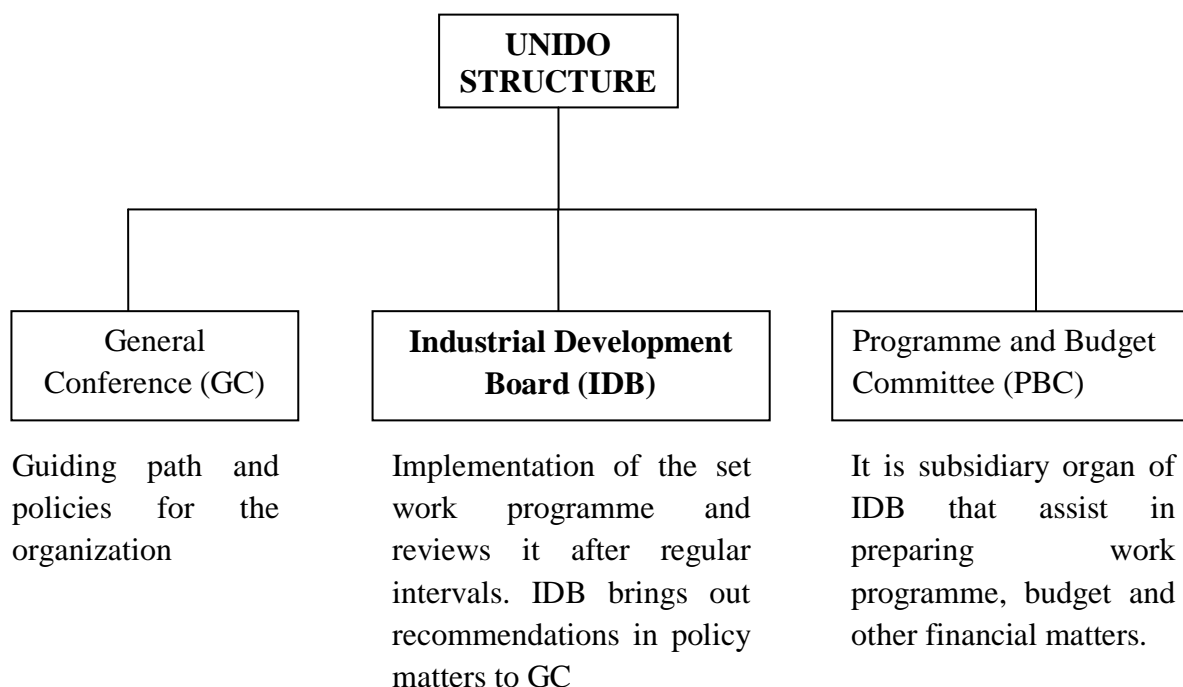
		academic resources to boost their R&D efforts.
7.	<b>Pradhan Mantri Kaushal Vikas Yojana (PMKVY)</b> pmkvyofficial.org/	AICTE under mentorship of MHRD has launched this scheme with an objective of promoting skill development via skill training sessions as per industrial needs in technical institutes during off hours.

Source: [www.aicte-india.org](http://www.aicte-india.org)

## 2.3 International Agencies

### A. United Nations Industrial Development Organization in India (UNIDO-India) [www.unido.org](http://www.unido.org)

UNIDO is an independent autonomous body, constituted in 1985 within United Nations (UN), which is playing the role of a catalyst in gearing up industrial development in the weaker economies of the world. Till date, UNIDO comprises of 170 member states and is composed of three units as mentioned in figure 9.



**Figure 9: Structure of UNIDO**

Presently, UNIDO is working for 2030 agenda ‘Sustainable Development Goals (SDGs)’ which calls for building infrastructure, fostering innovation and promoting inclusive and sustainable industrialization in weaker economic nations. Four thematic priority areas of UNIDO are listed in table 25.



**Table 25: Major Activities of UNIDO**

S. No.	Thematic Areas	Activities <i>(Industry related activities are in bold)</i>
1.	<b>Creation of Shared Prosperity</b>	<ul style="list-style-type: none"> <li>• <b>Agribusiness and rural entrepreneurship development</b></li> <li>• Women and youth in productive activities</li> <li>• Human security and post-crisis rehabilitation</li> </ul>
2.	<b>Advancing Economic Competitiveness</b>	<ul style="list-style-type: none"> <li>• <b>Investment, technology and SME development</b></li> <li>• Competitive trade capacities and corporate responsibility</li> <li>• <b>Entrepreneurship development [Entrepreneurship Curriculum Programme (ECP)]</b></li> </ul>
3.	<b>Safeguarding the Environment</b>	<ul style="list-style-type: none"> <li>• Resource-efficient and low-carbon industrial production</li> <li>• Energy access for productive uses</li> <li>• Implementation of multilateral environmental agreements</li> </ul>
4.	<b>Cross Cutting Services</b>	<ul style="list-style-type: none"> <li>• Partnerships for prosperity</li> <li>• <b>Industrial policy advice, research and statistics</b></li> <li>• Gender equality and the empowerment of women</li> </ul>

Source: [www.unido.org](http://www.unido.org)

The impact of UNIDO is brought forwards through four major functions ([www.unido.org](http://www.unido.org)):

(a) Technical cooperation, (b) Analytical and research functions, (c) Policy advisory services, normative functions and standards and quality-related activities, (d) Arranging and setting up partnerships within member countries for knowledge transfer, promoting networking and industrial cooperation.

**UNIDO-Delhi Centre:** India became member of UNIDO in 1985 and has its Head Office in New Delhi. It has been a successful initiative of UNIDO in collaboration with GoI that has brought industrial growth in different sectors. Subsequently UNIDO-Delhi also covers Afghanistan, Bangladesh, Bhutan, Nepal, Maldives and Sri Lanka. UNIDO-Delhi has played significant role in enhancing industrial development of India via number of programmes and initiatives of UNIDO (Table 26).

**Table 26: Activities of UNIDO-Delhi Centre**

S. No.	Initiative	Brief Details
1.	<b>India-Combining businesses</b>	UNIDO in support from the United Kingdom's Department for International Development (DFID) has initiated a dedicated programme for strengthening SMEs of India in field of handlooms, handicrafts and non-timber wood products.
2.	<b>India-Gears of growth</b>	UNIDO in association with Indian Automotive

	<b>[UNIDO-ACMA Automotive Component Supplier Development Programme]</b>	Components Manufacturers Association (ACMA) has assisted Indian SMEs in the field of automobiles and automotive related sector to meet challenges related to insufficient productivity, low quality, and scalability issues.
3.	<b>CSR South East Asia</b>	UNIDO initiated Triple Bottom Line demonstration project for facilitating market access for potential suppliers of developing countries and provides global market access to the SMEs to increase their value chain.
4.	<b>India-Climate-friendly refrigerators</b>	UNIDO in collaboration with the Swiss State Secretariat for Economic Affairs has supported Indian refrigeration manufacturers (Godrej & Boyce Mfg. Co. and Videocon Appliances Ltd.) for developing improved CDM methodologies in order to increase competitiveness and reduce environmental pollution.
5.	<b>UNIDO Centre for South-South Industrial Cooperation (UCSSIC)</b>	Launched in New Delhi in collaboration with Indian government with the following aims: <ul style="list-style-type: none"> <li>• To provide platform to encourage closer industrial cooperation among developing countries</li> <li>• Design practical and innovative projects to facilitate the transfer and diffusion of appropriate technologies</li> <li>• Skill development and capacity enhancement in entrepreneurship, trade and investment</li> </ul>

*Source: www.unido.org (http://www.unido.org/office/india.html)*

## **B. International Finance Corporation (IFC)-India; www.ifc.org**

IFC is one of the largest global development institutions established in year 1956. It consists of 184 member countries. IFC focuses on enhancement of private sector of developing countries to attain sustainable development of the country. IFC gives financial assistance along with technical expertise, global experience and innovations to address financial, political and operational challenges of the country. IFC also creates long term partnerships with various stakeholders of country to overcome constraints of finance, employee skills, infrastructure and regulatory environment.

India got associated with IFC in 1956 and since then IFC has supported ~346 companies by providing financial assistance worth 10.3 billion US\$ and arranging 2.9 billion US\$ from other stakeholders. For India, IFC has provided support to bring development of underserved, low income, rural and fragile regions in field of energy, roads, water, healthcare, education, waste management and sanitation.

IFC mainly invests in different ventures of early growth companies which are involved in innovative technologies to match demands of emerging markets. Early growth companies in field of healthcare, education, information technology mainly are supported by financial assistance from IFC. IFC also plays important role in promoting cross border technology transfer to spread the success of innovative technologies.

### 3. I-A Programmes/Schemes of Private Sector

#### 3.1 Industry Associations

##### A. Federation of Indian Chambers of Commerce and Industry (FICCI); [www.ficci.com](http://www.ficci.com)

FICCI is the largest and oldest existing apex business organization of India. It was established in 1927. It is a not-for-profit, non-government organisation and holds the responsibility for drafting policy and its execution that mainly concerns industry. Schemes by FICCI to strengthen I-A interface in country are presented in table 27.

**Table 27: Programmes of FICCI for Promoting Industry-Academia Linkages**

S. No.	Programme	Brief Details
1.	<b>National Knowledge Functional Hub</b> <a href="http://ficci-nkfh.com/">http://ficci-nkfh.com/</a>	Creation of hubs to increase I-A interactions by creating mentoring services between industry and academia.
2.	<b>FICCI Ladies Organization (FLO)</b> <a href="http://www.ficciflo.com/">http://www.ficciflo.com/</a>	Women wing of FICCI that has developed all India forum for women. FLO represents over 4000 women entrepreneurs and professionals for promoting entrepreneurship.
3.	<b>I-A-Research/ Government Interface (IARGI)</b> <a href="http://www.ficcifwi.com/pp-ts/rnd2.pdf">http://www.ficcifwi.com/pp-ts/rnd2.pdf</a>	Industrial partner and FICCI or Ministry of Food Processing Industry (MFPI) or CSIR together has financed IARGI to promote I-A linkages and commercialization of technologies.
4.	<b>DRDO - FICCI ATAC programme</b> <a href="http://drdoficciatac.com/">http://drdoficciatac.com/</a>	FICCI in association with DRDO initiated this programme for creating active commercial pathway for DRDO's technologies to the commercial markets.
5.	<b>Invest India</b> <a href="http://www.investindia.gov.in/">http://www.investindia.gov.in/</a>	It is a joint venture of FICCI, DIPP and state governments with shareholding of 51%, 45% and 4%, respectively. It holds the responsibility of enhancing R&D investments in India.

Source: [www.ficci.com](http://www.ficci.com)

##### B. Confederation of Indian Industry (CII); [www.cii.in](http://www.cii.in)

CII is an industry managed not-for-profit organization. It was founded in 1895, having 8000 members both from private and public sectors including Multinational Corporations (MNCs) and SMEs. It possess indirect membership of over 2,00,000 entities from 240 national and

regional sectoral industrial bodies. CII is working with a mandate of creating sustained environment conducive for industrial growth in India, by encouraging partnering and close linkages between government and industry through consultative processes. CII's initiatives to enhance I-A interface in India are listed in table 28.

**Table 28: Programmes and Initiatives of CII for Promoting I-A Linkages**

S. No.	Programme/ Initiative	Brief Details
1.	<b>Recommendation of CII National Committee on Higher Education on New Education Policy</b> <a href="http://cii.in/WebCMS/Upload/CII%20Recommendations%20on%20New%20Education%20Policy%202015269.pdf">http://cii.in/WebCMS/Upload/CII%20Recommendations%20on%20New%20Education%20Policy%202015269.pdf</a>	It was drafted in 2015 and specifically stressed on meaningful partnership of education sector with the private sector and engagement with industry to link education and employability
2.	<b>Quality Enhancement in Engineering Education (QEEE)-CII Industry Bridge Programme</b> <a href="http://www.pilot.edureform.iitm.ac.in/phases.php">http://www.pilot.edureform.iitm.ac.in/phases.php</a>	Programme was carried out in 2014 that is one of the models to bring industry and academia together. It focussed on industry bridge sessions on technology trends in the industry and the engineering applications in the industry
3.	<b>AICTE-CII Survey of Industry-Linked Technical Institutes 2016</b> <a href="http://www.aicte-india.org/CII-15.php">http://www.aicte-india.org/CII-15.php</a>	<ul style="list-style-type: none"> <li>• The AICTE-CII Survey is an online survey which is hosted on the server of AICTE at <a href="http://www.aicte-india.org">www.aicte-india.org</a>. In past, AICTE-CII survey on I-A linkages has analyzed institutes and colleges all over India for industry linkages.</li> <li>• The fifth edition of the survey is open to all degree and diploma granting institutes in engineering, management, pharmacy and architecture.</li> <li>• At the end of the survey, awards and citations will be given for best industry linked institute/college in specific domain areas.</li> </ul>
6.	<b>Global Innovation &amp; Technology Alliance (GITA)</b> <a href="http://gita.org.in/aboutus.aspx">http://gita.org.in/aboutus.aspx</a>	CII in collaboration with DST instituted GITA for promoting innovations in Indian Industry. GITA holds the responsibility of making goal oriented national and international R&D collaborations involving industry and academia.
7.	<b>Prime Minister Fellowship Scheme for Doctorate Research</b> <a href="http://primeministerfellowshipscheme.in/Home.aspx">http://primeministerfellowshipscheme.in/Home.aspx</a>	CII in association with SERB, DST initiated Prime Minister Fellowship scheme for PhD students pursuing industry oriented research, who can avail double fellowship, 50% from the government and 50% from the sponsored industry.

Source: [www.cii.in](http://www.cii.in); [www.aicte-india.org](http://www.aicte-india.org)

### **C. National Associations of Software and Services Companies (NASSCOM); www.nasscom.in**

NASSCOM, established in 1988, is the industry association for the information technology sector in India. It is an industry funded, not-for-profit organization working with an objective to establish growth led business and service sector in the country.

NASSCOM in association with 'ICICI Knowledge Park (IKP)' is promoting "*The India Innovation Fund (IIF; <http://www.indiainnovationfund.in/>)*" created for strategic investors ranging from information technology to telecommunications and life sciences. IIF is the collaboration of diverse institutions (public and private) as anchor investors who along with investments also provide the investee with guidance for technology development and market access. It is one of the first kinds of PPP at this scale for providing funds to entrepreneurs. Major anchor investors under IIF are Tata Consultancy Systems (TCS), IKP Trust, DST and Bharti Airtel. Currently IIF has a corpus of around ₹ 40 crores.

### **D. Other Industrial Associations**

There are some of the industrial associations like *Associated Chambers of Commerce & Industry of India* (ASSOCHAM; [www.assochem.org](http://www.assochem.org)) and *PHD Chambers of Commerce and Industry* (PHDCCI; [www.phdcci.in](http://www.phdcci.in)) which are strongly associated with industries all over in India and play role in stimulating and acknowledging educational institutes promoting I-A interface in country.

ASSOCHAM took an initiative through its various events for se promoting '*Mega Food Parks*' set up by Ministry of Food Processing in various parts of country to provide state of art infrastructure, technology and mentoring support to the enterprise engaged in food processing sector in association with higher educational institutes.

PHDCCI is a multi-state and proactive apex organisation functioning for creating strong linkages nationally and internationally. It acts as a catalyst for promoting industry, entrepreneurship and trade. PHDCCI is working for '*Skilling India for Global Competitiveness*' and has significantly contributed to socio-economic development in the country.

#### 4.I-A Programmes/Schemes of Banking Sector

##### A. Small Industries Development Bank of India (SIDBI); [www.sidbi.com](http://www.sidbi.com)

SIDBI, established in 1990 is one of the principal financial entities for the financing and promoting MSMEs development in India and is coordinating and supporting institutions which are engaged in similar activities. Major initiatives taken by SIDBI to promote industrial R&D are listed in table 29.

**Table 29: SIDBI Initiatives to Promote Industrial R&D**

S. No.	Initiative	Brief Details
1.	<b>Creation of SIDBI Innovation and Incubation Centre (SIIC) at IIT Kanpur</b> <a href="http://www.iitk.ac.in/siic/d/about-siic">http://www.iitk.ac.in/siic/d/about-siic</a>	SIIC was established in collaboration with SIDBI to foster innovation and entrepreneurial activities in IIT Kanpur. It provides support (financial and developmental) to the MSME sector.
2.	<b>Financing Schemes for Sustainable Development Including Energy Efficiency and Cleaner Production of MSMEs</b>	SIDBI started four different schemes to support R&D in MSMEs. These schemes are as follows: <ul style="list-style-type: none"> <li>• JICA -SIDBI financing scheme for MSME projects</li> <li>• Financing End to End Energy Efficiency Investments in MSMEs</li> <li>• Green Loan Scheme for health sector</li> <li>• Sustainable finance Scheme</li> <li>• Global Environment Facility in association with the World Bank.</li> </ul>
3.	<b>TIFAC-SIDBI Revolving Fund for Technology (SRIJAN Scheme)</b> <a href="http://www.sidbi.com/?q=tifac-sidbi-revolving-fund-technology-innovation-srijan-scheme">http://www.sidbi.com/?q=tifac-sidbi-revolving-fund-technology-innovation-srijan-scheme</a>	This scheme provides financial aid to MSMEs to develop, demonstrate, upscale and commercialize their innovative technology based projects.
4.	<b>Technology and Quality Upgradation Support to Micro, Small and Medium Enterprises (TEQUP)</b>	It aims to encourage the Indian MSMEs to improve their manufacturing processes in direction of energy efficient technologies in order to reduce emission of Green House Gases. Financial support under TEQUP is provided by SIDBI along with other banks.
5.	<b>Scheme for Food Processing Industries</b>	This scheme was launched in collaboration with Ministry of Food Processing Industries, GoI, to promote technology up gradation, modernization of food processing industries by giving financial assistance.
6.	<b>Technology Upgradation Fund Scheme for The Textile Industries (TUFS)</b>	This scheme was launched to promote technology up gradation and modernization in textile industries
7.	<b>Integrated Development of Leather Sector Scheme (IDLSS)</b>	This scheme was launched in association with leather sector of DIPP to promote technology up gradation for strengthening leather industry to compete with global markets.

Source: [www.sidbi.com](http://www.sidbi.com)

## B. State Bank of India (SBI); [www.sbi.co.in](http://www.sbi.co.in)

SBI, India's largest public bank was constituted in 1955. It actively participates in large number of welfare activities of community and is playing important role in nation building. Various initiatives of SBI for promoting industrial research and development in India are listed in table 30.

**Table 30: Initiatives of State Bank of India to Promote Industrial Research and Development**

S. No.	Initiative	Brief Details
1.	<b>CSIR-Tech</b> <a href="http://www.csirtech.com/">http://www.csirtech.com/</a>	Founded in 2011, as the initiative of CSIR. The ownership of CSIR-Tech lies with Entrepreneurial Development Centre of CSIR-National Chemical Laboratory (CSIR-NCL), Pune; CSIR-Scientists Welfare Trust (CSIR-SWT) and the State Bank of India. Bank provides the funding support for carrying out different activities of CSIR-Tech.
2.	<b>Entrepreneurship Development Institute of India (EDI)</b> <a href="http://www.ediindia.org">www.ediindia.org</a>	It is an autonomous not-for-profit institute established in 1983, in association with number of financial institutions support. SBI provided financial support of ₹ 20 Lakhs.

## C. Industrial Credit and Investment Corporation of India (ICICI); [www.icicibank.com](http://www.icicibank.com)

ICICI Bank, established in 1994 is India's largest private sector bank. It is engaged in human and economic developmental activities at national level. Bank has created '*ICICI Foundation*' that works for supporting innovation across diverse programmes and sectors. Programmes and initiatives of ICICI bank to promote industrial R&D activities are listed in table 31.

**Table 31: Industrial Research Oriented Programmes and Initiatives of ICICI Bank**

S. No.	Programme/ Initiative	Brief Details
1.	<b>Creation of Sponsored Research and Development Board (SPREAD)</b>	SPREAD was created in collaboration with the World Bank, ICICI Bank and the Indian Government for supporting industry oriented research in academic institutions.
2.	<b>Social Initiatives Group (SIG)</b> <a href="http://www.icicicommunities.org/sig.html">http://www.icicicommunities.org/sig.html</a>	SIG was established in 2000, a non-profit group for encouraging research in field of primary health and elementary education by providing access to finance. Under this group further, ' <i>ICICI Foundation for Inclusive Growth</i> (ICICI Foundation; <a href="http://www.icicifoundation.org/">http://www.icicifoundation.org/</a> )' was founded in 2008

		for promoting inclusive scientific and technological growth.
3.	<b>Creation of ICICI Knowledge Park (IKP)</b> <a href="http://www.ikpknowledgepark.com/">http://www.ikpknowledgepark.com/</a>	ICICI has also played substantial role in creation of Innovation Knowledge Progress (IKP; <a href="http://www.ikpknowledgepark.com/">http://www.ikpknowledgepark.com/</a> ) also know and ICICI Knowledge Park providing incubation support to budding entrepreneurs.
4.	<b>Entrepreneurship Development Institute of India (EDI)</b> <a href="http://www.ediindia.org">www.ediindia.org</a>	It is an autonomous not-for-profit institute established in 1983, in association with number of financial institutions support. ICICI provided financial support of ₹ 28 Lakhs
5.	<b>Technology Finance Group (TFG)</b> <a href="http://www.icicibank.com/corporate/technologyfinance/technology-finance.page">http://www.icicibank.com/corporate/technologyfinance/technology-finance.page</a>	ICICI bank has dedicated TFG that implements many other programmes in association with World Bank and USAID to help industry and institutions to undertake collaborative research and technology oriented projects. Programmes presently implemented by TFG are: <ul style="list-style-type: none"> <li>• <b>Agricultural Commercialization &amp; Enterprise (ACE) Title III Programme:</b> This programme activity focuses primarily on promoting agribusiness innovations and diversity by linking technology and labour requirements, reduction of post-harvest losses and encouraging projects that are highly visible and replicable.</li> <li>• <b>Technology Institution (TI) Programme:</b> This programme aims strengthen institutional potential for technology development, marketing and business development ability and commercialization. Under this programme sensitization of training scientists, up gradation and expansion of facilities is promoted by collaborating with national and international TIs. Till date programme has supported 50 such projects.</li> </ul>

Source: [www.icicibank.com](http://www.icicibank.com)

### C. National Bank for Agriculture and Rural Development (NABARD); [www.nabard.org](http://www.nabard.org)

It is leading development bank of India with corpus fund of ₹ 50 Crores for R&D. This dedicated fund aims at promoting research in field of agriculture and rural development. Bank provides grant in support of carrying out research projects, workshops, conference, publication cost, chair units and internship programmes. In the year 2014-15, NABARD R&D fund has supported 14 research projects all over in India.

**D. Others:** Many other banks have introduced various schemes for promoting industrial R&D which are listed in table 32.



**Table 32: Bank Schemes for Promoting Industry R&D**

S. No.	Bank	Schemes
1.	<b>Industrial Development Bank of India</b> hwww.idbi.com	Technology financing scheme for commercialization of indigenous technology and start-ups related to indigenous technologies. Gives financial assistance to STEPs scheme introduced by <i>NSTEDB</i> .
2.	<b>YES Bank</b> www.yesbank.in	In collaboration with IFC India, YES Bank has introduced schemes for elevating women owned technology business in India's priority area.
3.	<b>Industrial Finance Corporation of India (IFCI)</b> www.ifcilt.com	<ul style="list-style-type: none"> <li>IFCI in collaboration with Ministry of Social Justice and Empowerment launched a scheme for credit enhancement facility for budding entrepreneurs especially for lower strata of society.</li> <li>IFCI also contributed to the creation of Entrepreneurship Development Institute of India (EDI) by providing financial support of ₹ 28 Lakhs.</li> </ul>
4.	<b>Punjab National Bank (PNB)</b> www.pnbindia.in	<i>'PNB Mahila Udyam Nidhi Scheme, PNB MAHILA Samridhi Yojna, PNB Mahila Sashaktaran Abhiyan and PNB Kalyani card scheme'</i> are the schemes available for budding women entrepreneurs.
5.	<b>Oriental Bank of Commerce</b> www.obcindia.co.in	Under <i>'Oriented Mahila Vikas Yojana'</i> women entrepreneurs can avail financial support from the bank.
6.	<b>Bhartiya Mahila Bank</b> www.bmb.co.in	Bank has commenced various women entrepreneurship funding schemes.
7.	<b>Syndicate Bank</b> www.syndicatebank.in	It has created <i>Syndicate Bank Entrepreneurship Research and Training Centre at the Indian Institute of Technology, Kanpur (SBERTC-IITK)</i> . This centre is promoting cutting edge research, training and teaching in entrepreneurship by utilizing the facilities and intellectual pool of IIT Kanpur.

## 5. Summary

In the present chapter, an overview of various schemes/programmes/organizations of public and private sectors has been presented for enhancing I-A interactions, under the following sub-heads:

- Funding Agencies** (DST, DSIR, CSIR, BIRAC, ICAR, ICMR, DRDO, DIPP, DAE, MeitY, MoEFCC, ISRO)
- Educational Sector** (MHRD, UGC, AICTE)
- Financial Institutions** (ICICI, Yes Bank, SIDBI, SBI, NABARD, IDBI, Syndicate Bank)
- Industrial Associations** (FICCI, CII, NASSCOM, ASSOCHAM, PHDCCI)
- International Agencies** (UNIDO-INDIA, IFC-INDIA)

➤ **Funding Agencies:**

**DST** has floated maximum number of schemes/programmes. There are dedicated I-A research schemes for individuals e.g. ‘Prime Minister’s Fellowship Scheme’, as well as theme based programmes like ‘Drug and Pharmaceutical Research Programme’ and ‘Nano Application and Technology Advisory Group’ (NATAG). For the promotion of innovative products and technologies and enhancing I-A collaborative R&D, DST has introduced programmes like ‘Technology Systems Development Programmes’ (TSDP), ‘Instrumentation Development Programme’ (IDP) and many more. The schemes for the promotion of entrepreneurship ‘National Scheme for Technology Development Programme’ (NSTED) and ‘Start-Up Research Grant’ are very popular amongst young and enthusiastic researchers for shaping their ideas into commercial success. DST provides funds for the setting up of ‘Technology Business Incubators’ (TBIs) all over India to promote industry oriented, technology oriented and patent oriented research in the universities and research labs. belonging to public and private sectors. Recently, DST has introduced ‘National Initiative for Developing and Harnessing Innovation’ (NIDHI) scheme, through which it proposes to set up accelerators in various parts of India to boost up start-up culture in the country. DST has also established ‘Policy Research Centres’ in five institutes to collect evidence-based data for strengthening I-A partnership, entrepreneurship and innovation ecosystem in India. DST has led to the creation of autonomous organizations, such as ‘**TIFAC**’ and ‘**GITA**’. TIFAC is striving for technological advancement of the country. It has initiated programmes such as ‘Advanced Composites Programme’, ‘Revolving Fund’ and ‘Technology Refinement and Marketing Programme’ (TREMAM) to strengthen technological development of academia and industries. TIFAC has also created ‘Patent Facilitation Centres’ in 19 states for providing patent related services to public and private sectors. GITA, a joint initiative of DST and CII, is working with a specific mandate for (a) the promotion of applied and innovative research, and (b) creating international research collaborations amongst the scientists/institutes/industries of different countries.

Ministry of Science and Technology created a dedicated department ‘**DSIR**’ for promoting scientific and industrial research in the country. It has effectively promoted industrial R&D via different schemes, such as ‘Building Industrial R&D and Common Research Facilities (BIRD-crf)’ through which recognition to ‘Industrial R&D Units’ and ‘Scientific and Industrial Research Organization’ (SIRO) is carried

out. DSIR recognized R&D units avail fiscal benefits such as tax relaxation from the government. DSIR promotes I-A collaborative research and entrepreneurship through its different programmes namely ‘Patent Acquisition and Collaborative Research and Technology Development’ (PACE), ‘Promoting Innovations in Individuals, Start-ups and MSMEs’ (PRISM), ‘Access to Knowledge for Technology Development and Dissemination’ (A2K+) and ‘Consultancy Promotion Programme’ (CPP). It has been playing important role in technology development in industries and academia through ‘Technology Development and Demonstration Program’ (TDDP), ‘Technopreneur Promotion Programme’ (TePP), ‘Technology Development and Utilization Programme for Women’ (TDUPW), ‘Technology Management Programme’ (TMP) and ‘International Technology Transfer Programme’ (ITTP). Under DSIR, a dedicated agency ‘**NRDC**’ has been established which provides assistance to R&D institutes and universities, in developing and commercializing patents/technologies. It is acting as large repository of patents and technologies available for commercialization. It also provides IPR consultancy services and supports programmes for entrepreneurship development.

**CSIR** started one of its kind programme ‘New Millennium Indian Technology Leadership Initiative’ (NMITLI) to synergize academia, R&D laboratories and industry. CSIR has also led to the creation of an organization ‘**CSIR-Tech**’ which provides assistance in commercialization of lab research by helping the scientists/institutions in IPR issue and scouting market for their products/technologies. Many public funded research laboratories including CSIR, DRDO, DAE, IISc and industries avail the services of CSIR-Tech.

Another public funded organization, DBT, has created a nodal agency ‘**BIRAC**’ for promoting R&D activities in the biotechnology sector. BIRAC is effectively implementing Public-Private-Partnership (PPP) mode for collaborative research leading to technology development and commercialization for market and societal benefits. It has implemented schemes, such as ‘Small Business Innovation Research Initiative’ (SBIRI), ‘Biotechnology Industry Partnership Programme’ (BIPP) and ‘Contract Research Scheme’ (CRS) to promote I-A linkages in biotech research. BIRAC is also stimulating entrepreneurship development in the country via programmes such as ‘Biotechnology Ignition Grant’ (BIG), creation of ‘University Innovation Clusters’ (UICs) and ‘Bio-incubators’. BIRAC has collaborated with voluntary organization ‘**Society for Research and Initiatives for Sustainable**

**Technologies and Institutions'** (SRISTI) with an aim to strengthen creativity and innovation at grass root level.

**DRDO**, the premier institute for defense research has initiated 'DRDO-FICCI ATAC programme', 'Grant-in Aid' and 'Extramural Schemes' to promote I-A interface in defense related research.

**DIPP**, one of the foremost institutes dealing with industry policy design and formulation has introduced programmes, such as 'Industry Corridor Projects', 'Invest India', 'Atal Innovation Mission' (joint initiative of DIPP and NITI AYO) and 'Modified Industrial Infrastructure Upgradation Scheme' (MIUS) to support industrial growth by synergizing academia and industry for collaborative research. DIPP also provided support for creation of institutes, such as 'Rajiv Gandhi National Institute of Intellectual Property Management' (RGNIPM), 'Quality Council of India' (QCI), 'National Institute of Design' (NID), 'National Productivity Council' (NPC) and many more for IPR management and technology development in order to enhance industry competitiveness.

**DAE** has created industrial units, such as 'Nuclear Fuel Complex', 'Heavy Water Board' and 'Board of Radiation and Isotope Technology', where government, academia and industries are working collaboratively to address industrial problems. DAE has also introduced schemes for 'Enhancing Entrepreneurship and IPR Awareness' in field of atomic energy.

The 'Ministry of Electronics and Information Technology' (**MeitY**), acts as I-A interface in fields of electronics and information technology. It has led to the setting up of Electronics, and Information and Communication Technologies (ICT) academies all over India and incubators for electronics-related R&D entrepreneurship. MeitY has also commenced 'National Portal' for displaying of technologies that can be readily taken up by industries for commercialization.

**ISRO** via its initiative of sponsored research programmes named 'RESPOND', 'Technology Transfer Group' and 'SAC Industry Portal' and creation of unique corporation arm 'Antrix Corporation limited' has aided in technology development and technology transfer to space industry.

- **Educational Sector:** **MHRD** has instituted Council for Higher Education Cooperation (CIHEC) comprising of advisory members from industry, academia and stakeholder ministries. CIHEC council is working with special task of bringing industry and academia closer to each other to pursue collaborative R&D activities. MHRD has also

initiated programmes for setting up of 'Research Parks' to promote innovation ecosystem in higher educational institutes. 'TEQIP' programme was commenced by MHRD with an aim of making post graduate students industry ready by involving industries with TEQIP centers located in universities and other HEIs. MHRD also initiated a programme 'IMPRINT India' to promote innovations and technology commercialization in specific target research areas at pan IITs level. To generate skilled manpower and entrepreneurship culture, MHRD in association with its regulatory bodies, UGC and AICTE, has initiated programmes like GIAN and Kaushal Kendras.

- **Financial Institutions:** Banking sector of India, both public and private, has significantly contributed for the promotion of research in the industrial sector especially MSMEs, entrepreneurship and creation of institutes for promoting culture of innovation. Amongst the public banks, **SIDBI**, through its various programmes has contributed towards technology development and incubation support for start-ups. SIDBI has also played crucial role in the creation of 'SIDBI Innovation and Incubation Centre' (SIIC) at IIT Kanpur. **ICICI**, a private sector bank, as a part of their corporate social responsibility is playing an important role in promoting innovation through creation of dedicated 'Innovation Fund'. ICICI has a dedicated 'Technology Finance Group' to support technology development and creation of technology based institutions. In addition, ICICI played a crucial role in establishing 'Knowledge Park' in Hyderabad for promoting entrepreneurship. **SBI** has played crucial role in the creation of an organization CSIR-Tech which meant for promoting technology development and commercialization. Other public banks, such as NABARD and Syndicate Bank are also doing their bit in supporting innovations at higher educational institutes.
- **Industrial Associations:** Industrial associations, such as **FICCI**, **CII** and **NASSCOM** are contributing to the growth of I-A interactions and innovations by conducting national and international level workshops/conferences/I-A meets. These associations are also playing an important role by assisting the government and its agencies in formulating national policies in the areas of reforms in higher education system and carrying out surveys in the domains of academia and research.
- **International Agencies:** India being a member of United Nations has received funding support from international agencies, such as **UNIDO** and **IFC** for promoting

industry oriented research and technological advancements to compete with rest of the world.

## **6. Conclusion**

The economic prosperity of a nation is linked to its scientific and technological competence. To achieve success in these parameters, it is essential that industry and academia forge linkages to overcome the limitations of each other for commercializing R&D into innovative products/technologies. To bring government, industry and academia together, various public and private organizations have floated I-A programmes/schemes. In India, majority of R&D is being carried out by the funds provided by public sector funding agencies, such as DST, CSIR, DBT, BIRAC, DAE, DRDO, ISRO, MeitY, ICAR, MHRD and so on. In addition, government has set up dedicated agencies which aid in the promotion of applied research. IPO, NRDC and TIFAC assist public and private sectors in patent related matters; DSIR provides accreditation to R&D labs (public and private), which then become eligible for seeking incentives and R&D programmes from the government. CSIR-Tech assists many research labs, universities and entrepreneurs at all stages leading to commercialization of their research. BIRAC has been established for promoting entrepreneurship and R&D of MSMEs in the domain of biotechnology. GITA is engaged in enhancing R&D by forging national and international alliances. Financial institutions are contributing by way of providing financial assistance for creation of *Centres of Excellence* and *Technology Parks* and soft loans to entrepreneurs. Industry associations have set up dedicated research institutes with financial assistance from the public sector. All these industry-academia associated activities suggest that there is plethora of I-A related activities/schemes/programmes existing in India. However, there is no single platform where such information is either available or compiled. It is suggested that a national level centre be created where all the information pertaining to industry-academia regime of India is available. Such information will be helpful in identifying gaps and overlaps in the domain of I-A ecosystem in India. This piece of information will also be of great importance to policy makers for designing futuristic plans for Science, Technology and Innovations for India. This centre may be termed as National Industry-Academia Centre (NIAC) and governed by a council comprising of eminent scientists, industry personals, heads of funding agencies and representatives of NITI Ayog. The council should be responsible for designing as well as implementation of I-A Policy.

Asian countries like China and S. Korea have a single body responsible for designing and implementation of policy-programmes.

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## Symbols and Abbreviations

\$	Dollar
~	Approximate
₹	Rupees
ABLE	Association of Biotechnology Led Enterprises
ACE	Agricultural Commercialization & Enterprise
ACMA	Automotive Components Manufacturers Association
Agri	Agricultural
AICTE	All India Council for Technical Education
AIIMS	All India Institute of Medical Science
AIM	Atal Innovation Mission
AIRAC	Agriculture Industry Research Assistance Council
AMR	Anti-Microbial Resistance
APCTT	Asian and Pacific Centre for Transfer of Technology
ASSOCHAM	The Associated Chambers of Commerce of India
BCIL	Biotechnology Consortium India Ltd.
BIG	Biotechnology Ignition Grant Scheme
Biotech	Biotechnology
BIPP	Biotechnology Industry Partnership Programme
BIRAC	Biotechnology Industry Research Assistance Council
BIRD-crf	Building Industrial R&D and Common Research Facilities
BRIC	BIRAC Regional Innovation Centre
BRIT	Board of Radiation and Isotope Technology
CCAM	Congenital Cystic Adenomatoid Malformations
C-CAMP	Centre for Cellular and Molecular Platforms
CDFD	Centre for DNA Fingerprinting and Diagnostics
CDTI	Centre for the Development of Industrial Technology
CEFIPRA	Indo-French Center for the Promotion of Advanced Research
CfEL	Centre of Entrepreneurial Learning
Chd	Chandigarh
CIAB	Center of Innovative and Applied Bioprocessing
CIC	Cluster Innovation Centre
CIHEC	Council for Industry Higher Education Cooperation
CII	Confederation of Indian Industry
CMC	Christian Medical College
CMTI	Central Manufacturing Technology Institute
CPP	Consultancy Promotion Programme
CPPRI	Central Pulp and Paper Research Institute
Cr	Crore
CRAMS	Contract Research and Manufacturing Systems
CRS	Contract Research Scheme
CRTDH	Common Research and Technology Development Hubs
CSIR	Council of Scientific and Industrial Research
CTPL	CSIR-Tech Private Limited
DAE	Department of Atomic Energy
DARE	Department of Agricultural Research and Education
DB	Development Business
DBT	Department of Biotechnology



DeitY	Department of Electronics and Information Technology
DFID	Department for International Development
DIPP	Department of Industrial Policy and Promotion
DNA	Dexoynucleic Acid
DRAC	Deity Research Assistance Council
DRDO	Defence Research and Development Organization
DSIR	Department of Scientific and Industrial Research
DST	Department of Science and Technology
DTDDF	DAE Technologies Display and Dissemination Facility
DVP	Distinguished Visiting Professorship
EAC	Entrepreneurship Awareness Camp
EBTC	European Business & Technology Centre
ECP	Entrepreneurship Curriculum Programme
ECRA	Early Career Research Award
EDC	Entrepreneurial Development Centre
EDI	Entrepreneurship Development Institute
EDP	Entrepreneurship Development Programmes
EEN	Enterprise Europe Network
EIRAC	Environment related Industrial Research Assistance Council
ER	Extramural Research
ESDM	Electronics System Design and Manufacturing
ETA	Early Translational Accelerator
FAO	Food and Agriculture Organization
FDP	Faculty Development Programme
FICCI	Federation of Indian Chambers of Commerce and Industry
FITT	Foundation for Innovative and Technology Transfer
FLO	FICCI Ladies Organization
FTO	Freedom to Operate
GC	General Conference
GIAN	Global Initiative for Academic Network
GIs	Geographical Indicators
GITA	Global Innovation and Technology Alliance
GoI	Government of India
GSBTM	The Gujarat Biotechnology Council
HBN	Honey Bee Network
HI&PE	Heavy Industries and Public Enterprises
HR	Human Resource
HTIC	Healthcare Technology Innovation Centre
HWB	Heavy Water Board
I-A	Industry-Academia
IARGI	I-A-Research/ Government Interface
IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
ICGEB	International Centre for Genetic Engineering and Biotechnology
ICICI	Industrial Credit and Investment Corporation of India
ICMR	Indian Council of Medical Research
IDB	Industrial Development Board
IDBI	Industrial Development Bank of India
IDLSS	Integrated Development of Leather Sector Scheme
IEDC	Innovation and Entrepreneurship Development Centre

IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFCI	Industrial Finance Corporation of India
IGCAR	Indira Gandhi Centre for Atomic Research
IIF	India Innovation Fund
IIPC	Industry Institute Partnership Cell
IIPME	Industry Innovation Programme on medical Electronics
IIT	Indian Institute of Technology
IKP	Industrial Credit and Investment Corporation of India Bank Knowledge Park
IMPRINT	Impacting Research Innovation and Technology
INAE	Indian National Academy of Engineering
INNO INDIGO	Innovation Driven Initiative for the Development and Integration of Indian & European Research
IP	Intellectual Property
IPFC	Intellectual Property Facilitation Centre
IPRTI	Indian Plywood Industries Research and Training Institute
IPR	Intellectual Property Rights
IPS	Innovation Promotion Scheme
IRD	Industry R&D Promotion Programme
i-STED	S&T based Entrepreneurship Development
ITRAC	Information Technology Research Assistance Council
ITTP	International Technology Transfer Programme
JEOI	Joint Expression of Interest
KAUSHAL	Knowledge Acquisition and Up-gradation of Skilled Human Abilities and Livelihood
KIIT	Kalinga Institute of Industrial Technology
KIIT-TBI	KIIT-Technology Business Incubator
KIRAN	Knowledge Involvement in Research Advancement through Nurturing
KSIDC	Kerala State Industrial Development Corporation
M.Sc	Masters in Science
MEIT	Ministry of Electronics and Information Technology
MFPI	Ministry of Food Processing Industry
MHRD	Ministry of Human Resource and Development
MIIUS	Modified Industrial Infrastructure Upgradation Scheme
MIRAC	Medical Industry Research Assistance Council
MMP	Mission Mode Project
MNCs	Multinational Corporations
MoEFCC	Ministry of Environment, Forest and Climate Control
MoMSMEs	Ministry of Micro, Small and Medium Enterprises
MoU	Memorandum of Understanding
MTA	Material Transfer Agreement
NABI	National Agriculture Biotechnology Institute
NASSCOM	National Association of Software and Services Companies
NATAG	Nano Applications and Technology Advisory Group
NATP	National Agricultural Technology Project
NBRC	National Brain Research Centre
NCCBM	National Council for Cement and Building Materials
NCL	National Chemical Laboratory
NEGP	National E-Governance Plan
NFC	Nuclear Fuel Complex
NGOs	Non Government Organizations

NIC	National Informatics Centre
NID	National Institute of Design
NIFTEM	National Institute of Food Technology Entrepreneurship and Management
NIPGR	National Institute for Plant Genome Research
NMITLI	New Millennium Indian Technology Leadership Initiative
NNRMS	National Natural Resources Management System
NPC	National Productivity Council
NPDF	National Post-Doctoral Fellowship
NRDC	National Research Development Corporation
NSTED	National Science and Technology Entrepreneurship Development
PAC	Policy and Analysis Cell
PACE	Patent Acquisition and Collaborative Research and Technology Development
PBC	Programme and Budget Committee
PERD	B. V. Patel Pharmaceutical Education and Research Development
PFC	Patent Facilitation Center
Pharma	Pharmaceutical
PHDCC	Progress Harmony Development Chambers of Commerce
PIC	Patent Information Centers
PNB	Punjab National Bank
PPP	Public Private Partnership
PRC	Policy Research Centres
PRISM	Promoting Innovations in Individuals, Start-ups and MSMEs
PSCT	PowerShares S and P SmallCap Inform
PU	Panjab University
QCI	Quality Council of India
QEEE	Quality Enhancement in Engineering Education
QUT	Queensland University of Technology
R&D	Research and Development
RAPID	Research Alliance for Product Innovation and Development
RCB	Regional Centre for Biotechnology
RGNIIPM	Rajiv Gandhi National Institute of Intellectual Property Management
RUSA	Rashtriya Ucchar Aavishkar Abhiyaan
SAB	Secondary agriculture Bio-cluster
SAC	Space Application Centre
SAIC	Secondary Agriculture Innovation Cell
SBERTC-IITK	Syndicate Bank Entrepreneurship Research and Training Centre at the Indian Institute of Technology, Kanpur
SBI	State Bank of India
SBIRI	Small Business Innovation Research Initiative
SBTIC	Society for Biotechnology Incubation Centre
SCTI	Steinbeis Centre for Technology Transfer India
SDGs	Sustainable Development Goals
SERB	Schemes for funding industry relevant R&D
SETU	Self-Employment and Talent Utilization
SIDBI	Small Industries Development Bank of India
SIG	Social Initiatives Group
SMEs	Small and Medium Sized Enterprises
SPARSH	Social Innovation Programme for Products: Affordable and Relevant to Societal Health
SPREAD	Sponsored Research and Development Board
Sq.ft.	Square Feet

SRISTI	Society for Research and Initiatives for Sustainable Technologies and Institutions
SSI&A&RI	Small Scale Industries and Agro and Rural Industries
STED	S&T Entrepreneurship Development Project
STEP	S&T Entrepreneurs Park
STI	Science, Technology and Innovation
STPI	Software Technology Parks of India
SWT	Scientists Welfare Trust
TBI	Technology Business Incubator
TCFs	Technology Commercialization Facilitators
TCS	Tata Consultancy Systems
TDB	Technology Development Board
TDDP	Technology Development and Demonstration Program
TDUPW	Technology Development and Utilization Programme for Women
TEDP	Technology based EDP
TePP	Technopreneur Promotion Programme
TEQIP	Technical Education Quality Improvement Programme
TFG	Technology Finance Group
TI	Technology Institutions
TIFAC	Technology Information, Forecasting and Assessment Council
TMP	Technology Management Programme
TREMAP	Technology Refinement and Marketing Programme
TSDP	Technology Systems Development Programmes
TUFS	Technology Upgradation Fund Scheme for The Textile Industries
UCSSIC	UNIDO Centre for South-South Industrial Cooperation
UGC	University Grants Commission
UIC	University Innovation Cluster
UIL	University-Industry Inter Linkage
UIRPAC	University's Industry Research Promotion and Assistance Council
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN-ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNIDO-India	United Nations Industrial Development Organization in India
US	United States
WIPO	World Intellectual Property Rights Organization
ZTM-BPD	Zonal Technology Management and Business Planning and Development

