

# Biotechnology Industry Research Assistance Council (A Government of India Enterprise)

*Announces*

## 8<sup>th</sup> Call for Proposals

*under*



### About SPARSH.....

SPARSH (Social Innovation Programme for Products: Affordable and Relevant to Societal Health) is the Social Innovation Programme of BIRAC aimed at promoting the development of innovative solutions to society's most pressing social problems through biotechnological approaches. Since its inception, the program has been investing in high impact ideas and innovations that could address unmet needs and challenges that are neglected.

Till date, seven calls for proposals have been launched under the program. The first two calls of SPARSH were aligned with UN Millennium Development Goals 4 and 5 i.e., "*Reducing child mortality and improving maternal health*". The third and the fourth call for proposals were on "*Waste to Value*", and "*Ageing and Health*", respectively. A dedicated call on "*Waste to Value*" also reflects the mandate of Swachh Bharat Mission which aims at elimination of open defecation, conversion of unsanitary toilets to pour flush toilets, etc. The Fifth call on "*Innovative Diagnostic tools for Soil and Plant Health*" was launched on 26<sup>th</sup> January, 2017 for entrepreneurs and startups in the field of soil and plant health assessment. The theme of the Sixth call was "*Waste to Value*".

### Objectives of the Program

1. To identify and provide support to cutting edge innovations towards affordable product development that can bring significant social impact and address challenges of inclusive growth.
2. To provide support in form of impact funding of biotech product innovations (with social goals) that can be scaled.

Under the Scheme funding is provided to support innovations towards affordable product development that can bring significant social impact and address challenges of inclusive growth. 46 projects have so far been supported and 13 products/prototypes/technologies have been developed. The seventh call was announced on 2<sup>nd</sup> October, 2018 on the theme *Soil & Plant Health and Human Health*.

Under the current (8<sup>th</sup>) call, [proposals with well-established Proof-of-Concept](#) are invited in the following areas:

- *Waste to Value*
- *Livestock health and improvement*
- *New and improved agricultural tools*
- *Reducing post-harvest losses*
- *Combating environmental pollution*

## **ADDRESSING THE CHALLENGE**

### **1. Waste to value**

Increasing urbanization and growth of population along with the rising standards of living due to technological innovations have contributed to an increase both in the quantity and variety of solid wastes generated by industrial sectors such as sugar, pulp and paper, fruit and food processing, sago/starch, distilleries, dairies, tanneries, slaughterhouses, poultries, etc.

The U.S. Environmental Protection Agency (EPA) has defined solid waste as "*any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities.*" The principal sources of solid waste are residential households and the agricultural, commercial, construction, industrial and institutional sectors. India has approximately 36.5 million tonnes of waste generated annually. India will see a rise in waste generation from less than 40,000 metric tonnes per year to over 125,000 metric tonnes by the year 2030.

Industrial solid waste encompasses a wide range of materials including paper, packaging materials, waste from food processing, oils, resins, solvents, paints, ceramics, glass, metals, plastics, rubber, leather, wood, straw, abrasives, etc.

As per OECD (Organization for Economic Co-operation and Development), Agricultural waste is waste produced as a result of various agricultural operations. It includes manure and other wastes from farms, poultry houses and slaughterhouses; harvest waste; fertilizer run-off from fields and pesticides that enter into water, air or soils. Agricultural waste is the most widely available and also the most wasted energy and biomaterial source. While some of it is used for cattle fodder huge amounts of paddy straw, cane trash and other farm wastes are simply burned in the fields escalating the pollution problems. India now produces 98 million tonnes of paddy with roughly 130 million tonnes of straw of which only about half is used for fodder.

The poultry sector also produces waste products such as eggs shells, slaughter waste, hatchery waste, feathers, poultry droppings and litter manure. The huge quantity of waste generated may

pose a serious threat to the environmental safety by leading to contamination of groundwater and being a source for growth of insects, vermin and pathogenic micro-organisms.

As a result of heavy consumption of fish worldwide, a considerable amount of fish waste is produced yearly. Similar to most food industries, fish-processing operations produce waste, both in solid (e.g. scales, fins, tails, bones, viscera, skin, heads) as well as liquid (e.g. water discharge from cleaning and rinsing, brine, blood water) form. Hence, there is an increasing need to address waste management of fish and fish products.

Animal wastes contain substantial amounts of insoluble and hard-to-degrade structural proteins like collagen, elastin and keratin. These by products are often rich sources of protein, which can be extracted and hydrolyzed to be used as feed or functional ingredients. Most of these by-products also contain other organic and inorganic nutrients that are of value if a technology for their extraction is developed.

In addition to all of the above, urbanization has resulted in generation of over 160,000 Metric Tons (MT) of municipal solid waste daily in the country. The released waste emit GHGs like methane and carbon dioxide and add to air pollution. The problems caused by mismanagement of solid and liquid wastes can be significantly mitigated through the adoption of environment friendly waste to energy technologies that will allow treatment and processing of wastes before their disposal.

The waste streams or by-products from different industries currently stay unusable and go to disposal, or find only partial, low value utilization. Significant quantities of compounds with potential for valorization into high value products are lost in waste-streams. Furthermore, disposing of these streams in landfill causes environmental issues due to their high landfill leachate and methane-emissions. The presence of such vast amount of waste represents both an opportunity, and a necessity for finding a suitable use for all the above-mentioned waste or by-products and utilize it for production of bio-based materials.

Development of environment friendly, energy-efficient and cost effective technologies from wastes having market potential to cater to people's needs in rural and urban areas is the demand for today. The specific challenge is to achieve a sustainable and scalable solution for development of value added products.

The type of waste to be utilized and valorized may include:

WASTE	BIOTECHNOLOGICAL INTERVENTIONS	VALUE
<p><b>Agro industries</b></p> <ul style="list-style-type: none"> <li>• Agriculture residue</li> <li>• Horticulture industries</li> <li>• Agricultural weeds</li> <li>• Livestock and Poultry</li> <li>• Waste from aquatic industries</li> <li>• Food processing industries</li> </ul> <p><b>Industrial waste</b></p> <ul style="list-style-type: none"> <li>• Dairy</li> <li>• Distillery</li> <li>• Paper and pulp</li> <li>• Tannery</li> </ul> <p><b>Municipal Solid waste</b></p> <ul style="list-style-type: none"> <li>• Domestic and kitchen waste</li> <li>• Waste from restaurant and canteens</li> <li>• Others</li> </ul> <p><b>Other waste</b></p>		<p><b>Bio based Products</b></p> <p><i>Chemicals</i></p> <ul style="list-style-type: none"> <li>• Bio-based plastics and polymers</li> <li>• Textiles</li> <li>• Fine and Specialty chemicals</li> <li>• Platform chemicals</li> </ul> <p><i>Food and Feed</i></p> <ul style="list-style-type: none"> <li>• Nutraceuticals</li> <li>• Food ingredients/additive</li> <li>• Pigments</li> <li>• Dietary supplements</li> </ul> <p><i>Others</i></p> <p><b>Biofuels&amp; Bioenergy</b></p> <ul style="list-style-type: none"> <li>• Biofuel</li> <li>• Biogas</li> <li>• Electricity</li> </ul>

## 2. Livestock health and improvement

The growing world population is vulnerable to limitations in the production of agricultural products and any change, be it climatic realities and/or variations or civil strife upset the delicate balance of providing affordable food for all. Around one billion people living mostly in Africa and Asia, depend on livestock for their day-to-day livelihood. To reduce poverty, fight hunger and ensure global food security, there is an urgent need to increase livestock production in sustainable ways.

India has vast livestock resources. Livestock plays an important role in Indian economy. About 20.5 million people depend upon livestock for their livelihood. Livestock contributed 16% to the income of small farm households as against an average of 14% for all rural households. Livestock provides livelihood to two-third of rural community. It also provides employment to about 8.8 % of the population in India. Livestock sector contributes 4.11% GDP and 25.6% of total Agriculture GDP ([https://www.worldwidejournals.com/paripex/recent\\_issues\\_pdf/2017/January/January\\_2017\\_1483613920\\_\\_159.pdf](https://www.worldwidejournals.com/paripex/recent_issues_pdf/2017/January/January_2017_1483613920__159.pdf)).

Livestock raising is one of the fastest-growing agricultural sectors. The farmers in India maintain mixed farming system i.e. a combination of crop and livestock where the output of one enterprise

becomes the input of another enterprise thereby realize the resource efficiency. Given the importance of livestock in the rural economy, expanding livestock production and increasing animal productivity have the potential to significantly improve rural livelihoods.

As a result of globalization and climate change the world is currently facing an unprecedented increase of emerging and re-emerging animal diseases and zoonosis (animal diseases transmissible to humans). Diseases affecting livestock can have a devastating impact on animal productivity and production, on trade in live animals, meat and other animal products, on human health and, consequently, on the overall process of economic development. Improving the governance of animal health systems in both the public and private sector is the most effective response to this alarming situation. It is of utmost importance to apply the appropriate animal health policies and programs in order to safeguard public health and ensure food safety. Preventing and controlling diseases grows economies, bolsters local communities, and improves the health of vulnerable populations, especially the young and elderly. Securing a safe, sufficient and nutritious food supply at a time of rapidly increasing population depends on healthy, productive animals.

The Government of India has launched 'National Livestock Mission' which is an initiative of the Ministry of Agriculture and Farmers Welfare. The mission, which commenced from 2014-15, has been designed with the objective of sustainable development of the livestock sector.

The aim of this call is to provide valuable information on how new products/processes/techniques can be used to support sustainable livestock production systems, and to identify specific research needs and gaps and new options for solving established and emerging problems related to livestock in India.

### **3. New and improved agricultural tools**

In the last few decades there have been many new and innovative developments in the farming sector with modern mechanized tools that can help in increased crop production. New and improved farming techniques can lead to high crop yield and maintenance of fertility of the soil while reducing labour and time. Furthermore, proper implementation of existing machines along with the improved agricultural tools and technologies will help farmers by increasing their productivity and decreasing the complexity of the system.

Previously in a developing country like India, limited use of mechanized farming techniques has prevented the development of a more organized and productive agricultural sector. Although India is aware of the technologies but the farmers fail to adopt due to cost of the new agro machines and knowledge. Financial viability has to be leveraged by the government and promoted for bringing in innovation driven progress and growth of this ecosystem.

With technology enabled solutions, development of new and improved equipment/technologies on soil health crop variety, productivity and nutrients loss in soil; farms and farmers can prosper. For example to name a few, tractors now come with agricultural implements like cultivators or broadcast seeders which greatly help in plantation of crops. Disc rotators attached with the tractor disperses seedlings evenly. Seeds can be easily drilled without much effort and labour of the farmer. Water sprinkler helps to irrigate large parts evenly.

Conclusively, it is necessary to have modern tools and technologies which will address the entire value chain from growth to processing of the farm produce. Keeping in view, this call aims to develop new and improved farming equipment that will make it possible to produce more and higher quality food with less manpower.

#### **4. Reducing post-harvest losses**

In developing countries, a significant amount of produce is lost in postharvest operations due to a lack of knowledge, inadequate technology and/or poor storage infrastructure. On the contrary, in developed countries, food loss in the middle stages of the supply chain is relatively low due to availability of advanced technologies and efficient crop handling and storage systems.

During the crop transition from farm to consumer, it has to undergo several operations such as harvesting, threshing, cleaning, drying, storage, processing and transportation. During this movement, crop is lost due to several factors such as improper handling, inefficient processing facilities, biodegradation due to microorganisms and insects, etc. Postharvest losses includes the food loss across the food supply chain from harvesting of crop until its consumption. The losses can broadly be categorized as weight loss due to spoilage, quality loss, nutritional loss, seed viability loss, and commercial loss. Magnitude of postharvest losses in the food supply chain varies greatly among different crops, areas, and economies. Therefore it is important to identify factors at various stages that cause food losses- from harvesting, Threshing and Cleaning, Drying, Storage, Transportation, Milling.

Technology interventions and improved storage structures can play a critical role in reducing postharvest losses and increasing farmers' revenues. Using better agricultural practices and adequate storage technologies can significantly reduce the losses and help in strengthening food security, and poverty alleviation, increasing returns of smallholder farmers. Therefore this call of proposals is focused on reducing the postharvest losses for a sustainable solution to increase food availability, reduce pressure on natural resources, eliminate hunger and improve farmers' livelihoods.

#### **5. Combating environmental pollution**

A clean environment that includes clean air, water, land and energy, is essential for human existence. These components must be sustained through conservation and proper management. Human interactions with natural systems is exhausting the life-sustaining resources. The requirement that environments must support life, good health and human productivity warrants closer examination of how the environment we build and inhabit is organized and managed.

As per WHO, around 7 million people die every year from exposure to fine particles in polluted air that lead to diseases such as stroke, heart disease, lung cancer, chronic obstructive pulmonary diseases and respiratory infections, including pneumonia. It is to be noted that in upper-middle-income countries, pollution and behavioral risk factors are of approximately equal importance in non-communicable diseases (NCD) causation, and in lower-middle- and low-income countries, pollution is the predominant risk factor for NCD mortality. Further, small changes in the average temperature can lead to frequent occurrences of dangerous weather patterns and devastating

storms. Change in climate may affect human health, agriculture, water resources, forests, wildlife, and coastal areas in long term

A plethora of opportunities has been offered by the current trends in biotechnology for effectively addressing concerns pertaining to the monitoring, assessment, and treatment of contaminated water, air, and solid waste streams. Remediation of polluted sites necessitates the development of new technologies which emphasize the destruction of pollutants or conversion to value added products. The future of sustainable development requires measures to reduce dependence on renewable raw materials and demand for basic need. Keeping in view, the repercussions of the polluted environment caused by the industrial revolution and negligence of the common man, the current call invites proposals to address the solutions.

Proposals should include research and innovation for efficient and low cost remediation strategies using microorganisms by means of (bio-) electrochemical systems, or alternate systems that require minimum or zero external energy or chemicals.

## **SCOPE OF THE CALL**

Under the present call, proposals are invited in the following areas:

- Waste to Value
- Livestock health and Improvement
- New and improved agricultural Tools
- Reducing post-harvest losses
- Combating environmental pollution

Products, Processes and Technologies with well-established Proof of Concept (PoC) that can be developed to a commercial product will only be considered.

## **AREAS FOR SUPPORT**

### **1. Waste to Value**

- Bioconversion/enzymatic processing of waste into:
  - ✓ Value added products
  - ✓ Clean burning fuel
  - ✓ Self-powered devices
- Other related technologies

### **2. Livestock health and Improvement**

- Interventions towards quantitative and qualitative improvement in livestock production systems

- Rapid, specific and low cost diagnostic kits for on-site detection of various animal diseases
- Improving production and quality of fodder and fodder seeds
- Control and prevention of animal diseases
- Other related activities

### **3. New and improved agricultural tools**

- Development of new and improved equipment/technologies to enhance productivity particularly that of small land holdings:
  - by reducing labor and time for various farm activities (ploughing, sowing, planting, harvesting, etc.) and corollary agricultural activities (hay-making, shredding, and loading, etc.) through mechanization/automation
  - through reduced consumption of fertilizers and pesticides
  - through efficient irrigation systems involving measurement of water stress levels and adopting appropriate water management and conservation strategies
- Tractor enabled/mounted sensors & IOT tools for soil health analysis
- Blending operating systems of irrigation with fertilization and pest control
- Other related activities

### **4. Reducing post-harvest losses**

- By automating/semi-automating sorting, grading and packaging the agricultural/ horticulture produce
- Though use of practical and innovative storage methods/technologies particularly for use at farm level
- Through early detection; and management of post-harvest diseases (preferably through chemical – free methods)
- By designing tools/technologies for easy handling of farm produce and their transportation
- Through biotechnological interventions for preservation, processing and value addition of fruits and vegetables
- Other related activities

### **5. Combating environmental pollution**

- Reducing the generation of greenhouse gas (GHG) emissions to mitigate climate change
- Biofilters and bioscrubbers for combating air pollution



- Carbon capture and sequestration
- Demonstration of safer and cleaner bio-based technologies over existing ones with special emphasis on reducing carbon dioxide emissions
- Technologies for the bioremediation of contaminated soil and groundwater
- Development of new methodologies for solid/liquid waste management and clean energy production
- Removal of heavy metal and other contaminants
  - Conversion of landfill gas into electricity and other useful products
  - Novel Microbial fuel cell systems for clean energy generation

## **TYPES OF PROJECTS SUPPORTED**

### **What is supported?**

- Proposals with well-established Proof-of-Concept
- Projects that propose a process/product innovation with significant potential impact or commercial potential
- Developed process should be sustainable from an economic and environmental point of view
- Should require only short term development (less than 24 months)
- Should be scalable
- The Technology Readiness Level (TRL) at the end of the project should be 6-7 (Pilot Scale Demonstration of the technology).( Please refer to TRL definition on BIRAC website)

### **What is not supported?**

- Concepts/exploratory research ideas without proper Proof-of-Concept
- Projects with no or low element of novelty
- Solutions that require long term development
- Proposals without preliminary data and technology commercialization objectives
- Projects with no plan towards saleable (implementable) technology/ products/services
- Funding cannot be used to support PhD student research or any other academic research.
- The grant is not a research fellowship

## WHO CAN APPLY?

**Eligibility:** Proposals are invited from-

- Companies/Start-ups/Limited Liability Partnerships - LLP (*with minimum 51% Indian ownership*) are eligible to apply either alone, or in collaboration with another Company/Academic Institution
- Academic Institute, University, NGO, or Research Foundation, having proper registration/ accreditation from a government body are eligible to apply with one or more partners of which at least one is a Company

### ***Eligibility criteria for academic institutions***

- For Public or Private Institute, University, NGO or Research Foundation proper registration/ accreditation from a government body is mandatory

### ***Eligibility criteria for companies/LLP***

- Participating company should be registered under the Indian Companies Act, 2013 with at least 51% Indian shareholding i.e., shares of the Company should be held by Indian Citizens holding Indian passport
- Limited liability Partnership (LLP) incorporated under the Limited Liability Partnership Act, 2008 having a minimum half of the persons who have subscribed their names to the LLP document as its Partners should be Indian citizens
- Participating company/LLP should either have:
  - i. Adequate in-house facility for project implementation (which shall be evaluated during the site visit)

or

  - ii. Incubated with any of the recognized incubation centers at the time of proposal submission
- The Applicant should own the background Intellectual Property based on which the proposal is made.

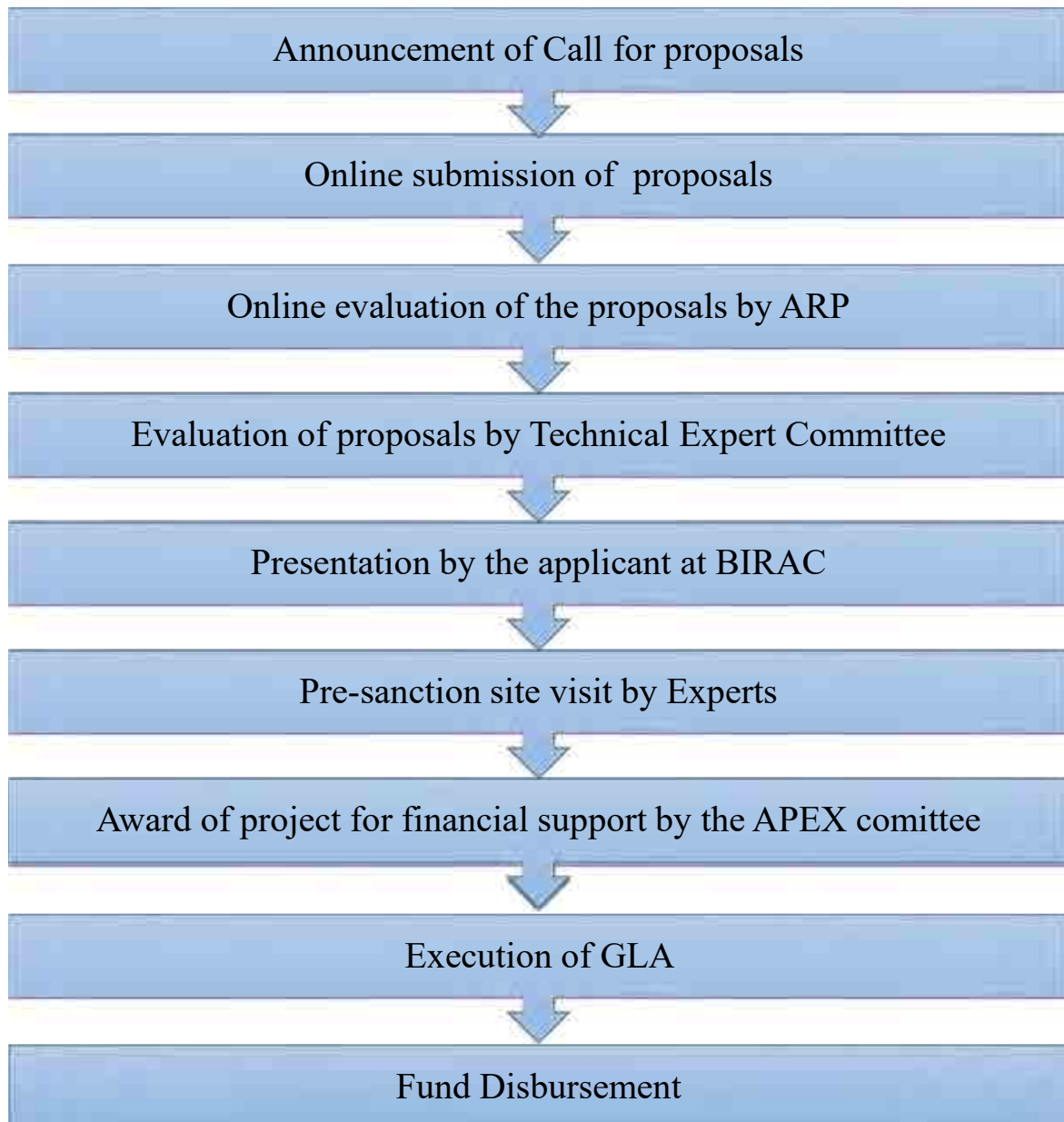
### **Note:**

- a) Any Company/LLP which is having two ongoing projects (as primary applicant or collaborator) in any BIRAC scheme that are scheduled to continue beyond 6 months from the closing date of the Call for Proposals shall not be considered for financial support
- b) Applicants and Co- applicants should not have any other legal disqualification that will prohibit them from participating in the scheme process and execution of necessary agreements thereafter.

## **DURATION OF PROJECT**

Up to a maximum of 24 months

## **EVALUATION PROCESS**



## **FUNDING**

Funding support will be in the form of Grant-in-Aid. The maximum cap is pre-determined and is as mentioned below:

- For proposals submitted by academia, 100% grant-in –aid to academia as well as its collaborator with a capping of Rs. 50 Lakhs per project
- For proposals submitted by Companies/LLP, there would be a capping of Rs. 100 lakhs per project (primary applicant + collaborator). The funding support from BIRAC under this category would be as follows:

*\* Projects upto 50 lakhs: 100% grant from BIRAC*

*\* Projects more than 50 lakhs but less than Rs. 100 lakhs: BIRAC grant would be Rs. 50 lakhs + 50% of the cost over and above Rs. 50 lakhs. Remaining cost would be borne by the company*

## **FUND DISBURSEMENT**

The fund disbursement is milestone based and will be released in 4-5 instalments as per the timeline of the project.

<b>Instalment No.</b>	<b>When</b>	<b>Amount (for proposal more than 12 month)</b>	<b>Amount (for proposal less than 12 month)</b>
1	Signing of Contract	30% of project cost	30% of project cost
2	Completion of 1st Milestone	20% of project cost	30% of project cost
3	Completion of 2 <sup>nd</sup> Milestone	20% of project cost	30% of project cost
4	Completion of 3 <sup>rd</sup> Milestone	20% of project cost	NA
5 (Final) *	Completion of project and submission of final report	10% of project cost	10% of project cost

*\*Since the last instalment is released after conclusion of the project, its nature would be reimbursement.*

## **INTELLECTUAL PROPERTY RIGHTS**

IPR will belong to the applicant

## **DATE OF CALL FOR PROPOSALS**

The call would open on 26<sup>th</sup> January, 2019 and shall close on **11<sup>th</sup>March, 2019**.

## CONTACT

For details related to scheme and submission of proposals, please log on to <http://www.birac.nic.in>

For additional information/clarification, please contact:

- Head-Investment (*investment.birac@gov.in*) or
- Program manager (*sparsh.birac@nic.in*)

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