



# BIG

Kick Starting Entrepreneurship

1<sup>st</sup> BIG Report - 2015



Igniting Innovation Sparks



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# Message



## Innovation is the Key to a growing Economy

Prof. K VijayRaghavan  
Secretary DBT & Chairman BIRAC

The question that policymakers, at the highest levels, continuously attempt to solve is how to keep a nation at the forefront of innovation such that new pathways are created that give rise to new industries which provide solutions, to myriad challenges. Innovations can bring higher productivity, generate employment and kick-start economic activity in several related and unrelated domains.

India cannot afford to miss the global transformation. We have the reagents for success we are a democracy and a young nation with two-thirds of our country is below 35 years of age. For India to not just to inch forward but leapfrog technologically, a massive push is needed to tap into available abundance of entrepreneurial energies. This is the context in which the Biotechnology Ignition

Grant- aptly named BIG was launched 3 years ago by BIRAC. BIG has focused on providing support, both funding and mentorship, to fledgling ideas that do not have a demonstrable proof-of-concept. BIRAC support through BIG is extended not just to the idea, but to the bearer of the idea and the surrounding team.

BIG has indeed brought in a positive biotech start-up culture in this country- a unique feature of this programme is its support to individuals as well as start-ups.

BIG is a big experiment- many of the ideas might fail to effloresce but this is an experiment that we cannot afford not to conduct. Within these entrepreneurial projects, perhaps there may lie several unicorns that need support. It is imperative that we do not miss out on nurturing future unicorns.

## **BIG is a big experiment- many of the ideas might fail to effloresce but this is an experiment that we cannot afford not to conduct.**

The BIG report highlights the journey of BIG and especially the journey of the entrepreneurs and their team. The report also captures the impact this programme has created; be it employment, skilling, IP and follow-on funding. These are the tangibles. However, equally important are the intangibles, the new ways of doing things, the creative collisions facilitated through networks and platforms.

The five BIG partners have synergistically worked with BIRAC to deliver the programme. It is necessary that we seek partnership with community at large, such as angel funders, VCs, accelerators, industry veterans, academic and scientific experts etc., so that our entrepreneurs and their ideas are nurtured while retaining aspects of selection and filtration.

BIG needs to expand, refine and continuously seek insights and constructive criticism. In short it should, like a good sports physiologist, know the pulse of those it seeks to help perform. BIRAC is committed to deepening BIG and expanding its impact. I would like to congratulate our BIG innovators and their teams and wish you success in your future journey.



# Foreword



Dr. Renu Swarup  
Senior Adviser, DBT and MD, BIRAC

BIRAC has over the last 3 years made a concerted effort to work towards fulfilling its mandate of “Empowering and Enabling the Innovation Ecosystem” in the Biotechnology Sector. Setup as a Not-for-Profit, Public Sector Company under Department of Biotechnology, Ministry of Science & Technology, Government of India, the primary focus of BIRAC has been to Nurture the Startups, and facilitate Industry-Academia interactions and to promote student entrepreneurship in a large way.

In this direction BIRAC launched Biotechnology Ignition Grant –BIG in July 2012. The purpose was to populate the Innovation Funnel, to have new Startup’s created and Ignite the Innovation Spirit in students and young entrepreneurs across the country. BIG was the first of its kind and a seed grant of Rs. 50 lakhs was made available to individual and young student entrepreneurs and startups. The impact of this has truly been “BIG”. In just about

3 years more than 150 young entrepreneurs have been supported and it is encouraging to note that out of this 44 are new startups created and seeded through the BIRAC BIG fund.

The BIG initiative is unique since this is managed by BIRAC’s 5 BIG Partners and it provides for the whole ecosystem support which includes Financing, Business and Technical Mentoring, Technology and IP Management and most importantly Capacity Building.

This survey brings to you glimpses of how the ecosystem is growing, the challenges and opportunities and the detailed analysis brings out a clear direction on the Way Forward.

We are confident that this initiative can be scaled up in a big way and would help in meeting the targets of the “Startup India Mission” announced by our Hon’ble Prime Minister.





# Acknowledgements

Biotechnology Ignition Grant (BIG), took its first nimble step 3 years ago and has now grown to have a foot print across the nation-the compounding effect of innovative ideas, supported by BIG, will create an amplified impact in the future. The 1st BIG report has evolved from our wish to convey the narrative of its evolution, measure and showcase its impact which it has created in a short period, understand the needs of the innovators and start-ups, and see where the gaps exist.

BIRAC's senior leadership especially Prof. K VijayRaghavan (Secretary DBT & Chairman BIRAC) and Dr. Renu Swarup (Senior Adviser DBT & MD BIRAC) provided encouragement and support that fuelled the report- their constant advice to reach out to the community and seek insights held us in good stead while we were conceptualising the report.

The programme has been guided from its start by Dr. MK Bhan and Prof. Padmanaban- who have given their time and insights to move this programme ahead. We are very thankful to them. We also acknowledge all our reviewers and selection committee members who have given their time for triaging of the BIG proposals.

BIG is truly a collaborative effort- involving people both internal and external to BIRAC. We would like to acknowledge our BIG partners for their continued support and building a community that is indeed BIG. We extend our appreciation to Deepanwita Chattopadhyay (IKP Knowledge Park, Hyderabad), Anil Wali (FITT IIT Delhi), Premnath Venugopalan (NCL Venture Center, Pune), Ramaswamy S (C-CAMP, Bangalore), Taslim Saiyed (C-CAMP), Mrutyunjay Suar (KIIT, Bhubaneswar), Vikraman Saranyan (IKP), Pratibha Boga-Kamat (C-CAMP), Ramjee Pallela (IKP), Manisha Premnath (Venture Center), Uma Patil (Venture Center), and M Nikhil (KIIT).

Our partnership with CfEL at the Judge Business School, University of Cambridge has become stronger each year-providing an opportunity to our BIG innovators to connect with the Cambridge ecosystem and the wider world. We would like to

acknowledge Shailendra Vyakarnam, Yupar Myint and Frances Bycroft for their help in making this partnership a success.

BIG is operationalised from the Strategy Partnerships & Entrepreneurship Development (SPED) group within BIRAC & the programme, over the last three years, has been diligently managed by- Sibi Sagar, Rajneesh Kumar and Kriti Taneja. The CfEL's partnership is taken care by Ankur Gupta.

The triaging process in BIG involves technical & IP related inputs from our colleagues at BIRAC- we thank PKS Sarma and the team- Jyoti Shukla, Sonia Gandhi, Shilpi Gupta, Prachi Agarwal, Amita Joshi and Dhiraj Kumar; the IP team - Vinita Jindal & Amit Katiyar; the Legal team- Banusri Velpandian, - the Finance team- Nandkishore, Lalitha Balakrishnan and Bhawna Nagpal; the Admin & IT support by Nameeta Khare, Amar Shukla and Jahnabi Chaudhry.

The 1<sup>st</sup> BIG Report would not have been possible, without the enthusiastic help and support provided to me by Akshay Kumar, Shilpi Singh, Amar Shukla and Kriti Taneja.

We would like to extend our appreciation to the 81 BIG innovators who responded to the survey, despite their busy schedules, and further with several others with whom we had a follow-on conversations- the survey coupled with the conversations gave us excellent feedback and insights that has helped us shape this report.

The programme's success is because of the innovators who have taken a leap into the universe of entrepreneurship- we sincerely acknowledge all of our BIG Innovators and it is their unbounded energy level that makes us strive even harder. BIRAC will continue to engage, keep channels of communication open with the innovators and seek to continually refine BIG. Ultimately in their success, lies our success and the nation's success and, most importantly, humanity's progress.

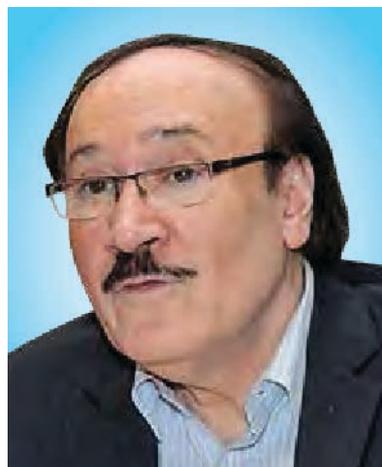
**Satya Prakash Dash**

Head, Strategy Partnerships & Entrepreneurship Development





“BIG is like  
the origin of  
the Ganges”



Dr. M. K. Bhan

Former Secretary Department of  
Biotechnology, Government of India  
& Former Chairman, BIRAC

Over a free flowing interaction, Dr. MK Bhan reflects on the need and relevance of early stage investments like BIG, its philosophy and the way forward.

**Satya Dash (SD):** Dr. Bhan, good afternoon- you have been instrumental in setting up BIG, how do you see the role of early stage funding programmes in the context of innovation landscape for a nation? Why was the need for BIG felt?

**Dr. MK Bhan (MKB):** The idea behind BIG is enshrined in the basic concept of when is the use of tax money appropriate for promoting innovation? This includes the time in the life of innovation pathway when ideas are nascent and as a society your goal is to initiate young and emerging people in science, engineering, medicine, agriculture & in variety of fields- to attract them into a world of thinking about their ideas & pursuing their ideas with the hope that there may be solutions. It is a message to the society, to people, that as a nation we invite you to participate in the adventure because we believe this is a key instrument of sustainable social & economic development. Tax money is also

used appropriately at times when investors & market forces tend to stay away- this is the period of highest uncertainty & highest risk.

Although we have SBIRI in India, however it is not early enough. The Indian SBIRI is not like the US's SBIR which is for early stage innovations. Hence (it was felt that), India's human capital cannot be transformed for social & economic development without an early stage scheme like BIG.

**SD:** So in the national context how do you visualise BIG?

**MKB:** BIG is like the origin of Ganges. BIG must be so BIG that rivers can form and not every droplet can make it to the river. Indeed, early stage schemes like BIG must be generous, large in scale, not risk averse and an investment in initiating the largest number of young people into a national army of solution designers & solution seekers.

There is a huge global experience now to indicate that sustained economic excellence happens only in countries that give a place to ideas like BIG.

**SD:** and in terms of overall cost to the nation?

**MKB:** The cost to the nation of not doing this is huge.

**SD:** Can you reflect upon the design elements that were integrated into BIG?

**MKB:** You are trying to move forward a potential innovator into a lifelong path of innovation- you have to look at the person and the idea together. BIG was designed to invest into an idea as well as the person. BIG was designed as a 'neighbourhood scheme'- running the schemes at multiple places such that money goes with mentorship. Mentorship is fundamental to this scheme.

**SD:** BIG is 3 years now- about 2.5 years since being operational, how does one assess a programme like BIG?

**MKB:** The early stage funding programmes must always be in grants-to ask for returns for investment ROI, is to fail the very spirit of the grant. The ROI in financial terms begins with schemes that cover late stage development & as I mentioned before, the early stage support is to invest in people and pipeline. Having said that, early stage programmes like BIG are assessed through the following:

- First, how many ideas we receive and we support are of the highest risk & highest rewards combination?
- Two, how did the experience transform the individual as a measure of how good are our mentorial systems.
- Three, is the number of applications shrinking or expanding? If they are not expanding then that means many parts of the country still don't have the message.
- Four, have you as an institution been able to build a relationship of trust with the individual?

**SD:** So what you are alluding to is whether the overall experience of BIG has been a transformational experience?

**MKB:** One must be attracted to that experience. Does the innovator see BIG & its BIG partner as an alma-mater in some form or only as a funding agency. So the institutional influence matters- they should see BIG as actually an empowerment

support that goes with money. We can say that BIG is a support mechanism in cash & kind

**There is a huge global experience now to indicate that sustained economic excellence happens only in countries that give a place to ideas like BIG. Any society that does not think about 15 years has a short term excellence**

**SD:** How would one scale BIG?

**MKB:** This is a good question, the dilemma in most places is to find the right balance between early stage investments & late stage investments. If you only invest in late stage programmes, you will get more success in the short run but after a few years, you will run out of ideas and hence future applications for late stage tend to come down.

In Western system, even in school they would be funded to these kind of things. Our early family experience tends to make us risk averse. In some way we have to compensate for this. The idea is to do BIG in a big scale- BIG is of value when it is BIG, when it is everywhere and covers all geographies. You must have enough 'succeeding ideas' and potentially successful ideas coming out of the pipeline.

**SD:** So as a country you need to hedge your bets across multitudes of innovative ideas. How do you see BIG evolving into the future?

**MKB:** At every stage, you must worry about today, next 5 years and the next 15 years. The pipeline is for the next 15 years. Any society that does not think about 15 years has a short term excellence. So they have this great period of success and this is where the USA is a leader because its pipelines are deep & massive.

**SD:** Thank you for your time and insights.

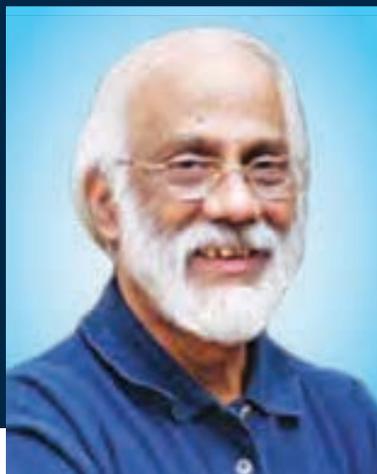
**MKB:** Thank you & all the best.



## BIG on the path to entrepreneurship

Prof. G. Padmanaban

Senior Science & Innovation Adviser,  
BIRAC, Former Director, IISc, Department of Biochemistry,  
Indian Institute of Science, Bangalore



The initiation of the Ignition Grant programme has established the path for entrepreneurship in Biotechnology in the country. BIG provides the platform for innovative ideas with young researchers (not necessarily in terms of age) with an entrepreneurship motivation to mature into SBIRI and then onto BIPP and CRS. The relevance of this programme has become clear with a rapid increase in the number of grantees and even a much larger number of applicants in each cycle to the extent that the number of mentor groups need to be expanded beyond the 5 established at present. There are already examples where the BIG idea has matured into the next stages. The need of the hour is to establish adequate number of incubators for all these start-ups so that the laboratory space and equipment infrastructure are accessible to them at affordable costs. One solution could be to create incubators for BIG grantees and other start-ups in all public sector research institutes and universities, central universities in particular. Agricultural universities may be able to set up specialized incubators to promote entrepreneurship in primary and secondary agriculture. Medical institutions may be able to set up specialized incubators to promote entrepreneurship in the health sector. Similar possibilities exist for the veterinary, aquaculture, bioinformatics, manufacture and other sectors. Although, some public sector institutions have set up incubators, the need is in an exponential scale.

The chosen path for almost all fresh Ph.Ds has been to have post-doctoral training abroad in academic research laboratories.

Similarly, candidates with post-doctoral training abroad look for mostly academic research positions in the country. Can there be a paradigm shift with the new path that is initiated with the BIG grant provided by BIRAC to become entrepreneurs? This could mean that qualified youngsters choosing a research career can also think of R&D based entrepreneurship as a serious career option. I believe that this would be an important requirement for any innovative technology to be developed. If India has to graduate from making only biogenerics and import substitution products to new generation innovative products, we need highly qualified researchers to take up R&D, leading all the way to translation. This change can happen even with candidates without a Ph.D. degree. I have already seen this happening with students of IITs, who choose to float a company and not necessarily think in terms of going abroad and settling down. This is easily feasible in the IT sector. But, Biotechnology in general needs lot more infrastructure and lead time to fructify. The Ignition Grant in that sense can potentially bring about a revolution in channelizing young researchers into a career of entrepreneurial venture and provide employment opportunities to many others. This would also require significant expansion of the BIG scheme, not necessarily confined to BIRAC. Hopefully the climate for investment and manufacture will also change for the better so that we will have a whole new generation of entrepreneurs in Biotechnology which can address the concerns of the country and also contribute to the welfare of man-kind globally.



# The Journey of BIG

## **Setting the Scene: The Department of Biotechnology & its response to the evolving Indian biotech startup ecosystem**

The history of biotech entrepreneurship in India goes back to more than three decades when Serum Institute (in 1968) and later Biocon (in 1978) were established at Pune and Bangalore respectively. Since then only a handful of biotech companies were established which mostly clustered around the hubs of Bangalore and Hyderabad and a few that put roots in Pune and Ahmedabad.

India was one of the first countries that realised the potential of the modern biotechnology and established a focused Department of Biotechnology in 1986 under the Ministry of Science & Technology. The initial years of DBT were focused on building the infrastructure- both brick & mortar and human capital in biotechnology that the country needed.

The industrial activity around biotechnology especially bioinformatics increased around the late 1990s and early 2000s mirroring the buzz of Y2K. A clutch of biotech companies were set up, some even by academic entrepreneurs. However, given the size of the country, the number of biotech companies was still small and their revenues modest.

The biotech entrepreneurial journey is risky and needs massive amounts of initial capital due to a long gestation period for product development. This scenario evokes a lukewarm response from private investors. The story of the IT start-ups in India took a different growth path in the same period given the fact that entry barriers to start are low with initial capital requirements significantly less and hence India IT startups rode the Y2K demand.

The DBT took notice of the biotech industry activity by the mid-2000s and identified the gaps that existed. The DBT responded to the signals from the nascent biotech industrial activity and initiated two flagship funding schemes- the SBIRI and BIPP- two pioneering Indian schemes that aimed to provide capital in form of soft loans and grants for biotech innovation that had crossed the proof-of-concept stage. These two flagship schemes guided the R&D appetite of the Indian biotech industry.

## **The establishment of BIRAC: The nodal biotechnology innovation agency**

BIRAC is a unique organisation in the Indian context. It is the nodal funding agency for the biotechnology industry that evolved out of a DBT's programme (called BIRAP) and was later, in 2012, transformed as a Not for Profit, Sec 25 (now Sec 8) company under the aegis of the Department of Biotechnology.

BIRAC's Vision is to stimulate, foster and enhance the strategic research and innovation capabilities of the Indian biotech industry, particularly start-ups and SME's, for creation of affordable products and addressing the needs of the largest section of society. The mandate of BIRAC is to catalyse the transformation of the rapidly growing biotechnology including medtech sector in India to global excellence and usher an impactful bioeconomy.

To implement its vision, BIRAC's strategy has embraced well rounded tools in first identifying gaps in the biotech innovation ecosystem and then designing solutions that address these gaps. BIRAC's funding mechanism encompass the entire range of the product development pipeline- from ideation to proof-of concept to later stages including validation, scale-up and commercialisation.

BIRAC has operationalised 7 flagship programmes and through partners, such as Bill & Melinda Gates Foundation, Wellcome Trust and DeitY, it has also put on the ground another six programmes- together all the programmes push for new product development.

## **BIRAC's strategy has embraced well rounded tools in first identifying gaps in the biotech innovation ecosystem and then designing solutions that address these gaps**

### **BIG in relation to the Global Models for Early Stage Biotech Funding**

Public funding of early stage innovation, especially in technology startups has been an issue that has been extensively commented upon. Governments play an important role in driving early stage funding which is crucial in several ways: first in developing the base of the innovation ecosystem and later, the continued support by the government helps a country to maintain a sustainable pipeline in the innovation ecosystem. Government intervention is also crucial in creating an effective, efficient and responsive regulatory landscape both in terms of taxation and commerce as well as regulation in health, food and agriculture. A well defined regulatory landscape signals to the industries the boundary conditions for R&D and industrial activity. Many a times, governments also play a role in creating early markets and adoption of new technologies.

Studies, including a recent one, by Marianna Mazzucato and several others have shown that the technology superpowers such as the USA and Israel have had sustained support from the government especially to early stage high risk innovations. For example, it has been shown that the contribution by NIH (which has a budget greater than US\$30 billion dollars per year) is immense in keeping the USA at the forefront of life science & healthcare innovation- the case of public funding of the human genome project and its positive spill over in expanding the genomics industry is an example of such public support to high end early stage technology development. Similarly, policy makers and economists have shown that the government's role

in the space programme and defence has contributed to the forward movement of the internet, information technologies and telecommunication- key sectors that have increased business efficiencies and productivity in the recent years.

It is precisely for this reason that in trying to keep the perennial spring of innovations from not being reduced to a trickle, in recent years, several nations including those whose economies are at the forefront of technological innovations, have re-focused on providing a boost to early stage innovation funding. This can be seen in the USA- one of the first countries to focus on early stage funding especially to its entrepreneurial small companies through SBIR and STTR grants. The Phase-I of SBIR program provides funding support up to \$150,000 (BIRAC's BIG is perhaps similar to Phase-I SBIR in its philosophy). These two pioneering programmes (SBIR & STTR) have continued to receive federal support and boast of several success stories in various technological areas such as life sciences, healthcare, IT and automobiles. These two programmes have contributed immensely in maintaining the USA's status as the leading nation in technological innovation.

In the USA, besides federal supported SBIR, several universities have mechanisms that provide access to early stage grants to their entrepreneurial talent. The Deshpande Center at MIT is a case in point. It has a namesake to BIRAC's BIG- a granting programme called 'Ignition' wherein US \$50K is given as grants to untested ideas that have potential to create high impact. The follow-on funding at Deshpande Center is called 'Innovation Grant' and is worth US \$150K. One of the key criteria for selection for grants at Deshpande Center is the disruptiveness of the idea as well as the likelihood of the idea resulting in a spinoff from MIT.

Similarly, Israel, popularly referred to as the startup nation in the world has a focused programme, the Tnufa Program, that extends support to individual entrepreneurs for prototyping, IP support and grants up to US \$50,000. Even mature economies of Europe and Asia such as Singapore have initiated programmes whose philosophy is to support early stage innovation research. Germany, through its Go-Bio programme, and Singapore via its 'Technology Enterprise Commercialisation Scheme (TECS)' have focused on enabling startups to push forward ideas towards commercialisation.

A strategic policy decision by several governments to intervene in early stages of innovation funding is in keeping with the aim to keep the bioinnovation pipeline of the nation active as well as to bridge the sharp gorge that lies between ideas and their proof-of-concept. This hurdle is exacerbated due to lack of private seed capital especially at the idea stage- the risks perceived are high and therefore private capital, except for a few rare instances, does not commit risk-capital at idea stages.

### **The Biotechnology Ignition Grant (BIG) Programme of BIRAC**

The BIG programme evolved from an extensive stakeholder consultation conducted, in 2010-2012, by the nodal biotech industry organisation, the Association of Biotech Led Enterprises (ABLE) at the behest of BIRAC and DBT which culminated in a high level roadmap report (Indian Biotechnology: The Roadmap to the Next Decade & Beyond). One of the important recommendations of the report to DBT and BIRAC was a suggestion that India should aim to become a global bioeconomy led by science driven enterprise especially via biotech startups. Further it was suggested that BIRAC should focus on designing and implementing an early stage seed fund specifically for biotechnology related fields of lifesciences and medical technology.

Taking note of the signals coming from the stakeholders, DBT & BIRAC realised that an early stage fund was essential to kickstart biotech entrepreneurship in India which, until then, lacked a focused programme which provided the necessary boost to creation and sustenance of biotech entrepreneurship. The Biotechnology Ignition Grant-BIG- as it is now popularly known was launched in the summer of 2012 with the first call for competitive proposals in July 2012.

The key strategy while designing this programme was to focus on supporting individual entrepreneurial talent in academia- be it driven by students or faculty as well as by young fledgling startups not older than 3 years. This focus of open support to both individuals and startups remains an unique feature of BIG perhaps making it stand out amongst other public funding measures in India.

Indeed since its inception BIG has focused on seeding a biotech startup culture to help India leapfrog to join the upper ranks of the global bioeconomy. BIG from the very outset aimed at

promoting novel, cutting edge ideas that are market driven with societal impact.

The creation of BIG bridged a gap in public funding of biotech startups and entrepreneurial individuals. BIG was akin to planting shoots of bioinnovation with the aim to populate the biotech innovation funnel with numerous ideas, providing a nurturing environment and help them grow and scale.

In India, where attitudes have long been risk-averse, especially regarding technology and scientific led entrepreneurship, establishing a programme that aimed to change this attitude in the biotechnology/life science domain was indeed a pioneering act by BIRAC. It is crucial for any knowledge driven economy to create a base of innovative ideas that has breadth as well as depth such that hundreds of ideas can be tested, refined and provided the right impetus to move them forward. For a long term strategy for a nation that needs to solve challenges in food security, health and energy, it is important to create and support a vast pool of dynamic entrepreneurial talent who are committed to launch a serious attempt to alleviate the societal challenges. It is with this systemic thinking that BIRAC kickstarted the BIG.

One important elements of design and implementation of BIG has been its partnership mode of functioning. BIRAC, initially, partnered with three technology incubators- IKP Knowledge Park at Hyderabad, FITT at IIT Delhi and C-CAMP at Bangalore as BIG Partners to implement the programme. As BIG gained momentum BIRAC extended its BIG partnerships to NCL-Venture Center at Pune and KIIT-TBI at KIIT University Bhubaneswar. Currently, these five partners help BIRAC to implement the programme.

The BIG programme is a competitive programme with two calls per year and the funding support that is typically extended is INR 5 million (or INR 50 lakhs) which in 2012 was close to US\$100,000. The projects range from 12 months to 18 months and under special circumstance allowed a further six months (no BIG project is allowed to go beyond 24 months). Biotech startups (including medtech) that are less than 3 years old from the time of the call for proposals are eligible and of course individuals can also apply as project leaders. The screening is 3 tiered- an online screening followed by two rounds of elimination through

presentations and the applications are triaged using the prism of novelty (disruptive vs. incremental), technical feasibility, commercialisation potential and competency of team. In total 155 BIG projects have been approved and are in various stages of their operations.

### **Connecting the biotech entrepreneurs to the wider BIG Ecosystem: BIG Partners, Networks and Mentorship**

While funding is extremely crucial it was not the sole intention when BIG programme was laid out. Besides funding, BIRAC intended to provide BIG grantees mentorship both in technical as well as business aspects of their entrepreneurial journeys. As mentioned previously, the BIG programme has 5 implementing partners who monitor and mentor the BIG grantees. Initially BIG began with three partners: FITT at IIT Delhi, IKP Knowledge Park and C-CAMP at Bangalore but as BIG grew there was a felt need to increase the numbers of partners and from the 4th Call of BIG, BIRAC welcomed two more partners to the BIG programme viz: NCL Venture Center at Pune and KIIT-TBI at Bhubaneswar.

The five partners have played an important role in mentoring the BIG grantees and connecting them with relevant experts as well as providing opportunities to interact and share knowledge with other entrepreneurs and other funders including angels and accelerators. BIG partners and BIRAC regularly organise network meetings as well as workshops that help BIG grantees in taking their ventures forward.

Building on BIG, BIRAC has launched several other programmes that attempt to fill the gaps in early stage funding.



### **BIRAC's partnership with Centre for Entrepreneurial Learning (CfEL), the Judge Business School, University of Cambridge**

Fostering mobility has positive spill overs. It is important for entrepreneurs to connect globally, share and learn from their global peers which possibly can help refinement of the business models of the BIG innovators. BIRAC provides continuous support to emerging entrepreneurs to be part of national and global networks. One such collaboration that BIRAC has initiated is with the Centre for Entrepreneurial Studies (CfEL) at the Judge Business School, University of Cambridge, UK.

In this collaboration with CfEL, BIRAC supports 5 BIG grantees who join CfEL's flagship (& aptly named) week long programme 'Ignite' programme which is more than a decade old. BIRAC has sent three batches of 5 BIG grantees (as BIRAC Ignite Fellows) to CfEL's Ignite. In addition to the programme, CfEL also mentors BIG grantees for an additional week to help connect BIG grantees to the Cambridge ecosystem and beyond. The Ignite programme has been of high value to the BIG grantees.



### **BIRAC BIG 1st Conclave in partnership with FITT, IIT Delhi**

One of the important aspects for BIRAC has been to build a community amongst the BIG grantees and provide platforms to interact with business leaders, funders and share experience.

BIRAC organised its 1<sup>st</sup> BIG Conclave in partnership with FITT, IIT Delhi at India Habitat Centre on 26<sup>th</sup> & 27<sup>th</sup> May 2015 which was attended by 70 BIG grantees, BIG partners, business leaders, mentors, angel funders, accelerators, foundations and other funding agencies. 15 BIG grantees presented their innovations and spoke about their journeys. Interestingly, two of the BIG grantees connected and set up a partnership- a positive serendipitous meeting and BIRAC would like to encourage similar collaborative outcomes.



### **Entrepreneurship Programmes at BIRAC: Helping ideas pole vault to the next stage**

Building on the learnings from BIG, BIRAC has fashioned a number of mechanisms aiming to boost entrepreneurship in biotechnology- a segment that faces challenges of long gestation period, regulatory hurdles, intensive early capital requirements amongst others. The cumulative impact of the challenges is that investor sentiments are generally lukewarm for investing in pure play biotech startups.

Through a focused approach on bio-entrepreneurship, BIRAC has endeavoured to populate the bio-innovation funnel of the nation and has built a portfolio of programmes that are strategic in their intent to create a gamut of opportunities for young startups and entrepreneurial individuals (Figure 1).

In 2013, BIRAC launched a social innovation programme called SPARSH that incorporated a product development component including funding for early stage startups and entrepreneurs as well as another component that aimed to build, tool and mentor a pool of social innovators through a fellowship programme (called Social Innovation Immersion Programme-SIIP) who, it was intended would identify gaps and attempt to bridge the gap through an innovative product or a service solution. SIIP is implemented through 4 partners-NCL's Venture Center, KIIT-TBI, THSTI and Villgro Foundation. Further in 2013, BIRAC launched

a BIRAC Regional Innovation Centre (BRIC) at IKP Knowledge Park to map the dynamics of the entrepreneurial ecosystem in Southern India and simultaneously provide support to startups for IP, technology transfer as well as networking opportunities.

Strategically BIRAC has also begun to focus on fostering entrepreneurship at places where innovations can be carried out in-situ. In this regard, it has built a recent partnership with SRISTI to support bioentrepreneurial ideas emanating from young biological sciences and medical technologies students at academic institutions across the country. Through the BIRAC-SRISTI Gandhian Young Technology Innovation (GYTI) Awards, BIRAC aims to support 15 entrepreneurial ideas by students in academia which can be propelled further with mentorship of academic faculty through an award of INR 15 lakhs. Further, an additional 100 germinating ideas across the country would be provided with INR 100,000.

One of the important programmes of BIRAC is the Bioincubator Support (BIS) wherein BIRAC has extended funding support

to 15 bioincubation centres across the nation and has build 124,000 sq.ft of incubation space besides supporting a common pool of high end instrumentation at each bioincubator which can be accessed by startups, SMEs and others in the ecosystem and beyond. These 15 bioincubators cover all aspects of biotechnology with focus areas from next generation sequencing, biopharma, to boosting the medtech sector in the nation. The bioincubation theme has been extended with the launch of a specialised programme, called University Innovation Cluster (UIC) that aims to revitalise industrially focused innovative R&D at universities through focused postdoctoral and as well as master's fellowships as well as provide support for incubation space.

The cumulative power of all the programmes starting from BIG, BIS, SPARSH, SIIP Fellowship, UIC, BIRAC-SRISTI Gandhian Award has been phenomenal and as these programmes take deeper roots they will help in the growth of bio-entrepreneurship in the country.

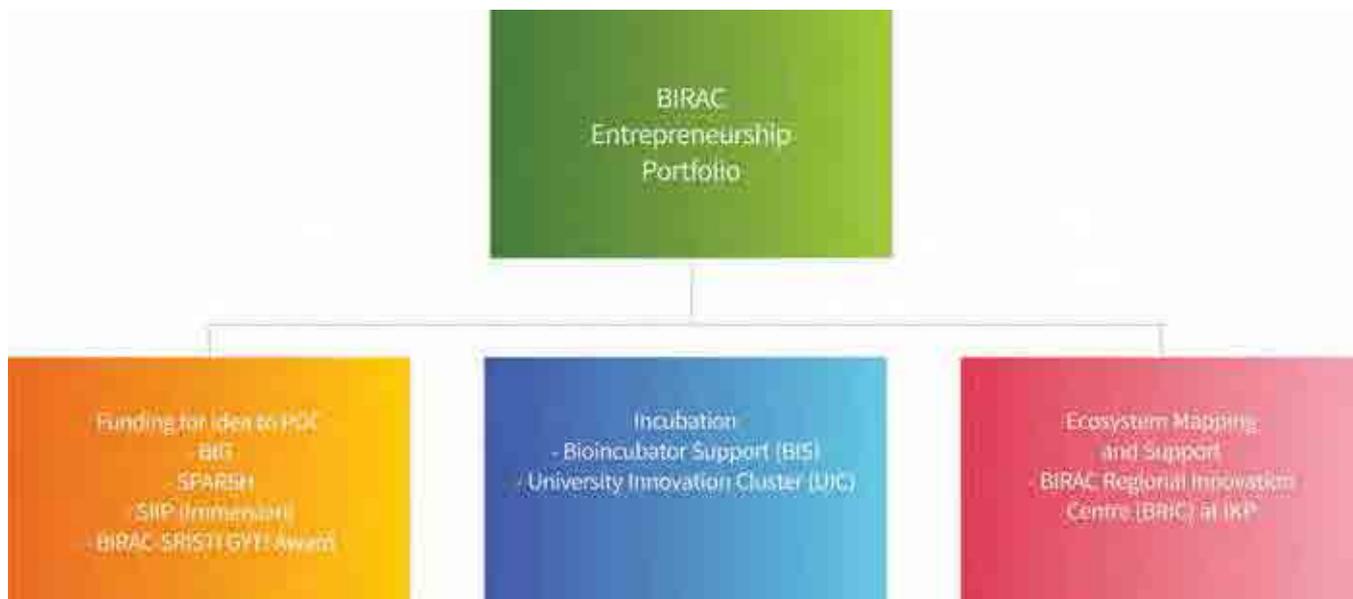


Figure 1 : The range of BIRAC Entrepreneurship Programmes



# 02

## BIG Partners Perspectives



### BIG - The Innovation Adjuvant

Dr. Anil Wali  
MD, FITT-IIT Delhi

The Foundation for Innovation and Technology Transfer (FITT) is a specialist external-interface organization created by IIT Delhi, and has been enabling innovations and technology commercialisation since 1992. Over the years, FITT has devised innovative ways to create partnerships and linkages that help in the knowledge transfer process. Amongst the key functional verticals, FITT has been playing a leading role in establishing a robust innovation eco-system in the country. In the year 1999-2000, FITT took an important step in establishing a Technology Business Incubation Unit (TBIU) at the Indian Institute of Technology Delhi (IIT Delhi) to provide a platform for enabling research spin-offs. The focus at the incubator has been on establishing innovation led technology ventures. In the beginning, much of the interest in the techno-entrepreneurial activities centred around ICT and engineering design, and there were relatively fewer biotech incubation proposals. However, attention towards the biotechnology sector got a flip only when BIRAC's Biotechnology Ignition Grant (BIG) scheme came on the horizon. For FITT, the selection by BIRAC as its BIG partner was an important milestone towards strengthening its technology-led innovation and entrepreneurship support architecture. Adoption of the BIG scheme has been an optimal fit in the repertoire of FITT's support toolkit. The BIG program started offering support in 2012, and since then we have been witnessing a surge of

interest both by innovators and wannabe entrepreneurs in the broad field of biotechnology. Though extremely competitive in nature, this scheme has been fairly liberal in its outlook to support innovative ideas in the various areas of biotechnology. In particular, BIG scheme is designed to stimulate IP creation, proof of concept and commercialization of research resultants. The BIG support, like the erstwhile TePP program of DSIR is in the form of a grant-in-aid that greatly helps to mitigate the development risks which is always a challenge for young innovators and early stage start-ups. One key aspect of BIG scheme is that it encourages support to out-of-box thinking and novel concepts that would have otherwise found difficult to muster need-based support. The establishment of BIRAC supported Biotechnology Business Incubation Facility (BBIF) compliments the infrastructural gaps in the start-up ecosystem for biotechnology at FITT/IIT Delhi. Since the inception of BIG, FITT through its partnership has supported 27 innovative projects all across the country. Of these, 13 happen to be from start-up companies mostly based out of leading TBIs in the country. A few scientist BIG grantees aspire to be entrepreneurs towards which FITT would provide needful hand-holding and mentorship. The legacy advantage of FITT comes into full play when it is in a position to mentor innovators on aspects of IP, technology, business strategy etc. Currently, three of the BIG grantees are incubating at BBIF in IIT Delhi.

Given our experience of over 15 years in fostering innovations, it is heartening to see the way BIRAC has charted a roadmap in building the techno-entrepreneurial value chain besides initiating valuable co-support programs with industry. BIG, in particular, has started generating huge interest amongst scientist and student innovators to actively look at commercializing their research and ideas. The grant of up to Rs 50 lakhs over

an 18-month period in this scheme adequately addresses the start-up needs of a variety of projects. The five BIG partners are effectively coordinating the consolidation and growth of biotech start-up landscape in the country. A few major successes from the BIG scheme seem round the corner and that should serve to boost the world of biotechnology enterprises in India.



## IKP's perspective on BIG programme: Reflections on trends

Ms. Deepanwita Chattopadhyay,  
Chairman & CEO, IKP Knowledge Park,  
Hyderabad

The Biotechnology Ignition Grant (BIG) scheme of BIRAC was launched in July 2012, and after six Calls, over 1000 applications and 155 grantees from across India, is undoubtedly the most sought after grant among early life science innovators. I cannot think of any innovation grant scheme in India, other than probably the Technology Entrepreneurship Promotion Programme (TEPP), that is comparable to the BIG scheme in its inclusive nature and its ability to transform the entrepreneurial ecosystem.

The Biotechnology Ignition Grant, as its name suggests, is focused on seeding innovative ideas in biotechnology, and more broadly in life sciences and medical technology, and is open to early start-ups (less than three years old), individual innovators as well as innovators from academia. Grants are meant for conducting proof of concept experiments or developing prototypes. The grant size of up to INR 50 lakhs is generous and compares well with similar global health exploration grants.

The BIG scheme recognises that the funding is only meant to act as the first step in the technology de-risking process. To broad-base its reach, BIG is implemented through five incubator partners who monitor and mentor the grantees. The success of the scheme is

measured by the number of technologies developed, IP generated/ patents filed by the grantees and follow-on funding raised.

IKP Knowledge Park (IKP) has been a BIG partner of BIRAC since 2012 with 39 grantees including eight graduates. 72% of IKP BIG grantees are from Pune (12), Hyderabad (9) and Bangalore (7) with the rest spread across India, including grantees from Guwahati, Imphal, Nagpur and Thanjavur.

While three years may be too short to draw any inference on a programme, I would like to share some initial trends. IKP received 307 applications from six Calls. 43% applications were from startups, 24% from individuals and 33% from academic/research institutions. That 23% of the applicants were women went to show that such funding schemes could play a vital role in encouraging women entrepreneurs.

39 proposals were selected for awards, which meant a conversion rate of 12.7%. The split among different categories of grantees was different from that at the application stage with 33% grantees representing startups, 23% individuals and 44% academia. This could be interpreted as proposals from the researcher

community scoring better on innovative ideas, or being more robust with available preliminary data. Scientists from National Chemical Laboratory, Pune turned out to be the most prolific among applicants from academic/research institutes with eight of them selected as grantees. This could be attributed to the deep engagement of NCL Venture Centre, the on-campus incubator, and also to the tradition of technology commercialisation at NCL. That 87% of the grantees have registered their companies is a reflection of their intent to commercialise their innovation.

The distribution of grantees by domain shows that 38% grantees are working on medical devices and diagnostics while 26% are addressing needs in the industrial biotech segment. These areas seem to be more amenable to incremental innovations addressing affordable solutions requiring reasonable investments till commercialisation, and hence an obvious opportunity.

Five of the eight graduates are pursuing their work beyond the grant period. Three of them have raised additional grant funding, one has received angel investment and another started posting revenues. Of the three who have discontinued their work, two failed to meet the projected milestones while one was constrained to discontinue operations due to their inability to raise further funding. Thirteen patents have been filed so far. The early trends seem healthy and are in consonance with the objectives of the Ignition Grant scheme. We would like to collate the data as more grantees enter the programme and graduate and also track the progress of the graduate start-ups, for in the ultimate analysis outcomes and not just outputs will determine the success of the programme.



## **BIRAC's Biotechnology Ignition Grant: Creating the pipeline of bio-entrepreneurs for the Nation!**

Dr. Premnath Venugopalan,  
Director, Venture Center, Pune

The Biotechnology Ignition Grant (BIG) scheme is a path breaking funding program of the Government of India and the Venture Center is excited to be a key enabling organization for this program as a BIG Partner.

The BIG scheme stands out amongst various other government initiatives by a) placing faith in individual innovators and biotech startups (for profit entities) for driving innovation as opposed to only supporting non-profit research and academic organizations, b) providing grant funding support as opposed to soft loans or equity investments, c) funding ideas at concept stage without requiring pre-existing data and body of work, d) empowering

innovators and entrepreneurs to take technology risk and build technology enterprises by reducing some of the early stage risk, e) funding at levels that is not sub-critical and funding mechanisms that are not too encumbered and do not have strings attached, and f) operating the program via multiple partner organizations to improve operational efficiencies, encourage competition and allow for easier scaling up and diversification of scope of activities. These features have been central to filling up an important gap in the funding landscape of the innovation ecosystem for scientific startups in India. Via its successful launch, BIG has also demonstrated a role model for funding program to other agencies

interested in promoting innovation. The BIG has emboldened and unleashed the energies of several entrepreneurs – young and not-so-young – to pursue their innovative ideas. BIRAC deserves full marks for conceptualizing such a program.

The Venture Center (which includes a BIRAC supported Bioincubator) has seen its innovation ecosystem energized by the BIG program in many ways. The BIG has helped nudge several highly qualified scientists and engineers to turn entrepreneurs, and this in turn has enriched Venture Center's human ecosystem tremendously. The sheer process of helping build teams for BIG, the large reviewer's network and mentor networks has brought together a large number of people with passion for technology and innovation - and this has had its own catalytic effects. We have seen the young and enterprising joining hands with the experienced and respected in unprecedented numbers. In Pune, BIG has also helped create the first crop of scientist entrepreneurs from publicly funded research organizations; Venture Center has at least 8 spinoff companies from research labs. Venture Center's mentoring sessions, talks, workshops and campaigns aligned with the BIG program have created a vibrant ecosystem with a buzz. The mentoring and incubation activities around BIG have

tremendously increased the offerings and capabilities of the concerned incubators, and encourage new enthusiasm in the incubation community. But most importantly, BIG has helped several people pursue bold ideas with potential to shape futuristic industries for the Nation such as medical biotech, biomed devices, diagnostics, agro-biotechnology, industrial biotechnology, etc. The Venture Center is today home to 24 resident incubatees and 37 associate/ pre-incubatees. Several of these are beneficiaries of BIRAC funding schemes. It is too early (in biotech timescales) to tell how many will succeed but if investor interest is anything to go by, the entrepreneurs hold enormous promise. Irrespective of success or failure, programs such as BIG would have ensured that India gave an honest and full-hearted shot at building a biotech-led innovation economy for the Nation.

The Venture Center strongly believes that in high-science and knowledge intensive industries, the best way to kick start innovation and build pipeline and momentum for entrepreneurship is via quick, flexible and adequate grant funding. Towards this end, a scheme such as BIG is the pressing need of the hour. BIG needs to be strengthened and expanded. The momentum that has been built should not be lost.



## C-CAMP's perspective on BIG programme

Dr. Taslimarif Saiyed  
COO, C-CAMP

**High-risk funding is necessary:** High-impact innovation comes with high-risk and hence, these innovations need risk funding at the early stage of any start-up. BIRAC in India through its BIG Scheme does precisely this. A crucial cog in this program has indeed been the support provided by partner organizations

across the country such as C-CAMP, IKP, FITT, Venture Centre and KIIT-TBI who help manage the initial screening and evaluation of proposals and once awarded, are closely involved with the awardees through incubation and mentoring throughout their project tenure.

**C-CAMP's Support in BIG Scheme:** Scientific and equally important, business handholding is essential to see these exciting ideas/discoveries through to the market. Having these BIG grantees incubate in a nurturing environment, thriving with cutting-edge technology and entrepreneurship expertise becomes very valuable to a budding entrepreneur or a start-up. C-CAMP, through its presence in the academic environment of NCBS/InStem and strategic collaborations with other organizations like NSRCEL (IIM-B); accelerators like Villgro, InnAccel and Axilor; IP firms; international organizations like Cambridge Judge Business school, One Nucleus, CAMTech and investors like Venture East, Indian Angel Network, Unitus Seed Funds; offers this very ecosystem to BIG funded start-ups partnered with it. The C-CAMP entrepreneurship program not only helps awardees connect with mentors but holds multiple workshops covering various aspects like clinical development, regulatory affairs, IP/Legal, further funding etc. and further provides the awardees with crucial networking opportunities. The BIG awardees have benefited remarkably from the mentoring and networking programs C-CAMP holds and we believe that it is an important value add to the an early-stage funding scheme like BIG.

**Outcomes from BIG Scheme at C-CAMP:** C-CAMP held its first Valedictory program for the 1st call awardees in June 2014. Through the first round of BIG (started late 2012), C-CAMP's 6 start-ups/entrepreneurs have successfully progressed their innovative ideas towards proof-of-concept studies and 4 of these 6 start-ups have secured next-level funding in form of grants, angel investment and even private equity investment. Going by this and the next batch of start-ups having established proof-of-concept and being well on their way to secure next level funding and validation of their technologies, we can certainly say that the

BIG scheme is doing wonders for promoting biotech enterprise formation and also academic entrepreneurship in the country with over 100 IP based start-ups supported.

One of the niche values that C-CAMP has been able to bring to this initiative is proximity to cutting-edge scientific environment for these start-ups. For high-impact innovation, it is imperative for start-ups to engage with scientific leaders and improve on their understanding of the broader field. We have seen multiple cases where this proximity has allowed fine-tuning of BIG projects for significant improvement. Previously unimaginable in the Indian bioscience funding landscape, BIRAC has been courageous and delivered a program that focuses on igniting innovation from early-stage ideas rather than simply fund existing mature companies with a track record of success. The program has also developed a thorough screening process to evaluate applications and this has been continually refined and optimized through successive calls to ensure that the ideas awarded have the maximum chance of success. We see a steady growth of interest in choosing C-CAMP as a BIG Partner for the BIG scheme, which is very encouraging as it indicates the efforts of BIRAC and the partners to create and help cultivate a more entrepreneurial culture across the nation. Such schemes will help young innovative start-up companies in need and increase the number of entrepreneurs with high-levels of expertise and exciting ideas being supported, which will contribute significantly in taking India from a service-based life science industry to innovation-based industry.

We, at C-CAMP, are delighted to have been a partner of BIG scheme and contribute. We have also learned significantly about Life science Innovation and we look forward to working with BIRAC for its other initiatives.



## The Eastern Perspective on BIG

Dr. Mrutyunjay Suar  
CEO KIIT TBI, Bhubaneswar

Being primarily a University based Incubator; we focus on translating research entrepreneurial avenues. On one hand, The “Biotechnology Ignition Grant” has provided us with the right platform to translate research, while on the other our experience in executing various cutting edge translational research projects gave us the right expertise to take the role of a BIG Partner. We are witnessing a steady rise in BIG applicants owing to our sensitization activities.

Being a relatively young BIG partner, our focus is to encourage startups with a “Technology Platform Model” wherein they sell/rent technologies to various established players. However, more recently, we are also getting into the RIPCO (Start-ups that research and develop a new product to finally license it to a big pharma/biotech company in exchange for a royalty on sales) & FIPCO (Start-ups that launch their own Product) models as well.

The KIIT BioIncubator has been focusing its activities on East and North East regions. In the State of Odisha, we have been able to evince interest in various stakeholders from research and academia, including innovators from CIPET, IIT (Bhubaneswar), ILS, NISER etc. BIG has become an excellent platform for researchers to translate research into products and processes of commercial viability. Our innovators are executing cutting-edge projects on various trans-disciplinary areas covering nanotech, diagnostics, biomed and life sciences.

We have been able to conduct several interactive workshops with various stakeholders to sensitize them about entrepreneurial opportunities. India’s North East region is very rich in biodiversity with various researchers executing projects on industrial

processes etc. With our interactions we have been able to evince interest from various academic NE researchers to commercialize their research and its products. We were able to evince interest in few tech and biomed startups from West Bengal and are in discussions with the NASSCOM Startup Warehouse, Kolkata to enter into a collaboration to promote startups in the big data bioinformatics space. Also, we are in negotiation to enter into strategic partnerships with some NE universities to setup satellite mentoring stations, wherein the BioIncubator would be involved in conceptualization of basic research projects which would one day be translatable, thus forming a long term relationship.

The KIIT BioIncubator is presently housing around 13 BIG Innovators out of which 3-4 are in the process of incorporating Pvt Ltd companies. The BioIncubator is also negotiating a technology transfer licensing deal. Our credibility as a BIG partner has also helped a resident incubatee to attract investment from private investors.

Improvement should be made with respect to derisking the biotechnology sector. The multi-billion dollar valuations and billion dollar investments that are routinely seen in the e-Commerce sector are either non-existent or minimal in the biotechnology sector. The angel investors and venture capitalists are bullish about the regulatory framework, which is hindering them to invest in biotechnology. However, we are seeing a rising trend where in few players are recognizing the efforts of the sector. A move in this regard from the Government is the equity based investment scheme – AcE fund. This will derisk some of the stages and encourage VCs to invest in the Indian biotechnology sector.

The BIG programme has been a pioneering programme helping create and sustain entrepreneurial energies across the nation. There are two BIG calls each year and currently the BIG7 round is active & the screening of the proposals is ongoing. The entire BIG process, like all other BIRAC programmes, is online and is open to startups (that are less than 3 years old from the date of the call) as well as individuals who wish to take an idea to a proof-of-concept stage.

Each BIG call typically evokes a response from all across the country, literally from Srinagar to Kanyakumari on one hand and from Agartala to Jaipur on the other. Over 6 calls, BIRAC has received 1036 applications and 155 are at various stages of their BIG lifecycle indicating a success rate of approximately 15%. The total number of women entrepreneur/innovator supported is 36. It is interesting to note the geographic distribution of the

BIG applicants. The distribution of the applications shows that entrepreneurial ambitions, especially in the realm of lifesciences, are emerging from all across the country. It is no surprise that the major cities have contributed majorly to the applications for BIG followed by a long tail of smaller number of applications from the rest of the country. The majority of applications received have been from Bangalore (189), Hyderabad (127), Delhi-NCR (117), Pune (92) and Chennai (77) followed by cities such as Mumbai (39), Bhubaneswar (32), Ahmedabad (31), Baroda (26), Kolkata (17), Manipal (10) and Guwahati (9).

Looking into the list of approved projects shows that the leading cities that have BIG projects are Bangalore which has 39 BIG approved grantees (25.16%), followed by Pune (27) with 17% of the BIG approved grantees (details in Figure-2 & 4)



Figure 2 : Distribution of BIG Grantees across cities



Figure 3: Women Entrepreneurs / Innovators supported through BIG



Figure 4 : The footprint of BIG

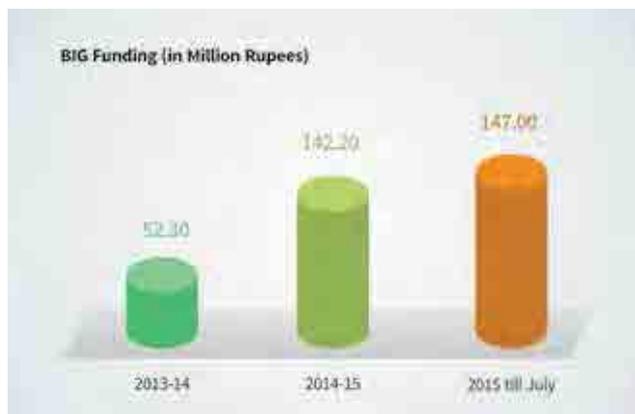


Figure 5 : BIG funding since 2012

In July 2015, BIRAC initiated a survey amongst the BIG grantees to understand the impact of BIG as well as provide a feedback platform for the BIG grantees. In the survey, emails were sent to 125 BIG approved projects, at various stages of their project timeline, with a request to fill in an online survey questionnaire. 81 BIG grantees responded to the survey. The data received from the grantees showed various elements of BIG's impact as well as the DNA of the entrepreneurial journey initiated by many of the grantees. The data presented in the following sections is a combination of survey data as well as centralised data available at BIRAC.

### The BIG Sectoral Distribution

An analysis of the BIG supported grants shows the distribution pattern of the approved projects in different sectoral domains of biotechnology or life sciences. 50% of the approved projects fall in the category of devices and diagnostics, followed by industrial biotechnology & secondary agriculture (21%), and cumulatively healthcare (especially drugs/drug delivery, biosimilars and stem cells and vaccines) together account for 25% while agriculture projects account for 3% and bioinformatics for 1% of the total approved BIG projects (Figure 6).

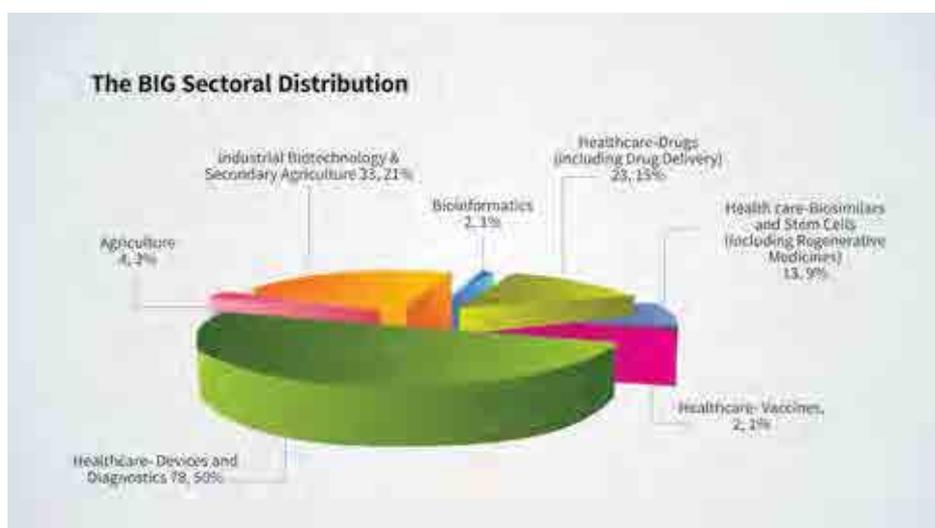


Figure 6: The Sectoral Distribution of approved BIG projects

**The routes to germination of the BIG idea by the innovators:**

The survey showed that the 'idea' for the BIG application emerged from variety of sources with 80 respondents providing diversity of responses from thesis, ongoing research, literature review to identification of societal needs, market driven and combination thereof. Figure 7 shows the range of responses that were received.

It is evident that more than 60% of grantees had identified the idea based on a clear social, market and social plus market need

and it is interesting to observe that 8% had derived their idea from a combination of thesis as well as understanding of either a market or social need that their thesis could lead to. Respondents alluding solely to 'thesis' or 'research', 'literature review' and 'literature review and thesis comprise 18%.

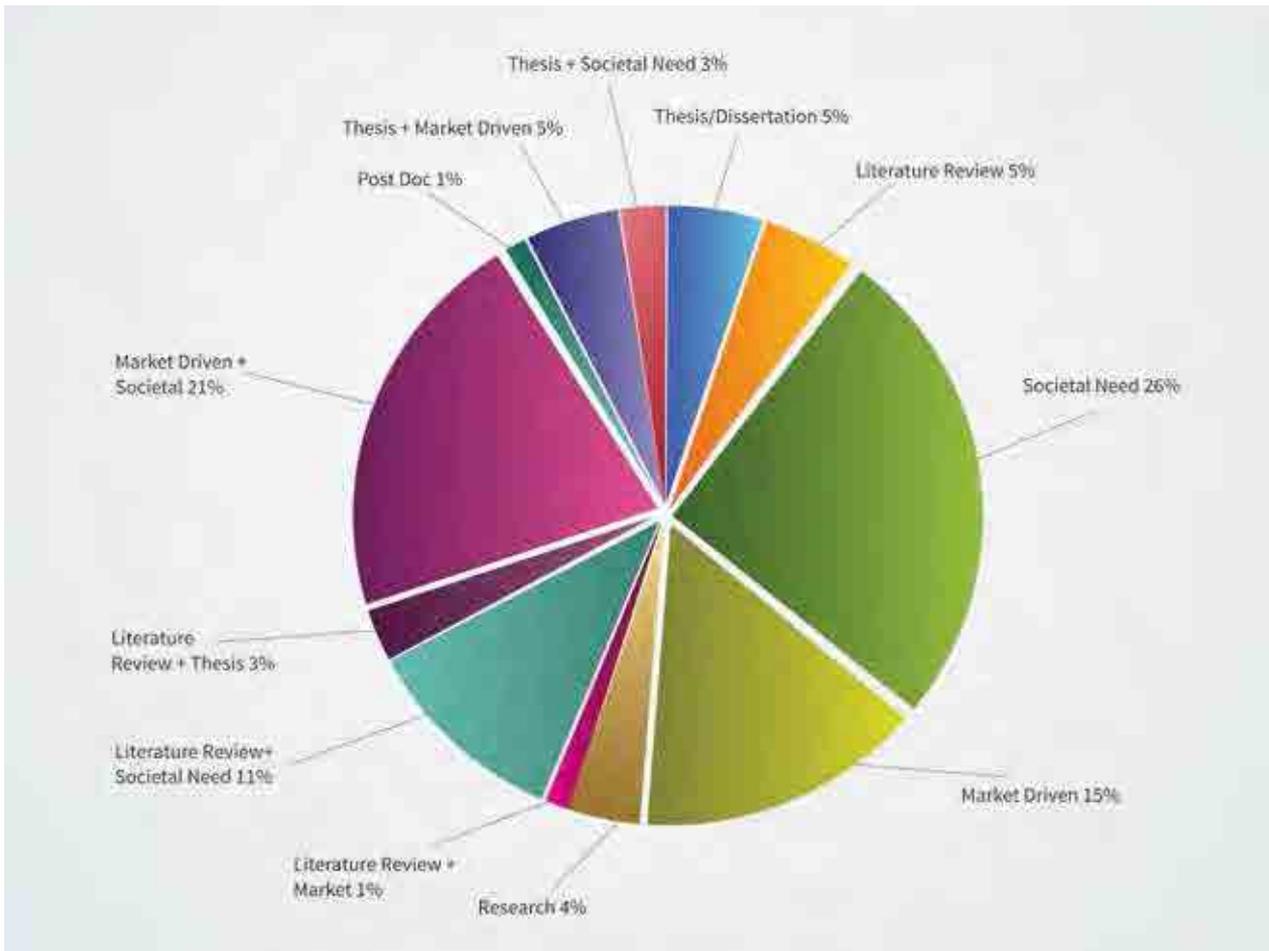


Figure 7: Responses to the query How did the BIG Idea emerge?

**The establishment of scientific enterprise: BIG's facilitative role in the journey from an individual to a biotech startup:  
The 'biotech startup factory'**

BIG has catalysed the transformation of individuals into entrepreneurs and this can be seen from the fact that out of 101 BIG grantees who had applied to BIG as individuals, 44 later established biotech startup ventures – a very high conversion rate of 43%. This also alludes to the fact that the total number of biotech startups supported by BIG is now 98 (Figure 8). Even analysing the survey data, of the 81 respondents, 36 had applied as startups and 45 had applied as individuals and amongst the 45, 23 later went on to establish a startup.

The number of individuals converting into startups across the 5 BIG partners is shown in the figure below (it is to be noted that Venture Center and KIIT-TBI joined as BIG partner from the 4th call while the other three have been BIG partners from the start).

Further analyses of the 155 projects reveals another interesting fact especially regarding academic/faculty led entrepreneurship.

**Encouraging Individuals to take the Startup Leap**



Figure 8: The individual to startup conversion

The number of academics who applied as an individual to BIG is 32 and 4 of the individual academics then later formed a company (a 12.5% conversion rate from individuals academics to startup).

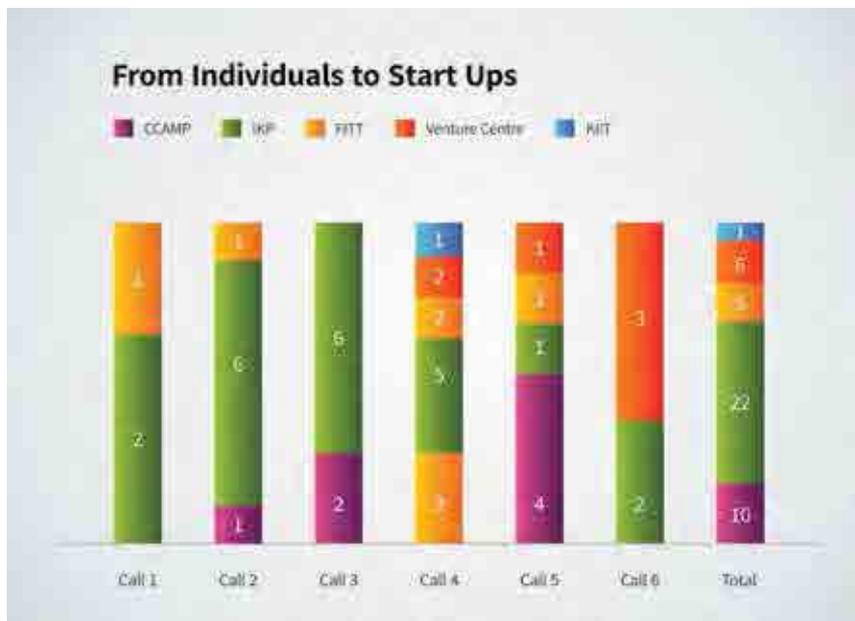


Figure 9: The individual to startup conversion at each BIG partner

## Seeking and Access to Expert Advice

One of the key elements that defines the success of an early stage venture is access to scientific and business advisors who help navigate young entrepreneurial talent on the turns and twists of leading a R&D project with commercial potential as well as providing mentorship in important aspects of business especially strategies regarding business model and future growth of the

company. The survey data shows interesting trends regarding BIG grantees engaging scientific and business advisors.

Regarding the issue of having scientific and business advice (80 responded to the question about scientific advisors and 78 did so for business advisors), the data shows that 82% (i.e 66/80) have a scientific advisor (Figure 10A & 10B) while only 53% (41/78) had business advisors (Figure 11A & 11B).

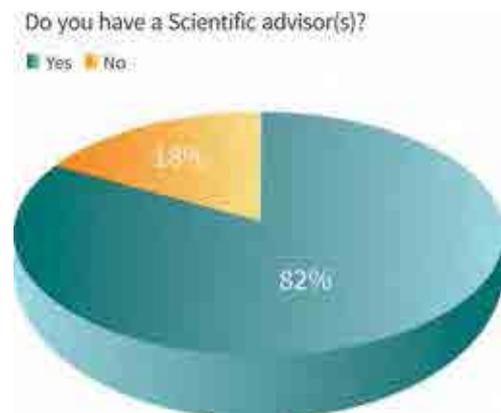


Figure 10A: Access to Scientific Advisors



Figure 10B: Access to Scientific Advisors



Figure 11A: Access to Business Advisors



Figure 11B: Access to Business Advisors

It is clear that BIRAC and its partners have to plug the gap of connecting business advisors to the BIG grantees. This will have a positive cascading effect when grantees explore follow-up funding.

It was also seen from the data that on an average 58% (38/66) of the BIG grantees (who had access to scientific advisors) received 1-5 hours of scientific advice per month from their respective advisors and around 18% (12/66) received 5-10 hours of scientific advice per month. An analysis of the survey w.r.t business advisors throws similar results i.e almost 60% (25/41) of BIG grantees (who

had access to business advisors) received 1-5 hours of business related advice from their business mentors per month.

### Impact on Employment & Skilling

Each BIG grant has a proportion of budget to hire a team for providing impetus to move the idea towards proof-of-concept. A combination of data from BIRAC and the survey has revealed that a total of 523 human resource positions were supported by BIG funding (Figure 12A & B).

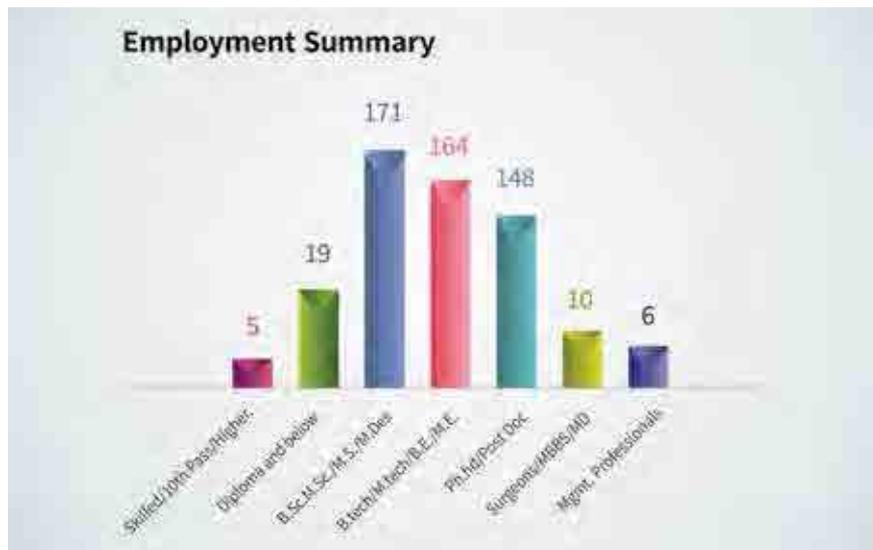


Figure 12A: Human Resource positions supported by BIG

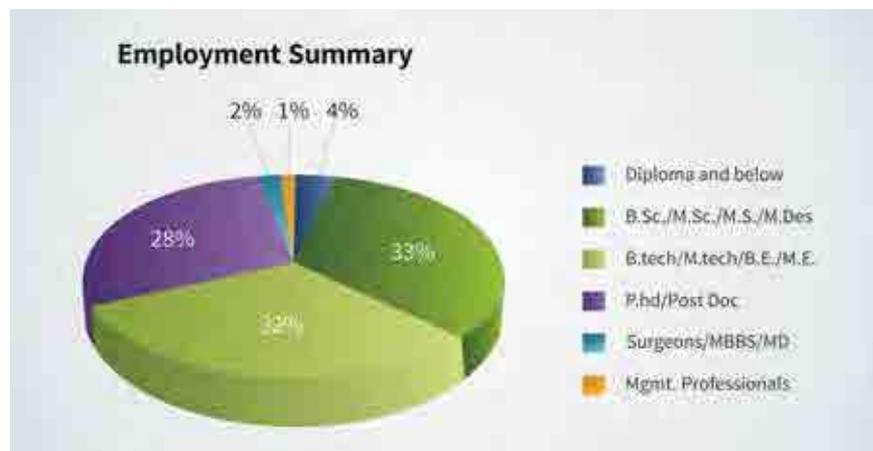


Figure 12B: Variety of Human Resource positions supported by BIG

The range of skill sets of human resource position also extended from skilled high schoolers, diploma holders, undergraduates (in basic sciences, engineering, medicine), postgraduates (MSc, MTech, Masters in engineering) as well as surgeons and management professionals. This is a significant number and the intangible benefits of 500 people going through training, gaining an understanding on aspects of business, project management and being able to be part of the biotech startup journey is certainly vast.

### Securing the Intellectual Property

The survey data showed that 52 respondents (out of 81) have filed for IP through BIG funding with total number of IP being filed being 66. 29 respondents have indicated that they have not filed any IPs (15 of which were below 9 months of project activity).

The highest proportion of BIG projects are in devices and diagnostics and this has a direct co-relation to the data of IP filed. 48% of the total IP filed are in devices and diagnostics (Figure 13) and none in bioinformatics.

### Showcasing BIG projects, collaborative opportunities, outsourcing and other sources of funding and follow-up funding

The BIG grantees who responded to the survey provided interesting insights about BIG projects. Answering to the survey

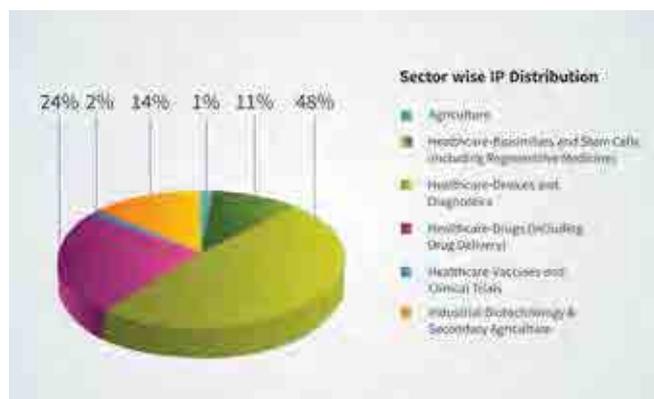


Figure 13: IP distribution in BIG

query whether they were able to present their BIG idea at any other national or international fora, 43% (33/77 respondents) answered in the affirmative. Amongst those who answered in affirmative, 55% (18/33) had presented their BIG projects exclusively in India, 27% (9/33) abroad and 18% (6/33) had an opportunity to present at both India and international fora (Figure 14).

Further to a question dealing with collaborations, out of 79 respondents to this particular query (Figure 15 A), 17 said that they could establish a collaboration during their BIG project and a further 33 mentioned that there is a possibility of collaboration being formed, thus showing that almost two-thirds (approx. 63%) have either ventured into a collaborative activity or see a possibility of an collaboration. Off the 17 who mentioned that a collaboration has been initiated by them 53% (9/17) had a collaboration with a national organisation, 35% (6/17) had a collaboration with an international organisation and 12% (2/17) had collaboration with both a national and an international organisation (Figure 15 B).

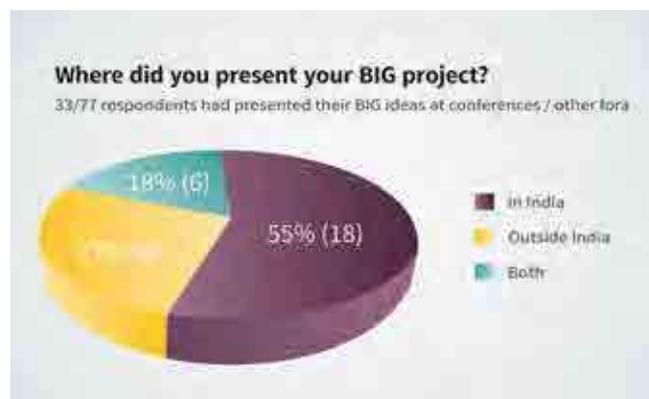


Figure 14: BIG Idea presented in different fora



Figure 15A

The BIG survey also revealed that all of the BIG grantees responding to the survey (81) had outsourced some component of their BIG projects and all (100%) of the outsourced work was based in India while 4 grantees (5% of the respondents to this query) had also outsourced work abroad. The amount of work that was outsourced showed that almost 92% of the outsourcing



Figure 15 B

was less than 30% of the total BIG projects, while 6% of the projects had outsourced 30-50% of the BIG project (Figure). The outsourcing data also conveys the message that through BIG another set of economic activity, through vendors, is being activated highlighting, once again, the overall impact of BIG.

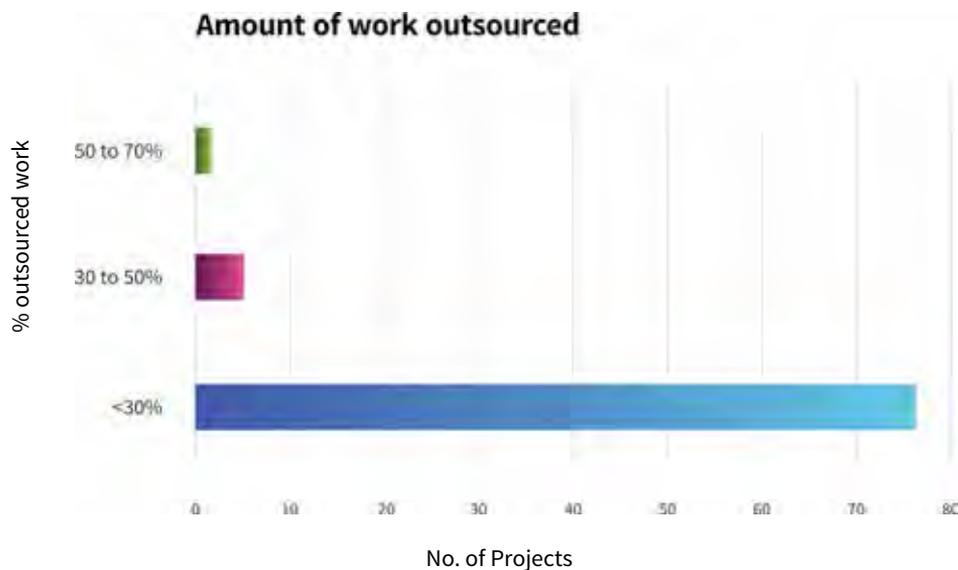


Figure 16

The survey revealed that 10 BIG grantees had availed funding from other sources during their BIG projects. Four had access to funding of INR 2.5-5 million, 5 had accessed funding from INR 5 million to INR 10 million and one BIG grantee had accessed funding amounting to INR 10 million to 50 million.

To a query that posed the question whether BIG grantees had applied for follow-up funding, out of 81 respondents, 30 answered in the affirmative (Figure 17A) and most of them had predominantly applied to public funding agencies besides also seeking funds from private (seed capital/angel funders) and the third sector (not-for-profits/foundations). Off these 30, who answered in the affirmative, 8 indicated that they had been successful in obtaining follow-on funding (Figure 17B). Besides, these 8, internal data showed, that 4 other BIG grantees have received other funds from BIRAC (SBIRI and BIPP)



Figure 17 A

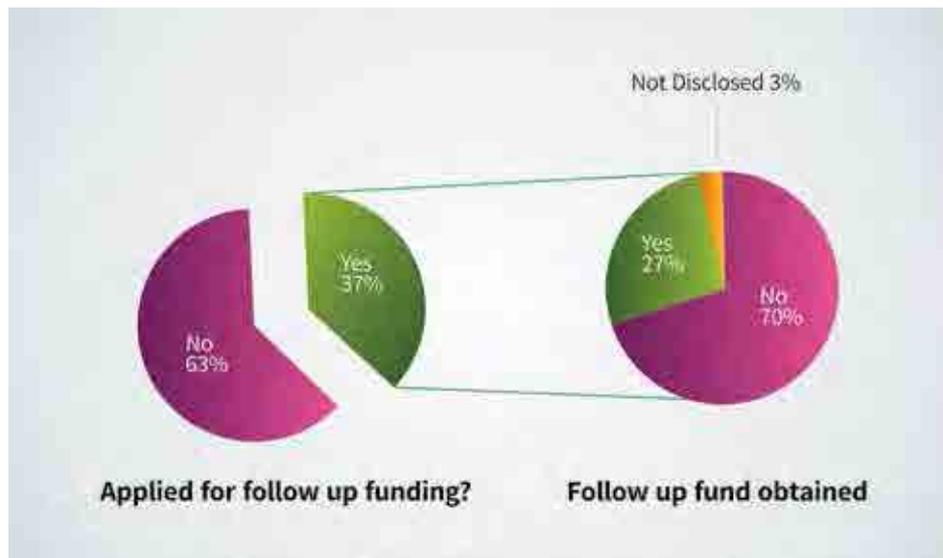


Figure 17 B

### Aiming for proof-of-concept & strategizing for growth

The BIG project duration is 18 months and in special cases a project is extended maximally for up to six months but never beyond 24 months. Looking at the BIG survey data especially at

those projects that have been active for 13 months or more (there were 36 such projects), 52% mentioned having completed 70% or more of the BIG milestones, a further 11% mentioned having finished 50-70% of their BIG milestones (Figure 18).

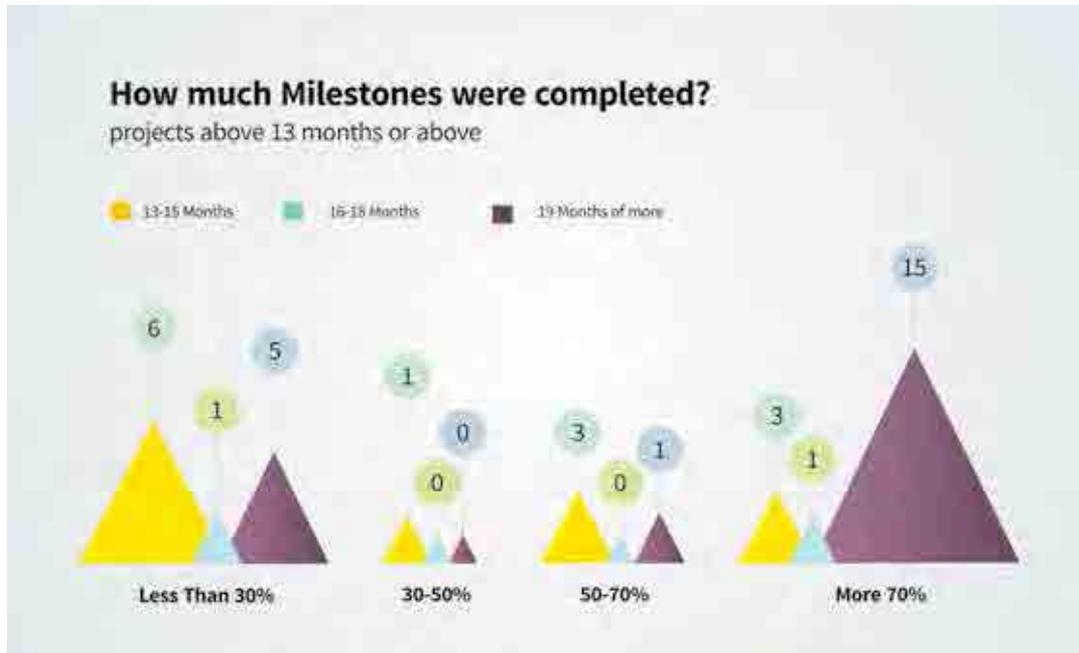


Figure 18: Milestones achieved by projects > 13 months

One of the key indicators which can gauge the forward planning by entrepreneurs could be via seeking their strategies in expanding their business development team even if they are at the proof of concept stages. In the survey, in response to a question regarding the expansion of business development teams, 17 respondents

(out of 79) answered 'yes' while 21 BIG grantees mentioned they are presently 'considering and a further 9 said they would expand 'at a later stage', thus almost 61% have either recruited or were planning to hire a business development team.

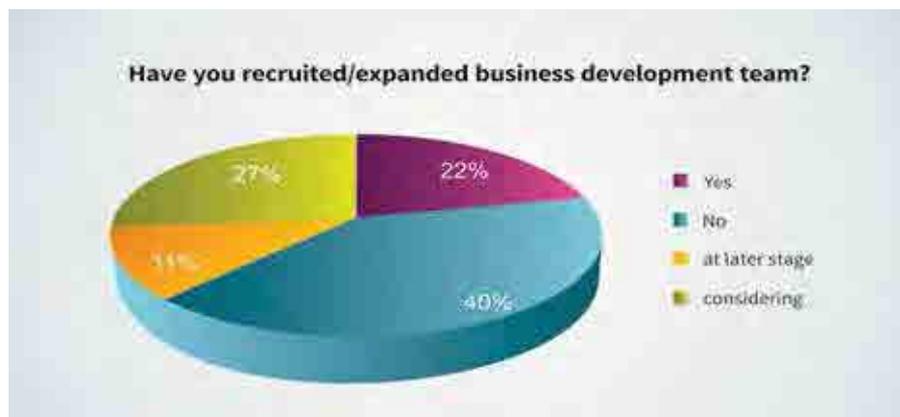


Figure 19: Business development plans



# 04

## The Future: Quo Vadis BIG?

***“Humans are mortal. So are ideas. An idea needs propagation as much as a plant needs watering. Otherwise both will wither and die”.***

Shri BR Ambedkar,  
Social Reformer and Architect of the Constitution of India.

The BIG as it has come to be known has steadily grown since its launch in 2012 and occupied a significant position as a leading early stage funding scheme in the biotechnology & life science domain in the country. It's a mirror to the country reflecting the power on how a small step for the nation in the form of ideation, design and implementation of a granting programme can unleash the untapped entrepreneurial energies of the nation. The learning for BIRAC from BIG has been immense too especially through the interaction with 'would be entrepreneurs', startups and serial entrepreneurs, implementing partners and other organisations with aligned aims.

### **The BIG Impact**

The extent of BIG's impact is evident from the data- creating a pool of inspired talent that wishes to channelize energies in solving societal and market problems is of immense national

wealth & perhaps it would not be wrong to say the BIG grantees are a 'national creativity treasure'. The pool of entrepreneurs understand the granular elements of moving an idea forward despite the inherent risk associated with demonstrating the viability of the idea itself. The combinatorial power of the 155 entrepreneurial individuals cannot be discounted- keeping a sustained focus on BIG and BIG like early stage funding support the compounding of the entrepreneurial power will make it a powerful force for a knowledge driven India- catalysing solutions for its citizens as well as for the world.

The survey has shown the impact of BIG in the last two years especially highlighting the IP being generated, new employment creation, organic networks being formed, creating a biotech startup culture in the country- this has been captured in the table below.

Summary of BIG Impact	
Total Start up supported	98
Women entrepreneur / innovator supported	36
Employment Generated	523
IP Filed (Survey Data)	66

### Summary of BIG Impact

Total no. of Scientific Advisors engaged in BIG projects directly (Survey Data)	100
Total no. of Business Advisors engaged in BIG projects directly (Survey Data)	57
BIG Grantees who presented BIG idea at National / International Forum (Survey Data)	33
Total No. of Conference attended by BIG Grantees (Survey Data)	National = 33 International = 19 National and International = 6
Collaborations of BIG grantee (Survey Data)	National = 9 International = 6 National and International = 2
BIG grantee applied for follow up funding (Survey Data)	30
Big grantee received follow up funding (Survey Data)	8

BIG has always attempted to continually renew itself- taking active feedback from grantees, experts and our partners. Roadmapping BIG has to be grounded in a thorough understanding of ‘what has worked’ and ‘what needs tweaking’ as well as ‘what more needs to be done’. The survey has also highlighted ‘what remains to be done’-especially the existing gaps that need focused and urgent attention.

#### The Existing Challenges

The BIG survey feedback and several follow-on interactions with entrepreneurs gave insights about the current challenges that biotech startups in India are facing. The challenges are given below.

#### The Issue of Scale & Follow-up funding:

The BIG grantees (especially those who responded to the survey) reckoned that scaling their entrepreneurial ideas and pushing them beyond proof-of-concept to validation and scale would be a challenge, however with the right mix of support and incentives this gap could be bridged too.

Two key factors were outlined- lack of access to dilutive funding especially from VCs who are perceived to have low risk appetite for funding life science innovations. Several grantees pointed out

that following BIG, the range of INR 20 million to INR 100 million is the crucial gap (the valley of death) and some indicated that BIRAC could bridge this with equity funding. It is to be noted that BIRAC has already launched an equity fund (BIRAC AcE Fund) which would be operationalised soon.

BIRAC is also actively exploring with two relevant organisations with deep knowledge and understanding of markets for partnership to help BIRAC supported entrepreneurs.

#### Access to Experts and Mentors

The survey has brought up interesting nuggets of data and it is crucial to point out, as many experts have repeatedly mentioned, that besides funding, effective mentorship is highly essential to the success of entrepreneurial ideas going forward especially as a startup venture. The survey reflected that while almost all BIG grantees secure access to scientific mentorship, however access to business mentorship still needs to be facilitated. The quality of mentors is crucial too especially creating a pool of mentors who can connect from granular issues to the larger whole and provide entrepreneurial talent access to effective advice and focused networks will determine the orbital jump of an entrepreneur to the next level.

### **Regulation including DSIR certification**

The survey revealed that concern regarding the regulatory landscape remains high amongst entrepreneurs. Many hoped that BIRAC would play a facilitative role in helping regulatory agencies understand the issues faced by entrepreneurs. The issue of DSIR certification was also reflected in the comments by BIG grantees.

### **The lack of responsive vendors**

Interestingly, many BIG grantees (especially the medtech grantees) outlined that the ecosystem still lacks high quality vendors and suppliers base- especially those who are responsive, quick and low cost and deliver components using injection moulding and CNC moulding. It was also mentioned that BIRAC could explore incentivising some of the vendors who could then play a catalytic role for startups.

### **Cost of Incubation and lack of access to high-end analytical facilities residing in academic institutions**

Many BIG grantees commented on the high cost of incubation and the transition of incubators from being just estate managers to facilitators who create the 'optimal' mix of environment for startups to grow. It is perhaps essential that incubators should hire human resources who are aware of the needs of startups and respond to the startup needs in a rapid and continual fashion.

### **Porous Platforms, Communities and Networks including bringing industry & academia together**

Several respondents pondered the need of a platform that can facilitate startups engaging with corporates while others highlighted access to resources within academia especially infrastructural resources as well as knowledge resources. Linkages to networks for finding new markets, channel partners (especially distribution channels) are important and BIG grantees need an early connect especially those who have reached a proof of concept and are entering into the stage of validation.

To address these issues, BIRAC is exploring possible partnerships with national and international agencies. Creation and expansion of such focused bootcamps that takes into account the important contextual elements of the Indian business environment and

**The extent of BIG's impact is evident from the data- creating a pool of inspired talent that wishes to channelize energies in solving societal and market problems is of immense national wealth & perhaps it would not be wrong to say the BIG grantees are a 'national creativity treasure'**

further that has the ability to link it to the global centres for innovation are being actively pursued by BIRAC. This will help BIG grantees and other start-ups tool themselves with the relevant business advice and forge new partnerships.

BIRAC would also explore use of technology in creating online platforms for BIG grantees to connect, discuss issues and form a cohesive group.

### **Lack of information, knowledge of markets and business models**

The survey showed that one of the gaps that remain is the access to relevant information about markets that the startups can focus on to enter. The need for as well as getting advice in business model strategies was also repeatedly pointed out. This could be linked to the previous identified gap about lack of access to mentors especially business mentors.

Creating a BIG community is an important element of the BIG journey. The BIG community should be accessible and reach out to new entrepreneurial individuals and startup entrants. It is hoped that several of the BIG grantees in turn would become mentors for future BIG grantees and BIRAC would be focusing on the use of technologies to create community platforms for BIG grantees to connect and seek information or explore possible collaborations amongst themselves. Such platforms would allow positive serendipity to occur to power the BIG grantee ahead. BIRAC in partnership with FITT at IIT Delhi (one of 5 BIG partners)

organised the 1<sup>st</sup> BIG Conclave especially for BIG grantees to interact with BIRAC, other funders and stakeholders, relevant experts as well as interact with peers. The success of the 1st BIG Conclave has made it clear that such focused BIG Conclaves would be conducted by BIG partners.

### **The 'Multinational-Startup' interface and connect**

Some respondents pointed out that the multinational companies remain on the other side and it would be helpful for BIRAC to facilitate a linkage between BIG grantees and multinational firms. This needs some effective solutions that are win-win for both the startups as well as the big companies. Bringing together the multinational and the startups onto a platform for closer interaction would be a good beginning to addressing some of these issues.

### **Lack of Skills & Talent**

Many of the survey respondent validated the perception that the industry needs a thorough and major skill renewal to be able to grow at the pace that it should ideally grow- both in technical skills as well as skills involved in writing grants. BIRAC is focused on also attempting to bridge the skill gap. In addition the leading states in biotechnology should be encouraged to invest in biotech/life sciences skilling programmes. BIRAC conducts several workshops throughout the year especially in grant writing, IP, hands-on training amongst others.

Experts have also pointed out the need for communication skills and other soft skills for entrepreneurs is an important but often neglected element of experience that BIRAC and its partners should aim at.

### **Roadmapping BIG and the Future**

BIG was launched in 2012 and was made operational since the last 2.5 years. Its impact is evident in such a short period of time. The intangible benefits are many too- especially skilling and exposing

hundreds of entrepreneurial individuals and startups (as well as their human resources) to the world of entrepreneurship and translational R&D. Through this, BIRAC is building and supporting young entrepreneurial talent who have the drive to solve problems and find solutions. Besides, BIG in its own way is also energising the national economy- the data on use of vendors is a pointer to this. BIG is indeed an 'ideas factory' for the nation- nurturing and watering green-shoots of innovations which will hopefully bring innovative products. BIG has undoubtedly made a significant impact in the biotech start-up culture in India- supporting 98 startups and help launch 44 new startups. Some of them would be hidden business unicorns. It is essential that the ecosystem provides a facilitative environment for these startups to grow. Programmes such as BIG are essential to replenish the innovation pipeline of the country and BIG itself should receive support for it to expand and therefore have the ability to create greater impact. BIG has to create enough feedback loops such that it continues to refine itself.

The roadmap for BIG has to be grounded in providing solutions to the gaps that have been identified both in terms of funding as well as other elements of the ecosystem. As pointed out earlier, BIG has to become the alma-mater for biotech entrepreneurs who gain not only through funding but also by deriving a sense of being part of something transformational for the country- BIRAC has to remain ever vigilant to the needs of the entrepreneurial community. The BIG grantees themselves should become mentors for future BIG grantees thus creating a virtuous cycle of growth and impact of BIG.

If India aims to be a global hub for bio-innovation then BIG needs to deepen and broaden and it is hoped it does indeed grow and continues to positively impact biotech startups and entrepreneurial individuals. BIRAC will continue to focus on refining BIG and amplifying BIG's impact.



# **BIG** Profiles

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## Development of an aptamer-based platform to detect novel Tuberculosis markers in human serum



### Achira Labs Pvt. Ltd.

Dhananjaya Dendukuri (Call 1)



### The Journey

A simple, yet accurate serological test for TB is an urgent unmet need. Through its BIG grant, Achira has developed a multiplexed, antigen detection test for TB using novel aptamer reagents. These nucleic acid based reagents are specific enough to pick up two different TB antigens that are secreted by the bacillus. The aptamer reagents have been ported onto Achira's proprietary microfluidics platform where they are currently undergoing clinical performance evaluation. Achira has benefitted from the BIG grant through funding for a high-impact, high-risk project and also through access to the larger biotech community in India and timely advice from the review committees at BIRAC and CCAMP. Once validated, we believe that this test will be an important addition to the battle against TB

## Development of trypsin resistant PAN reactive trypsin antibodies for industrial application



### Affigenix Biosolutions Private Limited

Arumugam Muruganandam (Call 3)



### The Journey

Affigenix Biosolutions Private Limited is on its way in meeting the milestones of DBT-BIRAC BIG 3 grant project titled "Development of pan reactive Trypsin resistant antibodies for industrial applications" in association with C-CAMP, BIG partner. We currently have clients from Biopharma industries who are using our anti-Trypsin antibodies developed from the proof-of-concept studies and have been successful in generating revenues. In case of Affigenix, BIRAC seed to budding entrepreneurs have indeed started to bloom early and bear fruits and we are confident of anchoring our roots in India and branch into the world market soon.

## To demonstrate Proof of Concept for a novel, non-invasive exosome - based screening (for early detection) cum diagnostic kit for multiple cancers (using one test) utilizing patient derived biofluids



### Exocan Healthcare Technologies Pvt. Ltd.

Aman Sharma (Call 4)



### The Journey

The BIG project “To demonstrate Proof of Concept for a novel, non-invasive exosome-based screening cum diagnostic kit for multiple cancers utilizing patient derived biofluids” is related to development of a liquid biopsy test to detect and diagnose cancer(s) at molecular level. For this, we aim to assemble the technology into a kit for non-subjective, non-expensive and single test based cancer(s) diagnosis. The technology should reduce patient’s travel time, omits the need of highly skilled medical professionals, and enhances accessibility of oncodiagnostics to the larger population. Our goal is to implement it for early cancer screening purposes once the proof-of-concept is ready. BIG funding has been instrumental in creating further grant opportunities for me and I formed a company, established multiple National, International collaborations.

## Production of collagen and by production from fresh water fish origin for biomedical applications



### Amnivor Medicare Pvt. Ltd

Santanu Dhara (Call 2)



### The Journey

We (Amnivor Medicare Pvt. Ltd.) have developed a procedure for isolation of collagen with higher thermal stability from fish scales of fresh water origin and prepared collagen based downstream products for wound healing and tissue engineering applications in a cost effective way. This source is safer i.e. less chance of disease transmission and economical as compared with bovine sources. In our country most of these products are imported and costly, and therefore not affordable to even middle class people. Our indigenously developed technology can improve health care delivery in a cost-effective way and hence serve mass population specifically poor section of the society. The proposed collagen source will also facilitate to overcome the religious barrier. The BIRAC has supported us to set up pilot scale plant and arranged training on entrepreneurship skill development.

## Process Crystallization as a Purification Tool to Therapeutic Antibody



### Bhami's Research Laboratory

Bhami Shenoy (Call 4)



### The Journey

Monoclonal antibodies (MAbs) have been widely used as treatments for a range of indications, including oncology, and infectious diseases. Manufacturing costs now represent 20 –25 % of annual sales. The downstream processing costs are 50 – 80 % of the total costs. There is an urgent need for alternative strategies to purify MAbs to reduce the costs. We purified trastuzumab, directly from cell culture media using crystalline technology and compared it with soluble with regard to its purity, biosimilarity and efficacy. The current strategy can be used to eliminate costly Protein A column to reduce the cost of manufacturing.

## Pharmacological Evaluation of N-oxide Metabolite of Antipsychotic Drug for Type 2 Diabetes



### Crystalin Research Pvt. Ltd.

Ashwini Nangia (Call 1)



### The Journey

Diabetes drugs are insulin sensitizers and/or insulin releasers, e.g. metformin, glitazones, and glipizide, tolbutamide, followed by the incretin activators or DPP-IV inhibitor gliptin drugs. The BIG project explores a new class of N-oxide drugs which are postulated to interact with the -cell signaling pathway to activate insulin release and also increase the islet density and pancreatic cells mass. A proof of concept study of BLNO was carried out in insulinogenic cell lines and Wistar rats. BIG funding was helpful to carry out the early explorations. Now we have POC results in hand on a novel first in class lead drug for type 2 diabetes.

# Green Manufacturing of Cephalosporin Antibiotics Using Recombinant Deacetylase



## Cellzyme Biotech

Rajkumar Rajagopal(Call 4)



### The Journey

CELLZYME BIOTECH, a Coimbatore based start-up was founded by Dr. Rajkumar Rajagopal in 2013. Antibiotics are manufactured at  $-50^{\circ}\text{C}$  and require harmful organic solvents and high amounts of alkali leading to the regulatory hurdles due to the formation of undesired impurities. Our BIG idea stems on addressing the unmet need of USFDA regulated pharmaceutical industries. Our proposed enzymatic process is cost-effective, greener and safer. Our central focus in BIRAC-SPARSH project is to develop an iron rich protein hydrolysate from rice bran to address the nutritional requirements of infants and young mothers. In addition to the financial support, BIRAC supported us with mentoring as BIRAC-IGNITE fellowship to attend IGNITE 2015 at Judge Business School, University of Cambridge.

# Hand-held Imaging Flow Cytometer for Quantitative Diagnosis of Malaria



Sai Siva Gorthi (Call 3)



### The Journey

Biotechnology Ignition Grant of BIRAC has enabled us in realizing a handheld “imaging” based malaria diagnostic device which fully automates the conventional microscopy based analysis- the gold standard method of malaria detection. The product consists of a custom designed portable digital microscope augmented with dedicated microfluidic lab-on-chips to enable process automation, as well as, cost-effective implementation. This self-operable in-vitro point-of-care quantitative diagnostic device requires only a drop-of-blood, and examines lakhs of cells on a single-cell level within a span of five minutes at such an affordable cost-per-test that it could be used by people living in rural areas as well.

# Establishing and Validating a novel drug target in mycobacterium tuberculosis

INNOVATOR 

## GeNext Genomics

Supriya Kashikar (Call 2)



### The Journey

GeNext Genomics (GNG) Pvt. Ltd. team is validating a unique target and developing a novel therapeutic in the form of a new biological entity for the cure of tuberculosis. “Dying of tuberculosis: The earth is suffocating- Swear to make them cut me open, so that I won’t be buried alive- Fredrich Chopin”. TB kills two million individuals every year, infecting one third of world’s population. A novel and effective molecule will not only cure the disease but also have huge social impact. BIRAC-BIG has provided a niche for us to take up high risk project and deliver. The mentorship program provided by C-CAMP helped us nurture our entrepreneur journey.

# mCAPD Mobile Continuous Ambulatory Peritoneal Dialysis

INNOVATOR 

Gowrishankar W (Call 3)



### The Journey

BIRAC is the main facilitator to bring my dream of a wearable dialysis device to reality through its BIG grant, bringing my simple idea into a proof of concept in a BIG way. BIRAC has been the magical “open sesame” in getting BIG incubation support, angel investments, network with doctors and patients. It has provided me with a bigger launchpad, lifting my project to higher levels with all stake holders. BIRAC shall surely usher in a biggest relief for renal patients throughout the world to lead a normal.

# Novel, Percutaneous Soft Tissue Biopsy System with assisted Hemostasis



**Indio Labs Pvt. Ltd.**

Siraj Bagwan (Call 3)



## The Journey

IndioLabs has developed a novel semi-automated biopsy device, integrating two unique technologies. BioScoop™ is a novel needle designed to pierce through and sample soft tissue with a single needle. Simultaneously, the BxSeal™ technology injects a controlled volume of hemostatic agent into the tissue cavity, thereby immediately stabilizing any internal hemorrhaging from the tissue. Together, they offer a novel, simple, safe and cost-effective solution for liver biopsy.

The need of a device solution was identified during clinical immersion at the Stanford India Biodesign Programme at AIIMS. Indio Labs was funded under the BIG scheme to further develop the tissue resection technology and needle characterization/calibration. The mentors at C-CAMP helped from all aspects in developing the relevant connections and made our entrepreneurial journey a smooth one.

## Intraosseous Device



Jayant Karve (call 1)



## The Journey

'Ozyn-D' a novel Intraosseous Device allows immediate vascular access through long bones in patients having difficult intravenous access in clinical emergencies. Also, a huge requirement exists in defence segment. It is a compact, lightweight, affordable and easy-to-use even by paramedics in resource constrained settings. Available as a pre-packaged, ready-to-insert, sterile disposable device, it becomes non-reusable after single insertion. Protected by the PCT application (patent filed) it has undergone third party biocompatibility testing. With 'Make in India' approach the development has been supported by BIRAC through the BIG. Having completed the in-human cadaver study at AIIMS, New Delhi it is now ready for First-in-Human (FIH) clinical trial.

# World's Most Affordable, long life Defibrillator that is Battery less, Hand Cranked, Rugged with reusable paddles.



## Jeevtronics Pvt. Ltd.

Aniruddha Atre &  
Ashish Gawade (Call 2)

### The Journey

Using BIRAC-BIG support, Jeevtronics has developed a proof-of-concept for a life saving defibrillator with built-in generator, audio-ECG (easier to interpret vs. Display ECG) and 4 times more affordable. Two new patents were filed during the BIG phase. Novel power electronics thus developed has enabled achievement of 4 times lower price. This will work even in rural India, where electricity is not available for 24 hours/ day. Audio ECG will enable relatively lower skilled personnel to operate this device. This will help improve the defibrillator to bed ratio in an ICU (presently at 1:50 vs. 1:3 in UK).



## Biomimetic Bone Substitutes



## Sitalogics Pvt. Ltd.

K Srinivas Rao (Call 2)

### The Journey

In SITALOGICS we have a mission to develop innovative biomaterial and regenerative technologies that are cost effective in India. We are an integrated developer and manufacturer of regenerative bio-materials. We aim to become a world player in five year through our proprietary cell-interactive biomaterial technologies capable of multiple applications in life science including medical research tools, drug development and therapeutics Company is focused on translational process towards commercialization of biomedical devices for wound care, orthobiologic bone graft substitute, biologic haemostat devices apart from research and development efforts for advanced devices for cellular therapy and tissue engineering We will soon manufacture, formulate, research, develop, process, refine, import, export, wholesale and/or retail trade in medical devices, Bio Implants, Health Care Products and Tissue Engineering.



## 3-D Printer Filaments that are Biomaterial-Based and Eco-Friendly



Karthik Chethan Venkateshan (Call 3)

### The Journey

Currently there is great demand for low cost environment friendly raw material for 3D printing industry in India. Our technology focuses on developing 3D printable bio-based filaments wherein the formulation and processing characteristics have been optimized. Further, the developed printable filament will meet requirements such as, biocompatibility and reduced material and process cost. Currently, we are fine-tuning the various biomaterial formulations and their extrusion parameters. Progress has been made in developing printable filaments. The BIG award from BIRAC has enabled us immensely to conduct innovative research on this particular technology and we are indebted for this invaluable financial assistance.



## Clonal propagation of elite genotype of orchid hybrids synthesised in Manipur for commercial cultivation



**Kwaklei & Khonggunmelei Orchids Pvt. Ltd.**

Rajkumar Kishor (Call 2)

### The Journey

Certain important orchid hybrids, viz., Aeridovanda Shiv Sidhu, Holcanthera MS Swaminathan, Renantanda Prof. G.J. Sharma, Renantanda Kebisana Shija, Renantanda Momon Shija, etc. have been synthesised and registered with the Royal Horticultural Society, London by Dr. Rajkumar Kishor. The ongoing project, under Biotechnology Ignition Grant (BIG) of BIRAC, focuses on selection of elite clones of the hybrids and micropropagation for commercial cultivation. It also involves production of secondary hybrids using the above mentioned hybrids as potential parents. This shall ensure a new range of breeds for future. Orchid hybrids of purely Indian origin shall definitely be novel and there is high chance of establishing and controlling their market both nationally and internationally. This may help the local growers and entrepreneurs avail new and surplus planting materials continuously.



## Exploring Muga silk fibre as a promising suture material



### Mugagen Laboratories Pvt. Ltd.

Utpal Bora (Call 2)



#### The Journey

The project is focussed on developing a standardized reeling and degumming protocol for Muga silk for eventually braiding and swaging them into needles of appropriate size to make a complete surgical suture. The technological gap in degumming and braiding of wild varieties of silk fibers are the major issues that the present innovation addresses. Besides the financial support to materialize our idea, BIRAC has helped us in overcoming the communication and knowledge gap between industry, academia, regulatory bodies and the market through several workshops and training programs. These programs have helped us in planning the course correction of the current project and encouraged us to transcend the myopic vision of academic research and focus on developing actual bench side products.

## Rapid Detection of Acute Myocardial Infarction by sensing Cardiac Markers using Micro Cantilever Technology



### Nanosniff Technologies Pvt. Ltd.

Nitin Kale (Call 1)



#### The Journey

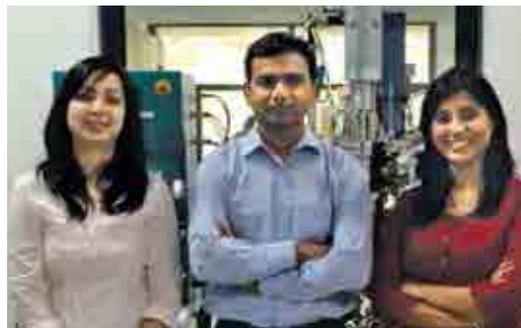
We have demonstrated aPoC for detection of Cardiac Markers (eg hFABP), using MEMS Microcantilevers, that are released in the blood after a person has a heart attack. We are now on-track to build a Point-of-Care instrument that can help a Doctor in determining whether the patient with chest-pain is actually undergoing a heart attack or not. The instrument can be deployed at even Rural Hospitals & it can be used by a nurse with results in 10 mins. Impact of myocardial infarction on our society is huge, in terms of loss of life and incapacitation. Our innovation will have a game changing and positive impact on the society, and also on the economic life of our populace. With BIRAC support we could demonstrate the proof of concept of our innovative idea.

# Synthetic biology for overproduction of 2,3-butanediol



## Butacell Research Pvt. Ltd.

Nidhi Adlaka & Neha Munjal(Call 2)



### The Journey

We have developed a technology for overproduction of 2,3-butanediol (BDO) using synthetic biology approach. BDO is a platform chemical with wide application ranging from pharmaceuticals, fuels to rubber industry. Even though it has huge market potential, India does not have indigenous technology for BDO production. Therefore, we aimed at developing cost effective technology for BDO production using synthetic biology route for Indian market. It was not very easy to scale up and standardize the whole process but help by BIRAC in both mentoring and providing monetary help has boosted us to reach our goal on time.

## Development of a novel fungal bio control agent using protoplast fusion technology to target drug resistant gastrointestinal cattle worms responsible for reducing productivity, by an eco-friendly approach.



## Wobble Base Bioresearch Pvt. Ltd.

Pratap Mukhopadhyaya (Call 2)



### The Journey

The innovation pursued in this project was aimed at addressing the ever increasing menace of drug resistance in gastrointestinal nematodes of dairy by way of developing a fungal spore formulation guided by an innovative gene expression profile and a unique delivery device in the form of jaggery tablets. Due to drug resistance, farmers are tempted to use excess drugs that secrete in the milk which can be controlled with this innovation. BIRAC has been of exceptional assistance in helping me give shape to my thoughts by more than one ways including fund, guidance, networking and encouragement.

# Novel Oncotherapeutic Measles Virus using eSAME system



## Seagull Biosolutions Pvt. Ltd

Vishwas Joshi (Call 1)



### The Journey

SBPL deployed the grant to develop & synthesize “Custom designed Measles viruses” which in-turn helped us to produce SBPL-0100 which kills a wide range of cancer cells without causing toxicity to non-cancerous cells. If successfully launched, SBPL-0100 would be India’s first “Targeted Cancer therapy” and available at costs lesser than mABs therapies.

We have developed “Active Virosome Technology” platform useful for producing vaccines against viral diseases& used it to produce a novel vaccine agent (SBPL-0200) for Dengue. SBPL has also produced world’s first VLP vaccine (SBPL-0500) for Measles and shown that it can induce anti-measles immunity. SBPL-0500 has potential to be useful to vaccinate infants (age 4 to 9 months) which cannot be vaccinated using current Measles vaccine. We thank DSIR & DBT GOI, The BMGF, USA and ICICI Bank.

# Keyhole surgery replaceable artificial heart



## SG ArtHeart Pvt. Ltd.

Sujoy K Guha (Call 3)



### The Journey

In India particularly, terminal heart disease is a huge issue even affecting younger population. Hence the need for Artificial Heart over a long life span is there especially that can withstand wear and tear.

BIRAC support under BIG has enabled giving practical form to the “In use repairable artificial heart” and the patent filing for it. Animal study being worked out with the BIG support. Physical experiment and Animal experiment facilities at IIT Kharagpur; STEP IIT Kharagpur gives the infrastructure for the development.

# Atomic Force Probing of cells for for clinical and pharmaceutical applications



## Shilps Sciences Pvt. Ltd.

Ashwin Lal (Call 4)



### The Journey

Shilps Sciences is a life science and nano-tech company founded in December 2013 with the goal of bringing advancements in nanotechnology to healthcare. We are developing an Atomic Force Microscope to detect mechanical parameters of cells at the nanometer scale and use this as a biomarker for metastatic potential in cancer. We have also developed novel microfluidics for single cell analysis. The goal is to use this for investigating cell heterogeneity, with implications in drug screening, cell based therapies and companion diagnostics. The company has benefitted from BIRAC's BIG program and sponsorship for Ignite, a Cambridge entrepreneurship workshop.

# Multispectral Optical Imaging and Computing Technologies for Realtime in situ Functional Characterization and Monitoring of Cutaneous Wound Healing Progression



## SkinCurate Research Pvt Ltd.

Debdoot Sheet /  
Sri Phani Krishna Karri (Call 4)



### The Journey

The innovation is a hardware software co-designed mobile app for real time noninvasive diagnostic imaging of dermatoses. At an initial phase, the theoretical concepts to model the multispectral optical interactions with various wounds have been conceived. Construction of multispectral image database for various wounds is under process. The outcome of the product enables real time in situ functional characterization of dermatoses, avoiding biopsy procedure. The product helps paramedics reach out to resource constrained areas, facilitating patient comfort centric point-of-care diagnosis. We are based in Kharagpur, incubated at STEP-IIT Kharagpur, and financially supported by the BIRAC-BIG grant locally through the KIIT-TBI, Bhubaneswar.

## A novel device to screen newborns for hearing loss in resource poor settings



### Sohum Innovation Lab

Nitin Sisodia (Call 2)



### The Journey

Sohum is a unique device & system solution to do mass screening of newborns for hearing loss in resource-poor settings to prevent speech loss. In India, hearing impairment goes undiagnosed till the child is about 4 years. By then, it is too late for the care cycle to be effective. This leads to speech loss, impaired communication skills, possible mental illness and unemployment. Sohum is a noninvasive, safe technology to screen neonates for hearing impairment with high sensitivity and specificity in resource-limited settings. It uses brainstem auditory evoked response (BAER) technology which is gold standard, in an innovative way with an easy-to-use interface designed specifically for use in developing countries scenario. BIRAC supported Sohum through BIG scheme which helped us refine key features of Sohum and design refined specification.

## Economical process for conversion of waste to green chemicals



### String Bio

Ezhil Subbian (Call 3)



### The Journey

Imagine a clean world that we would be proud to leave behind for our kids. String's solution brings us closer to this reality. We are developing processes to capture methane, largely from waste, into everyday products. Everyday products from plastic cups to high performance polymers like stents and sutures. Our goal is to enable sustainable cycles for managing waste by using it to make biodegradable polymers.

Funded by the BIG project from BIRAC, over the course of the last year, we have developed IP protected biocatalysts, fermentation processes and downstream purification technologies to enable this solution.

## Novel Chitosan derivative for building SAR in plants: specifically leaf blight of Pomegranate caused by Xanthomonas sp.



### Swasti Agro & Bioproducts Pvt. Ltd.

Abhay Shendye (Call 4)



#### The Journey

Swasti Agro and Bioproducts Pvt. Ltd. builds disease resistance in pomegranate against bacterial blight. This has huge positive environmental impact since toxic chemicals are eliminated. Farmers get predicted, higher yields and more profits. Preliminary results on sixteen crops grown in India suggest a potential for yield increase of Rs. 15000 cr. per annum.

Initial work on this innovative idea was possibly based only on alchemy of ignorance and amnesia. With BIRAC support we developed scientific basis, and proof of concept. Development of strong data on mechanism of action was instrumental in attracting serious investors. Networking opportunities provided much needed connections.

## To develop a novel, cost effective, non - allergic herbal formulation for management of spontaneous bleeding and allied complications in multiple coagulation disorders.



Tania Paul (Call 4)



#### The Journey

The idea is to develop a novel herbal formulation which when administered orally and/or applied topically at the site of injury will solve coagulation disorders in thousands of people who are suffering from Hemophilia, Thrombocytopenia and different types of Hemorrhages. It is predicted that the world drugs market for preventing haemorrhages will generate \$13.5bn in the year 2017. The grant has provided the platform from where we can provide the society with a drug that will facilitate in reducing the bleeding diathesis in people suffering from blood loss. This journey wouldn't have initiated without the grant provided by BIG BIRAC as this was like a backbone to an idea that will rise to entrepreneurship.

# Development of Fucose Knock out technology platform in CHO S cell line for improved Biotherapeutics



## Theramyt Biologics Pvt. Ltd.

Maloy Ghosh &  
Kavitha Iyer Rodrigues (Call 2)

### The Journey

Theramyt's technology platforms are focused on development of series of novel biomolecules and improved biologics that constitutes a long term product pipeline. Our target is to alter fucosylation of antibody Fc region to create Biobetter molecules with enhanced Antibody dependent cellular cytotoxicity (ADCC). The product is expected to provide new treatment options with reduced drug dosage. The BIG project through BIRAC has helped us to start our R&D program as well as allowed us to incubate at CCAMP, Bangalore. The support system at CCAMP and through BIRAC has helped us in technical evaluation of our research ideas and refinement of strategy to achieve specific goals in fairly short period of time. We have already filed multiple provisional patents related to our product and platform development technologies. We aim to take these novel biologics from bench to manufacturing scale and finally to global market.



# Modular Resilin-mimetic Elastomeric Platform



## Pandorum Technologies Pvt. Ltd.

Tuhin Bhowmick (Call 1)

### The Journey

Innovative materials and methods to create environments that can promote functional cell/ tissue growth in vivo and in vitro has a range of medical applications including regenerative medicine, drug screening and implantable devices. Our BIG project was to develop of a novel biomaterial class through assembly of molecular building block- 'legos' with tunable material property and functions that can form the base of the 'technology pyramid' of tissue engineering. With BIG, it was possible for us to take the first step into the path of translational research. Besides funding, BIRAC's guidance taught us the importance of collaboration with end-users and an awareness of aspects such as toxicology, ethical and regulatory issues, health economics and clinical trial design that builds the path from the bench to the bed-side.



## Fibre lasers for photoselective tissue ablation



### Unilumen Photonics Pvt. Ltd.

Anil Prabhakar(Call 2)



### The Journey

Fibre lasers are the next generation of high power lasers useful for material modification and surface micro-machining. Unilumen Photonics has modified this technology for use in surgical applications, such as tissue photo-ablation for prostate surgery and retinal photo-coagulation. The lasers are available in both infra-red and visible wavelengths. In addition, pulsed fibre lasers can be synchronized through a method of injection locking to an external trigger signal. Synchronized pulsed lasers find applications in fields as diverse as optofluidics lab-on-chip diagnostics and in super-resolution microscopy.

## Laser Desorption / Ionization Mass Spectrometric (LDI MS) solutions for High throughput detection and analysis of residual compounds, contaminants and small molecules in milk and dairy products.



### Barefeet Analytics Pvt. Ltd.

Venkateswarlu Panchagnula (Call 3)



### The Journey

There are numerous challenges in the quality, logistics and economics of food analysis with significant rejection rates and losses in the export market. Barefeet Analytics aims to address this by providing innovative, reliable and cost efficient solutions for pesticide residue and contaminant analysis from food. Using laser desorption ionization mass spectrometry methods developed for pesticide analysis, large numbers of samples can be analyzed rapidly – about 20 times the throughput at about one fifth of the cost of existing methods. Support from the BIRAC BIG scheme is enabling the development of POC and field trials for analysis from milk.

## Direct Beta Thalassemia Carrier Detection Kit



Yogesh Badhe (Call 4)



### The Journey

Simple cost effective, efficient, reliable, beta thalassemia carrier detection kit has been developed, requiring no equipment and electricity, suitable for field application. Validation of the kit in field application is being established with the help of BIRAC BIG grant. Every year about one lakh thalassemia major children are born all over the world and ten thousand in India alone. The thalassemia children need blood transfusion every three weeks and their life span is no more than 30 years. The family suffers in distress and helplessness and country has huge financial burden. The kit aims at thalassemia free society.

## Novel inhibitors of DNA Gyrase for the treatment of multidrug resistant infections



**Vitas Pharma Research Pvt. Ltd.**

Radha Rangarajan (Call 1)



### The Journey

With BIG support, Vitas Pharma undertook research on a novel class of compounds that target DNA replication in bacteria. The team has identified a lead series of compounds with in vitro activity against highly resistant Gram negative clinical strains and has established proof-of-concept in the animal model. Further studies to establish the safety of the series are underway. The company has been approved for a follow-on BIPP Grant. A successful drug emerging from this research will significantly reduce the burden of multidrug resistance and provide physicians with a novel therapy to treat infections. BIG Grant has allowed us to accelerate our research and was a key factor in our accessing external funding.

# Mechanical Heart Valve Fixation System: A Improve Design for Superior cardiac performance



**Innovator Lab Consultants India Pvt. Ltd.**  
Sujoy Shad (Call 1)



## The Journey

We are designing an improved mechanical heart valves that are meant to replace heart valves damaged by infections and ageing and have more space, reduce possibility of infective complications & paraprosthetic leaks. We estimate a 35% to 115% increase in effective orifice area. The innovation will have immense societal impact as over 600K patients globally and 40K Indian suffer heart valve disease. Importantly, 25% patients are small adults or young children who remain the dominant focus of our development. I had considered this concept design over 10 yrs ago, and along the way I tried to get research organisations to undertake development. That did not work out. I tried rope in the only Indian heart valve manufacturer to undertake this development, that too did not succeed. With the BIG grant the much delayed journey started.

# Fetal Electrocardiogram and Uterine Activity signal extraction from Maternal Electrocardiogram eliminating the need for the use of conventional transducers



**Pradin Technologies Pvt. Ltd.**  
Dinesh Bindiganavale (Call 1)



## The Journey

Transducer-less fetal monitors unlike conventional cardiocographs is a novel approach to promotecontinuous monitoring of high & medium risk pregnancies. The alarming rate of stillbirths in India isgreater than the sum of malaria & AIDS related deaths together. Motivation for the project is anaffordable, portable, non-invasive & easy to use solution for the primary & home care segment. The first BIG grant from BIRAC has catalysed our idea into a proof-of-concept development. This is nowbeing engineered for pilot market introduction. This also started us on an entrepreneurial journey by registering “Pradin Technologies Pvt Ltd”.

## Value added products such as nutraceuticals, poultry feed, aqua feed from the wastes/byproducts of palm oil mills and silk reeling industries



Srinivas Bandlamori (Call 2)

### The Journey

Through this project we identified two industries viz., Oil Palm and Silk reeling industry. Of the total raw silk produced in India (26,480 MT), only 25% is used for silk production, while remaining 75% is discarded as waste. India produces 50,000 M, for every Kg of oil, 3.45 Kg of waste is generated. Wastes from both these industries have been used to develop High Value Low Volume products such as Omega-3 fatty acids, & Low Value High Volume products like poultry feed, aqua feed, etc. The collaboration with BIRAC and their BIG Partner has helped us to scale up the innovation and convert it into a commercially viable products. The handholding and the mentorship provided was a key behind the success of this project.



## Pupil Expansion Ring & Delivery Systems



**Nayan Eye Centre Pvt. Ltd.**

Suven Bhattacharjee (Call 4)

### The Journey

The simple single plane design of the 'Bhattacharjee ring' redefines the way pupil is expanded during cataract surgery in eyes which do not dilate with medications. It paves the way for machine manufacture of the device, translating into reduced costs to the patient and health care system. The rings are made of 5-0 (0.1 mm) nylon and can be inserted and removed through a 0.9 mm incision which no device has been able to achieve. BIRAC through the BIG funding is assisting validation of the concept through multicenter global trials and development of the 'Truly Continuous Ring', 'Delivery Systems' & 'Expandable Ring'.



# Development of Diagnostic Reagents for Acute Myocardial Infarction



**G.M. Biotech**  
Susmita Ghosh (Call 1)



## The Journey

G.M. Biotech have innovated an animal free, antibody free reagent development platform technology that can be used for detection of protein markers. Our first product in pipeline is an acute myocardial infarction detection kit based upon earliest cardiac marker H-FABP. The novel platform technology also enabled us to develop a new instrument-free format of diagnostics that can be practiced in any healthcare set-up, rural or urban. Since our kit will detect heart attack within 1-2 hrs after the onset, it will aid in much earlier medical intervention and save more lives. Grant from BIRAC aided us launching this high risk project in a systematic manner and also helped us building a self-sufficient R&D laboratory.



# The **BIG** List

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## List of Innovators / Entrepreneurs



# BIOTECHNOLOGY IGNITION GRANT (BIG)

CALL 1-6

S. No	Call	Title of the project	Name of Grantee	Project Coordinator	BIG Partner
1	1	Rapid Detection of Acute Myocardial Infarction by sensing Cardiac Markers using Micro Cantilever Technology- Nitin Kale	Nanosniff Technologies Pvt Ltd	Dr. Nitin Kale	Foundation for Innovation and Technology Transfer (FITT), New Delhi
2	1	Study, Design and Development of Hit Molecules for Type II Diabetes -Avinash Mishra	Novo Informatics Pvt Ltd	Mr. Avinash Mishra	Foundation for Innovation and Technology Transfer (FITT), New Delhi
3	1	Development of Diagnostic Reagents for Acute Myocardial Infarction-S. Ghosh	G.M. Biotech	Dr. Susmita Ghosh	Foundation for Innovation and Technology Transfer (FITT), New Delhi
4	1	Intraosseous Device	Dr. Jayant Karve	Dr. Sandeep Singh	Foundation for Innovation and Technology Transfer (FITT), New Delhi
5	1	Mechanical Heart Valve Fixation System: A Improve Design for Superior cardiac performance: - Dr.Sujay Shad	Innovator Lab Consultants	Dr. Sujay Shad	Foundation for Innovation and Technology Transfer (FITT), New Delhi
6	1	Personal Ophthalmic Diagnostic System (PODS)	I4Vision Diagnostics Private Limited	Dr. Dinesh Verma	Foundation for Innovation and Technology Transfer (FITT), New Delhi
7	2	production of collagen and by production from fresh water fish origin for biomedical applications:	Amnivor Medical Private Limited	Dr. Santanu Dhara	Foundation for Innovation and Technology Transfer (FITT), New Delhi
8	2	Design and Development of a Rapid Point-of-Care Device for Endotoxin Detection in Critically Ill/Septicemia Patients- Shalini Gupta	Dr. Shalini Gupta	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
9	2	Detection of Circulating Tumor Cells by Multifunctional Highly Dispersible Polymeric-Magneto-Antibody Nanosystem -	Actorius Innovations and Research	Dr. Muralidhara Padigar	Foundation for Innovation and Technology Transfer (FITT), New Delhi
10	2	Use of Novel Superoxide dismutase with anti-ageing properties as oral supplement and cosmetics.	Mahesh Sankar Dhar	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi

S. No	Call	Title of the project	Name of Grantee	Project Coordinator	BIG Partner
11	2	Biomimetic Bone Substitutes: -	Sitalogics Pvt. Ltd.	Dr. K Srinivas Rao	Foundation for Innovation and Technology Transfer (FITT), New Delhi
12	2	Deglycosylated ethnic banana as a mucosal health protectant-	A Pallavi	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
13	3	Keyhole surgery replaceable artificial heart	SG ArtHeart Private Limited	Dr. Sujoy K Guha	Foundation for Innovation and Technology Transfer (FITT), New Delhi
14	3	Production of Phytate free food grains: Effective Strategy to deal with micronutrient deficiency	Dr. M.K. Reddy	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
15	3	Development of a commercial grade low cost Arterial pulse analyzer	Mr. Sushant Poojary	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
16	3	Transdermal Iron Replenishment Therapy	Dr. H.N. Shivakumar	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
17	3	Interaction of Nano-embedded Piriformospora indica with the plant of medicinal importance, Brassica oleracea var. Botrytis (Broccoli)	Dr. Ajit Varma	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
18	3	mCAPD Mobile Continuous Ambulatory Peritoneal Dialysis	Gowrishankar W	Mr. S Pattabiraman	Foundation for Innovation and Technology Transfer (FITT), New Delhi
19	4	Pupil Expansion Devices and Delivery System	Dr. Suven Bhattacharjee	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
20	4	Process Crystallization as a Purification Tool to Therapeutic Antibody	Bhami's Research Laboratory	Dr. Bhami Shenoy	Foundation for Innovation and Technology Transfer (FITT), New Delhi
21	4	Developing a rapid multiplex test to diagnose extensively drug resistant (XDR) TB and Multidrug resistant (MOR) TB	Yaathm Biotech Pvt Ltd	Ms. Anitha Rajagopal	Foundation for Innovation and Technology Transfer (FITT), New Delhi
22	4	Development of an indigenous rapid card test to detect IgM against TORCH infections in prenatal and perinatal causes using recombinant proteins as capture antigens	Sakosh Biotech Private Limited	Dr. Kavita Singh	Foundation for Innovation and Technology Transfer (FITT), New Delhi
23	4	An innovative, hand-held (pen-styled) sensor system for early identification of coarctation of aorta in neonates	Abhijith Bailur	Dr. Rajnish Juneja	Foundation for Innovation and Technology Transfer (FITT), New Delhi
24	4	Introduction and development of a new DNA based kit for Early and accurate diagnosis of Tuberculosis	Nextec Lifesciences Pvt. Ltd	Dr. Ranjana Srivastava	Foundation for Innovation and Technology Transfer (FITT), New Delhi
25	4	Development and Validation of novel pseudobioaffinity based purification method for efficient recovery of coagulation factor VIII	Plasmatech Solutions Pvt. Ltd.	Mr. Vignesh N Janakiraman	Foundation for Innovation and Technology Transfer (FITT), New Delhi

S. No	Call	Title of the project	Name of Grantee	Project Coordinator	BIG Partner
26	4	Renewable chemicals for high performance materials	Aseem Gupta	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
27	5	Development of early Breast and Cervical cancer detection method using novel, high resolution digital holographic microscope	Dr. Sarita Ahlawat	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
28	5	Scintilla - a portable urine protein analyser device for Mass Healthcare	Cutting Edge Medical Devices Pvt Ltd	Dr. Pankaj Parashar	Foundation for Innovation and Technology Transfer (FITT), New Delhi
29	5	A safe and effective technology for treating musculoskeletal disorders in elder patients	Dr. Vanaja K Gowda	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
30	5	Rapid diagnosis of bacterial gastroenteritis in resource poor settings	Dr. Vivekanandan Perumal	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
31	5	Innovative approach for upscaling natural tocopherol production from engineered brassica juncea (Indian mustard) for therapeutics	Dr. Neera Bhalla Sarin	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
32	5	Development of affordable breast prosthesis and mastectomy bras for breast cancer patients	Dr. Pawan Mehrotra	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
33	6	Design and development of a low cost, easy-to-use stretcher, for complete immobilization of spine and limbs, and shock absorption during transport of physical trauma patients	Dr. Anupam Bam	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
34	6	Manufacturing of a new universally adjustable orthodontic bracket	Dr. Alka Banker	-	Foundation for Innovation and Technology Transfer (FITT), New Delhi
35	1	Development of an aptamer-based platform to detect novel Tuberculosis markers in human serum	Achira Labs Pvt. Ltd.	Dr. Dhananjaya Dendukuri	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
36	1	Modular Resilin-mimetic Elastomeric Platform	Pandorum Technologies Pvt. Ltd.	Dr. Tuhin Bhowmick	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
37	1	Metabolic Engineering of marine bacteria for the production of isobutanol in salt water	Sea6 Energy Pvt. Ltd.	Ms. Sri Sailaja Nori	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
38	1	Dr. Vikas Mehra - Expression of therapeutic diabody against TNF-alpha and IL17R	Dr. Vikas Mehra	Dr. Bharat Chattoo	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore

S. No	Call	Title of the project	Name of Grantee	Project Coordinator	BIG Partner
39	1	Cancer treatment through autologous activated dendritic cells	Western Range Biopharmaceuticals	Dr. Vinod Kuberkar	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
40	1	Enzymatic maceration of mango pulp to produce quality wine	Codon Biosciences Pvt. Ltd.	Dr. Archana Thakur	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
41	2	Fibre lasers for photoselective tissue ablation	Unilumen Photonics Pvt Ltd	Mr. Anil Prabhakar	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
42	2	Testing the feasibility of Nano magnetic disc based ablation of Cancer cells in vitro	Nurture Earth R&D Pvt. Ltd.	Dr. Seshgiri Raghukumar	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
43	2	Establishing and Validating a novel drug target in mycobacterium tuberculosis	GeNext Genomics Pvt Ltd	Mrs. Supriya Kashikar	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
44	2	Industrial application of a novel cancer drug screening method	InvivoD Solutions Private Limited	Dr. Pradip Sinha	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
45	2	Development of Fucose Knock out technology platform in CHO S cell line for improved Biotherapeutics	Theramyt Biologics Pvt Ltd	Dr. Maloy Ghosh/ Ms. Kavitha Iyer Rodrigues	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
46	2	Development and Validation of Gene Delivery System for Novel Model Organisms	Dr. Yashoda Ghanekar	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
47	2	A Yeast based system for protein expression and metabolic engineering	Dr. Vinod Nayak	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
48	2	Synthetic biology for overproduction of 2,3-butanediol	Butacell Research Pvt. Ltd.	Dr. Nidhi Adlaka	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
49	2	Value added products such as nutraceuticals, poultry feed, aqua feed from the wastes/byproducts of palm oil mills and silk reeling industries	Mr. Srinivas Bandlamori	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
50	2	Developing Novel Lactic Acid Bacteria Antimicrobial Interventions to Improve Food Safety and Shelf-Life	Dr. Swetha Morey	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
51	2	Development Of Low Cost High Performance Immobilized Lipases For Intersterification Of Oils Andfats To Produce Healthy Fats	Shirdi Sai Nutraceuticals Pvt. Ltd	Dr. Munishwar N Gupta	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
52	3	Novel, Percutaneous Soft Tissue Biopsy System with assisted Hemostasis	Indio Labs Pvt. Ltd.	Dr. Siraj Bagwan	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
53	3	Hand-held Imaging Flow Cytometer for Quantitative Diagnosis of Malaria	Dr. Sai Siva Gorthi	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore

S. No	Call	Title of the project	Name of Grantee	Project Coordinator	BIG Partner
54	3	A simple platform based novel,rapid and color changing one-time and reusable nanofiber strips for selective detection of Enterohaemorrhagic Escherichia coli (EHEC)O157:H7	Module Innovations Pvt. Ltd.	Mr. Sachin Dubey	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
55	3	Development of Long Circulating Biodegradable Nanoparticle MRI Contrast Agents Based on Hydroxypropyl-beta-Cyclodextrin	Robust herbals Pvt. Ltd.	Dr. Ravikumar K	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
56	3	An implantable drug-delivery device for improving Tuberculosis treatment adherence and compliance	Dr. Jonathan Pillai	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
57	3	Low-Cost Prophylactic Topical Dermal Cream to Prevent Chronic Exposure of Toxic Pesticides	Dr. Praveen Vemula	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
58	3	Development of trypsin resistant PAN reactive trypsin antibodies for industrial application	Affigenix Biosolutions Pvt Ltd	Dr. Arumugam Muruganandam	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
59	3	Bicistronic self replicating DNA vaccine for rabies and immunocontraception in stray dogs	Geniron Biolabs Pvt. Ltd.	Dr. Prashant T	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
60	3	3D printer filaments that are biomaterial-based and eco-friendly	Dr. Karthik Chetan	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
61	3	Economical process for conversion of waste to green chemicals	String Bio	Dr. Ezhil Subbian	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
62	3	Upscaling Banana propagation using bioreactors	Dr. Sukhada Mohandas	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
63	3	Development of economically viable synergistic nutraceutical formulations with Cordyceps and male silkworm larvae for disorders related to pancreas, kidney, liver, impotency etc. by culturing Cordyceps on silkworm in an artificial environment	Dr. Mousumi Mondal	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
64	3	“ A novel therapeutic modality using Adipose derived Mesenchymal Stem cells (ADMSCs) for treating Osteoarthritis patients & establishing clinical based evidence”™.	Total Potential Cells (P) Ltd.	Dr. Bhaskar Vyas	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
65	3	Establishment of a Mesenchymal Stem Cell Bank as an Alternative Skin Bank	OCT Therapies and Research Private Limited	Dr. Caroline Mathen	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
66	4	Novel Therapeutic interventions against fatal canine viral pathogenesis	Dr. B. Mohana Subramanian	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore

S. No	Call	Title of the project	Name of Grantee	Project Coordinator	BIG Partner
67	4	A Safer and easier Nasal foreign body extractor for clinicians in under-served areas	Inaccel Consulting	Dr. Jagdish Chaturvedi	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
68	4	Mapping of Prochiral Chemical Space covered by Ketoreductases	Biomoneta Research	Dr. Srividya Janani Venkatraman	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
69	4	Evaluation of Clovamide analogs as Neuroprotective Agents for treatment of Parkinson's disease	Kinome Pharma	Dr. Vellareddy Anantharam	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
70	4	Unraveling mechanism of action for anti-bacterial compounds emerging from phenotypic screens	Bugworks Research	Mr. Ramanujan Kadambi	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
71	4	Atomic Force Probing of cells for for clinical and pharmaceutical applications	Shilps Sciences Private Limited	Dr. Ashwin Lal	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
72	4	Microarray based technology for simultaneous detection of food and water borne pathogens	Dr. Sampath Srisailam	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
73	5	Novel and effective way to reduce the risk of ventilator associated pneumonia	Coeo Labs	Mr. Nachiket Deval	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
74	5	Bile acid lipoids as potential therapeutics for psoriasis	Dr. Srujan Kumar Marepally	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
75	5	Development of highly sensitive and portable optical microscope for malaria parasite detection.	Dr. Satya Tapas	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
76	5	First-in-Class Therapeutics for Lysosomal Storage Disorders	Aten Biotherapeutics Pvt. Ltd.	Dr. Aditya Kulkarni	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
77	5	PentaFluVac " An indigenous replication-incompetent viral vaccine for avian, swine and human influenza	Pentavalent Bio Sciences Pvt.Ltd.	Ms. Bhavani PV	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
78	5	Conversion of CT/MR data to 3d printed models help the surgeons plan surgery more accurately by means of better implants thereby increasing accuracy & reducing time taken for actual procedure. This brings down costs, increases throughput & accuracy.	DF3D Creations Pvt. Ltd.	Mr. Deepak Raj K	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
79	5	Automated detection of abnormal copy number variants in human diseases	Dr. Naga Mohan Kommu	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
80	5	Development of a novel monolayer based parallel artificial membrane permeability assay to determine permeability of new chemical entities and drugs	Vital Bioscientific Solutions Pvt Ltd	Mrs. Padma Priya Paragi Vedanthi	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore

S. No	Call	Title of the project	Name of Grantee	Project Coordinator	BIG Partner
81	5	The PubMed Graph: System to query and rank search results spanning multiple biomedical documents	RelAgent Technologies Pvt. Ltd	Dr. S Ramanan	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
82	5	Harnessing cheater cells for probiotics: applying game theory for nutrition and health	Dr. Soumen Roy	-	Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore
83	1	A Platform for Rapid Antibiotic Susceptibility Testing (AST) and Assessment Of Bacterial Load	Sabio Innovative Solutions Pvt. Ltd.	Mr. Udit Parekh	IKP Knowledge Park, Hyderabad
84	1	Novel inhibitors of DNA Gyrase for the treatment of multidrug resistant infections	Vitas Pharma Research Pvt. Ltd.	Dr. Radha Rangarajan	IKP Knowledge Park, Hyderabad
85	1	Pharmacological Evaluation of N-oxide Metabolite of Antipsychotic Drug for Type 2 Diabetes	Crystalin Research Pvt. Ltd.	Dr. Ashwini Nangia	IKP Knowledge Park, Hyderabad
86	1	Novel Oncotherapeutic Measles Virus using eSAME system	Seagull Biosolutions Pvt. Ltd	Dr. Vishwas Joshi	IKP Knowledge Park, Hyderabad
87	1	Fetal Electrocardiogram and Uterine Activity signal extraction from Maternal Electrocardiogram eliminating the need for the use of conventional transducers	Pradin Technologies	Mr. Dinesh Bindiganavale	IKP Knowledge Park, Hyderabad
88	1	Creation of transgenic zebrafish as cancer models	Zephase Therapeutics Pvt. Ltd.	Dr. Kiranam Chatti	IKP Knowledge Park, Hyderabad
89	1	Biochemical Research & Development to Improve the Efficacy of a Dry, Thermophilic, Anaerobic Reactor	GPS Renewables Pvt. Ltd.	Dr. Mainak Chakravarty/Mr. Sajal Chakravarty	IKP Knowledge Park, Hyderabad
90	1	Engineered stable, nano-sized bubble liposomes - a commercially viable drug delivery platform	Dr. Praveer Gupta	-	IKP Knowledge Park, Hyderabad
91	2	Bioremediations for Agro Industrial Solid Wastes by ARBIT for Efficient Management Through Energy and Biomanure Conversions.	Swayambhu Biologics Pvt. Ltd.	Mr. Balaji R	IKP Knowledge Park, Hyderabad
92	2	Novel Integrated Newborn Resuscitation Solution to Empower Front-line Health Workers to Resuscitate Newborns Effectively	Windmill Health Tech. Pvt. Ltd.	Dr. Ayesha Chaudhary/ Dr. Avijit Bansal	IKP Knowledge Park, Hyderabad
93	2	A novel device to screen newborns for hearing loss in resource poor settings	Sohum Innovations Pvt. Ltd.	Mr. Nitin Sisodia	IKP Knowledge Park, Hyderabad

S. No	Call	Title of the project	Name of Grantee	Project Coordinator	BIG Partner
94	2	Clonal propagation of elite genotype of orchid hybrids synthesised in Manipur for commercial cultivation	Kwaklei & Khonggunmelei Orchids Pvt. Ltd.	Dr. Kishor Rajkumar	IKP Knowledge Park, Hyderabad
95	2	Exploring Muga silk fibre as a promising suture material	Mugagen Laboratories Pvt. Ltd.	Dr. Utpal Bora	IKP Knowledge Park, Hyderabad
96	2	Delivery and retention of Irinotecan loaded magnetic nanoparticles for treatment of brain tumors	Vegrandis Therapeutics Pvt. Ltd.	Dr. Uday Saxena	IKP Knowledge Park, Hyderabad
97	2	Development of a novel fungal bio control agent using protoplast fusion technology to target drug resistant gastrointestinal cattle worms responsible for reducing productivity, by an eco friendly approach.	Wobble Base Bioresearch Pvt. Ltd.	Dr. Pratap Mukhopadhyaya	IKP Knowledge Park, Hyderabad
98	2	World's Most Affordable, long life Defibrillator that is Battery less, Hand Cranked, Rugged with reusable paddles.	Jeevtronics Pvt. Ltd.	Mr. Aniruddha Atre	IKP Knowledge Park, Hyderabad
99	2	Hollow Fibre Membrane Based Low-Cost Oxygen Concentrator for Medical Applications	Genrich Membranes Pvt. Ltd.	Mr. Amin Almel	IKP Knowledge Park, Hyderabad
100	3	Metabolic engineering of Pseudomonas putida for 3-Hydroxypropionic acid production /	Mr. P.Sathyavathan	-	IKP Knowledge Park, Hyderabad
101	3	Glycolytic Inhibitor	M/s. AtharvWin Healthcare Pvt Ltd	Mr. Anil Roy	IKP Knowledge Park, Hyderabad
102	3	3-D Bone Graft and GBR Membrane for Maxillofacial and periodontal repair: Towards a clinical study	Regensol	Mr. Kunal Khanna	IKP Knowledge Park, Hyderabad
103	3	A Novel method of converting Agri Waste to Energy with direct benefit to farmers: Use Rice Husks to produce Carbon-coated Nanoporous Si/SiO <sub>2</sub> for Li-ion batteries & create THRIFT fund for farmer contribution for solar water pump under subsidy scheme	Sky Solar & Power India Limited	Mr. Mike Ragahvan	IKP Knowledge Park, Hyderabad
104	3	Non-invasive prenatal diagnosis kit for sickle cell anemia	Pregene Research Pvt. Ltd.	Dr. Shivkumar D. Chauhan	IKP Knowledge Park, Hyderabad
105	3	Bioabsorbable implants based on polylactic acid (PLLA)	Orthocrafts Innovations Pvt. Ltd.	Ashish K Lele	IKP Knowledge Park, Hyderabad

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106	3	A novel formulation for Probiotic food additive.	Abhiruchi Probiotics Pvt. Ltd	Dr. Archana Pundle/Mr. Hrishikesh Mungi	IKP Knowledge Park, Hyderabad
107	3	Development of a Biosensor based Point-of-care Nucleic Acid Testing System	M/s. Purius Nanosystems Pvt. Ltd.	Mr. Purushothaman Gempuraj	IKP Knowledge Park, Hyderabad
108	3	Laser Desorption / Ionization Mass Spectrometric (LDI MS) solutions for HIGH throughput detection and analysis of residual compounds, contaminants and small molecules in milk and dairy products.	Barefeet Analytics Pvt. Ltd	Dr. Venkateswarlu Panchagnula	IKP Knowledge Park, Hyderabad
109	4	Osteoconductive Bone Graft Susbtitutes	BiolMed Innovations Pvt. Ltd.	Mrs. Anuya Nisal	IKP Knowledge Park, Hyderabad
110	4	Production of non-alcoholic drink enriched with essential vitamins and minerals by microbial fermentation of natural raw materials	Naturlich Global Beverages Pvt. Ltd.	Mr. Arjun Radha Krishna	IKP Knowledge Park, Hyderabad
111	4	Application of pentose utilizing yeast strain(s) for higher ethanol production from hemicelluloses	Dr. Sushma Meshram	-	IKP Knowledge Park, Hyderabad
112	4	Brun – A Perinatal Monitoring Device	Brun Health Pvt. Ltd.	Mr. Anirudh Chaturvedi	IKP Knowledge Park, Hyderabad
113	4	VodCa for Distillery Industry [VodCa: Vortex Diode based Cavitation Devices]	Vivira Process Technologies Pvt. Ltd.	Dr. Vivek Ranade	IKP Knowledge Park, Hyderabad
114	4	Development of a novel diagnostic kit for Tuberculosis	Annweshan SciTech. Pvt. Ltd.	Dr. Dhiman Sarkar	IKP Knowledge Park, Hyderabad
115	5	Develop and Test Certain 3D Printing Technologies to Produce Innovative limbs at Affordable Costs for the Disabled in India	Dr. Srinivasa Prakash Regalla	-	IKP Knowledge Park, Hyderabad
116	5	Remote Cardiac Monitoring and Real-Time Outpatient Cardiac Telemetry	Monitra Healthcare Pvt. Ltd.	Mr. Ravi Bhogu	IKP Knowledge Park, Hyderabad
117	5	Bio-Synthesis, Production and Formulation of Sophorolipids for the purpose of Sanitizing/Sterilizing Fruits and Vegetables thus enhancing their shelf-life.	Mr. Mihir Mehta	-	IKP Knowledge Park, Hyderabad
118	5	ISITE Intra-Ocular Lens for Spectacle Free Vision	Nayam Innovations Pvt. Ltd.	Mr. Tanuj Gigras	IKP Knowledge Park, Hyderabad

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119	5	Establishment and Validation of Commercially Viable Technologies for the Production of Omega-3 Fatty Acids from Marine Microalgae	AlgalR NutraPharms Pvt. Ltd.	Dr. Mohanraj Subramanian	IKP Knowledge Park, Hyderabad
120	6	An Affordable, 'Point-of-sample collection' Cervical Cancer screening tool	Aindra Systems Pvt. Ltd.	Mr. Adarsh Natarajan	IKP Knowledge Park, Hyderabad
121	6	Development of Oral Cancer Screening Camera	Sascan Meditech Pvt. Ltd.	Dr. Subhash Narayanan	IKP Knowledge Park, Hyderabad
122	6	Development of Handheld Device for Glycated Hemoglobin and Albumin Sensing	Pathshodh Healthcare Pvt. Ltd.	Dr. Navakanta Bhat	IKP Knowledge Park, Hyderabad
123	4	Recombinant Enabling MDR Platform	Dr. Shrikant Mishra	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
124	4	Multispectral Optical Imaging and Computing Technologies for Realtime In situ Functional Characterization and Monitoring of Cutaneous Wound Healing Progression	SkinCurate Research Pvt Ltd	Mr. Debdoot Sheet	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
125	4	Development of a novel technology for generation of stable transgenic systems with no off-targets	Viravecs Labs	Dr. Rohan H Kamat	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
126	5	Multiplexed bead based suspension array for dengue serotyping	Dr. Biswadeep Das	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
127	5	Design And Evaluation Of Novel Formulations Of Some Anti- Cancer Drugs For Metronomic Chemotherapy	Ms. Chaitali Vibhakar Surve	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
128	5	Development of De-metalizer Kit from Biopolymers for Efficient Removal of Heavy Metal Ions from Contaminated Water Especially of the Mining Areas	Dr. Luna Goswami	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
129	5	Optically tunable nanobio-sensor for detecting the efficacy of mosquitocidal repellants	Dr. Raghavendra Samantaray	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
130	5	Development of food colourants and textile dyes from natural pigments of microbial origin	Dr. Sureshkumar Singh	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
131	6	Tear Dipstick immunoassay for diagnosis of adult primary glaucoma	Dr. Aparna Rao	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
132	6	Development of a molecular needle as a novel platform for delivery of anticancer drugs	Dr. Nusrat J M Sanghamitra	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
133	6	Networked Critical Care Monitoring in Low Resource Settings	Lattice Innovations Pvt Ltd	Mr. Chayan Chatterjee	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar

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134	6	Point-of-Care Diagnostic Kit for Diarrheal Bacterial Pathogens	Priti Sundar Mohanty	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
135	6	Detection and diagnosis of Urinary Tract Infection through development of a rapid and sensitive non-invasive agglutination method	Dr. Surajit Bhattacharjee	-	KIIT Technology Business Incubator (KIIT-TBI), Bhubaneswar
136	4	Green Manufacturing of Cephalosporin Antibiotics Using Recombinant Deacetylase	Cellzyme Biotech India Pvt. Ltd.	Dr. Rajkumar Rajagopal	Venture Center, Pune
137	4	Novel Chitosan derivative for building SAR in plants: specifically leaf blight of Pomegranate caused by Xanthomonas sp.	Swasti Agro & Bioproducts Pvt. Ltd.	Dr. Abhay Shendye	Venture Center, Pune
138	4	To demonstrate Proof of Concept for a novel, non-invasive exosome -based screening (for early detection) cum diagnostic kit for multiple cancers (using one test) utilizing patient derived biofluids	Mr. Aman Sharma	-	Venture Center, Pune
139	4	To demonstrate proof-of-concept for an automated clinical analysis and annotation pipeline for NGS based somatic cancer genomic test for diagnosis, prognosis and personalized therapy. This will enable low cost and actionable genomic testing in India.	InDNA Research Labs Pvt. Ltd.	Mr. Aditya Phatak	Venture Center, Pune
140	4	To develop a novel, cost effective, non- allergic herbal formulation for management of spontaneous bleeding and allied complications in multiple coagulation disorders.	Miss. Tania Paul	-	Venture Center, Pune
141	4	Use of Portable Raman Spectrometer for Soil & Minerals Analysis	Molqbits Sensors and Data Pvt. Ltd	Dr. Girish Arabale	Venture Center, Pune
142	4	Direct beta thalassemia carrier detection kit	Mr. Yogesh Badhe	-	Venture Center, Pune
143	5	Design second stage of prototype for Low cost, low dosage Digital X-Ray using TDI sensor	Mother Diagnostic Systems Pvt Ltd	Mr. Karthik Somsundaram	Venture Center, Pune
144	5	Development of smartphone based eye imaging system	Visint Healthcare	Dr. Ramesh S Ve	Venture Center, Pune
145	5	Production of Ccclodextringlycosyltransferase / CGTase enzyme using a Membrane Cell Recycle Bioreactor (MCRB)	Dr. Sanjay Nene	-	Venture Center, Pune
146	5	A novel organic and inorganic nano-formulation for rapid wound healing and control of infection	Mr Milind K. Choudhari	-	Venture Center, Pune

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147	5	Innovative scar-free organ retractor for reduced port laparoscopic surgery	Croleon Innovation Labs Pvt. Ltd.	Mr. Chinmay Deodhar	Venture Center, Pune
148	5	Process to produce double haploid parental lines with new, unique, rare genetic combinations using DH technology coupled with a strategy to increase or alter meiotic recombination in the technology demonstration system of mustard	Dr. Renuka Diwan	-	Venture Center, Pune
149	5	Novel process for manufacturing of D-Penicillamine	Shweta Shree Life Sciences Pvt. Ltd.	Dr. Guruprasad Kulkarni	Venture Center, Pune
150	5	Development of a point-of-care device for prenatal diagnosis of congenital anomalies	Dr. Rishi Adhikary	-	Venture Center, Pune
151	6	SphinX - Ostomy management device	Pranav Chopra	-	Venture Center, Pune
152	6	DNA Testing on Disposable Plastic Biochips: A High Sensitivity Platform for Malaria Detection	OmiX Research and Diagnostics Laboratories Pvt. Ltd.	Dr. Sudeshna Adak	Venture Center, Pune
153	6	Affordable and Safe therapy for Neonates with Hypoxic Ischemic Encephalopathy	Sensivision Health Technologies Pvt Ltd	Mr. Jayadeep K. Unni	Venture Center, Pune
154	6	A cost effective process of making Anaerobic Granulated Sludge optimized for quick start-up and easy operation of UASB in WWTP while making the process energy efficient, achieving higher COD removal rate, high yield of CH <sub>4</sub> at higher loading rates	Dr. Vanita Prasad	-	Venture Center, Pune
155	6	A gonio camera without a slit lamp	Dr. H V Srinivas	-	Venture Center, Pune

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