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Towards Global Leadership



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Ignite Innovate Incubate

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



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chief editor's take



BIRAC's focus is on empowering and enabling the innovation driven biotech enterprise in the country. BIRAC is uniquely positioned to contribute significantly to the "Make in India" programme, a flagship programme of the Country especially to play a catalytic role in the development of affordable and accessible products of national and societal relevance.

Working through a holistic approach we support innovations that are emerging at grassroots to innovation which are at a late stage of development. BIRAC has today successfully established a pipeline that helps innovations to move through various stages from idea to proof-of-concept to validation and scale. Targeted support at each of these stages helps to derisk the path of innovation and eventual commercialisation.

In the last 3 years we have supported nearly 270 SMEs and companies. We have also provided start up grants to 140 entrepreneurial ideas. The support through various instruments that BIRAC has established would continue and we believe that the cumulative power of the emerging ecosystem would propel India to be a Biomanufacturing destination for affordable and accessible products that would be made in India, for India and for the world. ■

Renu Swarup

Managing Director, BIRAC &
Senior Adviser/Scientist 'H', DBT, Govt. of India

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Accelerating Make in India



The 'Make in India' programme covering 25 industrial sectors aims to build India into a best in class manufacturing hub. Two areas related to us, pharmaceuticals and biotechnology are appropriately amongst the 25 industrial sectors that have been identified. These two sectors possess an immense potential to contribute and provide leadership to this nationwide flagship programme.

There are several components that need to correctly come together to establish India as a major destination of bio-manufacturing. These components include optimal funding at each stage of innovation, a clear regulatory landscape, quality R&D infrastructure to scale, and skilled human resources. There are, in addition, several other baseline factors such as 'ease of doing business', access to power and basic infrastructure which will influence the outcome of the programme.

The opportunity for India, in the pharma and biotechnology sector, lie in domains such as biosimilars, vaccines, biomedical technology including devices and diagnostics, industrial biotechnology and agricultural biotechnology. Each domain has its own unique challenge and hence would require directed interventions and policy implementation.

India has built capabilities in chemistry, biological sciences, engineering and informatics; each of these capabilities would play an important role in spurring biomanufacturing in the country. The country needs to deepen, expand and accelerate these capabilities to be able to successfully leverage the opportunity that we have.

It is important to note that Make in India is a continuum- from ideation to scalable manufacturing which meets demand. We need to feed into the innovation pipeline such that it remains full of bright novel ideas- a subset of which would eventually progress to manufacturing. It is therefore important to simultaneously foster discovery on one end as well as validation and scale on the other end. BIRAC's flagship programmes such as Biotech Ignition Grant, its bioincubation programme and its recent partnership with Society for Research and Initiatives for

Sustainable Technologies and Institutions (SRISTI) are all strategies to populate the innovation funnel such that products ideas are able to move from ideation to next stage.

In the biomanufacturing arena the challenge before us is to bridge the gap between dual requirements of product excellence and extreme affordability. India provides an experimental laboratory where we could attempt to cross this bridge, and in doing so create impact not just nationally but globally. The recent success of Rotavirus vaccine "Rotavac" is a pointer to exciting possibilities in this approach. Similarly, we have supported several product development projects that have resulted in 17 affordable products and 11 technologies- the result is outcome of our programmes for product development such as SBIRI and BIPP.

Excellence in biomanufacturing also calls for greater linkages between industry and academia and exploring diverse modes of partnerships amongst organisations. In addition, the creation of multitudes of platforms and networks will provide a fillip to cutting edge biomanufacturing in India. This has been BIRAC's top priority and would continue to remain so.

BIRAC is at the forefront of 'Make in India' in the biotechnology sector through support mechanisms for cutting edge technologies that could then be translated to products by manufacturing in India. We welcome aligned organisations both national and international to join us in taking this programme forward and strategize to amplify public good in India and across the globe. ■

Prof. K. VijayRaghavan

Chairman, BIRAC

&

Secretary, DBT, Govt. of India

T S Balganesh

Incentivising Conversion of Science into Application is Critical



Dr. T S Balganesh is Head OSDD Unit and CSIR Distinguished Scientist.

Dr. Balganesh is a renowned R&D scientist and was the key driver in establishing Astra Zeneca in India (AZI) and making AZI globally recognised as a leading organisation in developing solutions for Tuberculosis. Dr. Balganesh has led EU's Framework 6 consortium for TB (New Medicines for Tuberculosis) & is member of the Steering Committee of EU's Framework 7 consortium (More medicines for TB). He holds a PhD from University of Calcutta and postdoctoral experience from Brookhaven National Lab, USA and Max Planck Institute for Molecular Genetics, Germany. The University of Uppsala, Sweden conferred a honorary doctorate in recognition of his immense contributions to TB and malaria research. Dr. Balganesh shared his views with BIRAC regarding the status of biopharma research & development in India.

What are the current trends in biopharma R&D across the globe and how is India pegged in this context?

T S Balganesh (TSB) : Current trends in bio-pharma globally can be visualized to be pushing in 4 different directions- from the immunology side it is the ability to modulate components of the apparatus and thus cure or control afflictions, exemplified by the renewed interest in immunotherapy; the second is the trend towards specifically targeting pathways which are unique in certain diseases thus qualifying for accelerated approval, exemplified by the 'orphan disease' area which brought 70% of the revenues of the top big pharma; the third is the overlapping of diagnostic and/or biomarker driven therapy for segregated populations, broadly classified as personalized therapy and the last but not the least is the 'bio-similar' therapeutics, its manufacture and the price competition.

India is known for being the small molecule pharma manufacturing hub. What are the challenges and opportunities for India in the field of biopharma manufacturing especially in the context of 'Make in India'?

TSB : India's small molecule manufacturing was built on the availability of skilled man-power developed over decades; chemistry as a discipline had been nurtured through the various educational institutions. The world of bio-pharma manufacturing needs competent biologists and chemical engineers to synergise efforts to make this happen. We are known to preciously guard our disciplinary domains in the field of education and thus expecting the educational pattern to allow interdisciplinary learning opportunities in the near future is unlikely to happen. This represents a major hurdle at the fundamentals that we need to overcome to be globally competitive in manufacturing.

Given the challenges (perhaps outlined in the previous question), what could be India's immediate and near term strategies to overcome the hurdles? How do you foresee the growth of the Indian biomanufacturing industry?

TSB : The field of bio-pharma or small molecule drug discovery involves multidisciplinary training; a continued weakness we breed. The current strategy is to 'import' the talent / expertise, however the import flux is largely of individuals with academic track records for whom the industrial ambience is less attractive. Thus, there is a shortage of a stable pool of experts in this area.

There is a desperate need to make our pharma industry attractive for top talent. This attraction need not always depend on financial incentives; it is also dependent on the work culture and the long-term commitment. Given the current context of events that has seen closure of a number of reputable R and D laboratories in India, there is considerable skepticism on the long-term commitment to R and D in this field. However the last of the drivers referred to in the trends will continue to attract investment, the question is where will the 'product' be sourced from, perhaps not from the companies which will be the ultimate manufacturers of the product. India will have to evolve an independent model where small biotechs lead the product discovery while early development is carried out with State supported Public-Private-Partnerships. The pharma companies in India can then step in as they have the capacity to manufacture the 'product' for both the Indian as well as the International market.

Discovery science especially in the context of drug discovery is key to populating the back end of the pharmaceutical innovation funnel. Are the important components of early stage drug discovery present in India? If not, how can this gap be bridged?

TSB : The foundations for innovative drug discovery is always excellence in Science. India has quite a few research laboratories, which could, easily fit such a bill. My own experience is this aspect can be viewed under two different streams

- Lack of appropriate 'facilitation expertise' to convert excellence in Science into a discovery programme. It can easily be argued that several funding agencies do exist that support early drug discovery programmes, however research towards drug discovery also needs facilitators

and mentors who can guide pertinent observations into a drug discovery mode. Drug discovery also needs standardized platforms, every academic laboratory cannot afford to build and sustain specific platforms for drug discovery. I believe we need to find models by which these two components can be made available to innovative minds to support and promote drug discovery. A paradigm shift in how we support drug discovery in India thus needs to be evolved.

- The second aspect of the same problem is to generate interest in the academic community to explore 'application' options for some of the 'innovative' research that is conducted. In the earlier paragraph I argued about 'facilitating' drug discovery, however this can happen only if the investigator believes that there is such a potential for the work being carried out. There exists very little incentive for such a path and in most cases such a path is viewed as a dilution of effort; recognition in the current paradigm is only for publishing and gathering awards. Converting science into application takes time and effort and is today viewed as a thankless path. This needs to change if we have to get the best of minds to think of application of science.

In the global bio-innovation hubs such as Boston, Cambridge & Munich, academic spin off feed the innovation funnel of big pharmaceuticals. What is your opinion about the emergence of start ups from academia in India? How can one facilitate a greater engagement between industry & academia?

TSB : It is an interesting aspect, if one just looks at bio-innovation start-ups, there are several such happening involving different sectors but if you ask the question differently in terms of the support and connectivity to big pharmaceuticals then we draw a blank. Indian big pharmaceuticals are reluctant to invest in start-ups as there is a lack of early discovery programmes within their portfolio. On the contrary if we expand the interest to global players then this argument does not hold water though several interesting 'deals' have been struck over the last few years. The need for greater understanding between the academic and industrial partners needs to be fostered; this understanding can only happen if there is mutual respect and overlapping scientific and business interests. ■

Biotech-Healthcare Industry in India

Negotiating the Curve



Harish Iyer
CEO, Shantha Biotechnics
 Hyderabad, India

As we look at taking the biotech-healthcare industry to the next level through Make In India, we need to understand several aspects about the landscape and the path ahead.

The Biotechnology industry in India is a key sector that could provide solutions to many problems that the country faces. In this article, I focus on biopharma/biomanufacturing/healthcare as this is the bellwether for how this industry will grow in the country.

There is a significant burden of disease in all countries across the world. In less economically developed geographies, the burden of communicable childhood diseases is extensive. As societies become wealthier, one sees a trend towards more non-communicable diseases such as cardiovascular diseases, diabetes, cancer, hypertension and as populations age further we see neurodegenerative diseases increasing. Biotechnology products hold significant promise and can play a critical role in both prevention, therapy and alleviation of suffering. Many modern examples such as vaccines, insulins, are all products of the biotech revolution.

In order to create newer products, one must ensure that the right ecosystem is there within the country to help talented academicians (public and private), industry, scientists, clinicians, engineers, managers, policy makers, regulators and funders to create a vibrant culture of innovation and research.

This ecosystem must connect with other systems across the world to enable the right collaborations that harness the best ideas while engaging the great pool of talent available across the width and breadth of the country. Pressing diseases that threaten our society: Ebola, malaria, pandemic flu, need to look at the biotechnology field for understanding and potential solutions. It is equally important to engage the public and explain the benefits, and bring on the right side of this effort by promoting awareness of the tremendous potential of this sector.

We need to have the manpower with the right skillset in diverse aspects such as biotechnology manufacturing, quality, clinical R&D, and engineering to help build the right factories and manufacture key products – whether they are today's vaccines, therapeutics, diagnostics or futuristic wearables (devices!).

It is likely that a significant volume of biotech products manufactured in India will be for export. However, I believe that the Indian public must not be denied the benefits such biotech products can deliver. Like all major economies in the world, the Indian government must play a critical role in absorbing the products that are created from this ecosystem to help Indians improve their quality of life. In healthcare, it is likely that the



government be able to provide the latest vaccines, therapies, prevention to the largest possible group of patients through public insurance schemes.

In terms of total expenditure on Health, India fares worse than all other BRIC countries, leave apart the US. For a comparison see the table giving World Bank statistics.

India has the lowest healthcare spending in comparison to all other countries by far. In fact, we are about 4- to 5-fold lower when compared to our closest comparator, China. For India, this will require that there be an increase in healthcare public spending from the current 1% GDP (3.9% in the table is a sum of both public and private spending) and by universalizing healthcare and recognizing this as a critical investment in the future of a health citizenry.

The Indian biotech industry has already shown enough examples where companies with well-established infrastructure, in many cases using an innovation network of govts, NGOs have come

up with products that are high quality and affordable (see box above) A few examples are listed in the below:

Vaccines

Shanchol (Shantha Biotech)
MenAfrivacA (Serum Institute)
Rotavac (Bharat Biotech)

Biologics

Insugen, Alzumab (Biocon)
Wosulin (Wockhardt)

The Indian government will continue to play a critical role in the path to promote and encourage the dream of Make In India. From a turnover perspective, this industry is the third biggest biotech industry in the Asia-Pacific region and is estimated to be almost \$5bn in FY 2012-13 registering an almost 15% growth.

The Indian biotech industry has set its aims high of getting to US\$100bn by 2025. It will require a different way of working and significant efforts on the part of industry, academia, government and support from the public to ensure that this can come to fruition. With the right ingredients in place, there is no doubt that this goal can be achieved. ■

Indicators for 2011	Brazil	Russia	India	China	USA
Infant mortality (per 1000 live, 2012 data)	13	9	44	12	6
Physicians per 1000	1.8 (2010)	4.3 (2010)	0.65 (2010)	1.8 (2011)	2.4 (2010)
HC expenditure per capita (US\$)	1121	887	43	278	8608
Out-of-Pocket expenditure	58%	88%	86%	79%	21%
HC expenditure (total), % of GDP	8.9%	6.3%	3.9%	5.2%	17.9%
GDP (US \$ trillion)	2.3	2.0	1.8	8.3	15.7

Medical Devices and Pharmaceuticals Sector

Need for an Ecosystem Overhaul



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The 'Make in India' campaign has the promise to revolutionize the Industry, improve the GDP and create jobs in India. But does it have the fire to propel India's Biotechnology, Pharmaceutical, and Medical devices industry into the next orbit? India is a large healthcare consumption market, but can it become the manufacturing hub for Asia's healthcare consumption?

According to the IMS Health, the medicine spending share of the emerging markets (Asia & Australia) is getting closer to the share of USA which currently is the largest market in the world. In 2013, of the USD 989 billion medicine market, US accounted for 37%, while emerging markets accounted for 29%. In 2018, it is estimated that of the USD 1300 billion, emerging markets will account for 36% and US at 38%. While India and China are expected to occupy a sizable geography for the healthcare consumption market, what does this mean for the local industry?

The same day that PM Narendra Modi announced the 'Make in India' campaign, the Chinese government responded with a 'Make in China' campaign. Interestingly, much of what India sells in the pharmaceuticals and medical devices sectors is not made in India. The medical technology sector estimated at INR 30,000 crores imports 80% of its products from China. India is also the largest importer of Active Pharmaceutical Ingredients (API) from China. The country's contribution to the global biotech industry is a mere 2% by value; similarly pharmaceutical industry's contribution is a miniscule 2.4% by value.

Over time, India failed to develop an ecosystem to attract technology transfer, suppliers etc from the west. The impact of this



is that the combined economic advantage of this sector is behind other markets such as China. China attracted the technology transfer from the west and managed to develop a strong ecosystem compared to its peers in the emerging markets. The ecosystem includes technology suppliers, machinery suppliers, trained employees, consultants to handle overseas and domestic regulatory approvals, input material suppliers and finance. To 'Make in India', this full ecosystem needs to be developed.

It would be impractical for the government to bring a holistic change in the healthcare sector across all the fronts of the ecosystem. A practical approach might be for the government to focus on a few sub sector within the healthcare market to begin with. The focus would be first on the sub-sectors that need the least government intervention, and addresses a large market. The medical device sector would be one such sub-sector, as 80% of the products are imported from China today. The government could devise a strategy with the industry, to facilitate medical device technology transfer from the west to reduce the imports from China. This specific focus can build a stronger ecosystem of ancillary industry, skilled man power, and manufacturing capabilities that could potentially play a larger role in other sub sectors of the industry. ■

The Wellcome Trust

Translational Research for Affordable Healthcare



Shirshendu Mukherjee
Senior Strategic Advisor
Wellcome Trust –India Initiatives

India is a country with a strong intellectual foundation which has let to creation of a back bone which is rich in basic science in all fields but lacked capabilities for translating the same for benefit of mankind.

But things have changed since last couple of years as we see greater interaction with academia and industry which is a key element of translational research in India. Without industry and academia working together translational research will be difficult, as it is very important to bridge the gap between academia and industry. Academia brings in rich experience of basic research in terms of proof of concept and industry has the relevant experience in terms of scale up and marketability of the innovation. Both the partners i.e. the industry and the academia lead to developing a 360° path to take the innovation ahead. Academia should concentrate on basic research and develop a strong proof of concept for the innovation and the industry should continue to interact with the academia to move forward the innovation in all respect that is to understand the market pull and push, regulatory challenges, IP issues and finally the exit strategy.

Things have changed in terms of funding translational research. In last couple of years, state funding, has come in strongly along with international funding. Funding agencies are increasingly engaging with the Indian scientific community and the Industry, to build a bridge to cross the valley of death and fund high risk translational project which leads to the improvement of quality of human life. Organisations like BIRAC, Indo-US Science and Technology



Forum, Wellcome Trust and Bill and Melinda Gates Foundation, have been mandated not only to fund high risk translational research but also build capacity to manage translational projects by hand holding applicants from both academia and industry. Grant writing workshop, outreach activities and post funding management have been the highlights of the programmes.

Wellcome Trust, India initiative on R&D for Affordable Healthcare is mandated to work with Indian innovators in both academia and industry to promote translational research in India and beyond. Initiative's primary thrust is to have the centre of gravity of the project in India (which builds translational capabilities) but can have collaboration beyond borders. This helps building external collaborations into the project which leads to building translational capabilities. The initiative collaborates with BIRAC on thematic issues of national priorities for public good.

An example, to show how it develops translational capabilities is a project funded at IIT Delhi (academic partner), Pheonix Medical System (industrial partner) and Sakhsam Trust (validation and dissemination partner)

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Agri-biotech Ventures

Shoots of Opportunity

The agricultural sector in India contributes a little over 13 percent to the GDP. However, over 50 percent of all working people in the country are engaged in primary agriculture! Therefore, the country largely, remains an agrarian economy. The growth of this sector is imperative for the equitable growth of the country.



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The diverse agro-climatic conditions, and the large arable area allow for the cultivation of a large number of crops; the areas under several of them being the largest in the world. However, productivity levels leave much to be desired. Land holdings are small and getting even smaller. Climate change is having a growing influence on the weather and the monsoon rains, which are vital for the large rain-fed parts of the country, have been erratic. This trend can be expected to continue into the future and may even get worse. All these present an excellent opportunity for the infusion of new technologies that increase productivity and stabilize yields. On-farm losses due to pests, diseases and



weeds can be addressed with technologies that are effective and environmental friendly. Breeding for climate resilient varieties through the development of abiotic stress tolerance using molecular Marker-Assisted Selection or through the ectopic expression of candidate genes are now within the realms of possibility. There is a huge thrust on secondary agriculture – adding value to the primary agricultural produce, including several post-harvest interventions and food processing. All these combine to provide a favourable environment for a thriving agri-biotech industry. The industry though, has been rather stagnant for the last few years because of several reasons. The only GM crops introduced for commercial cultivation is Bt cotton. In spite of its tremendous success, such technologies in other crops are yet to see the light!

One of the primary reasons for the stalling of new GM crop development has been the policy ambivalence regarding the adoption of such technologies. Though the country has had a reasonable regulatory framework, implementation has been impeded by activism and misinformation campaigns. This situation tends to favour only those large players who have the resources and staying power to tide over such adverse times. For start-ups, the regulatory risks are perceived to be too large and keep away potential investors. Many technologies are on the shelves for the last many years for want of regulatory clearances to do field trials. The new requirement to obtain NoC from the State to initiate field trials has only added to the problem. This situation needs to change and a clear policy direction has to be laid out with regard to GM crops in the country. A science-based regulatory system that cannot be held hostage to politics and

ideology is the need of the hour. It should act like an efficient brake-system in an automobile; that allows it to go faster!

India has an enviable network of public institutions that do research and development on the latest agricultural technologies. However, the output, in terms of commercial products, is not commensurate with the resources that are being used up. What is probably lacking is a seamless connectivity between such public institutions and the private sector, which have the capability and compulsion to disseminate such technologies to the farmer. There are a few significant examples of private sector involvement helping to take the fruits of University research to the masses; hybrid rice is one such. If appropriate systems

are implemented to facilitate such a meaningful public-private partnership, many of our institutions can nucleate profitable ventures in the agricultural technology space.

Increasing the productivity and profitability of farms is no longer a desirable outcome; it is an imperative for ensuring the food and nutritional security for the future generations. India, with its technical manpower, research assets and other endowments like land and water can be a global leader in the agricultural sector. The thrust of the “make in India” campaign should, in my opinion, start with Agriculture! ■

New Initiatives at BIRAC



Collaborating with Department of Electronics & Information Technology

BIRAC collaborated with Department of Electronics and Information Technology (DeitY), Ministry of Communications & IT, Government of India, to launch an Industry Innovation Programme for Medical Electronics.

DeitY has pledged INR 10.5 crores for promoting innovation in Medical electronics, while BIRAC will manage the entire programme. ■

Partnering with

Society for Research & Initiatives for Sustainable Technologies & Institutions (SRISTI)



BIRAC has signed a MoU with SRISTI to promote and nurture the grassroots level innovations across the country. Under the collaboration, BIRAC would support SRISTI's Gandhian Young Technological Innovation Awards (GYTI) by constituting a new BIRAC-SRISTI GYTI Award focused on recognising and funding innovations in the realm of biotechnology/life sciences/healthcare including medical devices & diagnostics, and SRISTI will also launch an online accelerator and Sanctuary of Innovations for providing in-situ incubation to identified grassroots innovations. ■

Joint Call on Red Biotechnology with Bpifrance and CEFIPRA

BIRAC has ventured into yet another international partnership by collaborating with Bpifrance—a French public investment bank and CEFIPRA (Indo-French Centre for the Promotion of Advanced Research), for fostering the healthcare biotechnology at global level. The call will be announced on 20th March 2015. ■



SERVIR L'AVENIR

Biotech Sector and Make in India

Start Local, To Go Global**Rajesh Rai**

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We have been hearing a lot about ‘Make in India’ as a path to getting a large and growing number of young Indians into the manufacturing workforce. The logic seems to be that there is a large Indian domestic market especially in areas like mobile phones, electronics, energy, defence, and health care. By focusing on manufacturing products for these areas, industry can provide job opportunities to a large number of Indians to move from the agricultural, unorganized sector into the organized labour force. The government on its part is looking to simplify regulations, improve infrastructure and in general provide a more predictable, stable environment to enable industry to build sustainable and profitable manufacturing ventures.



Investors have in general been looking at these developments with great interest. As an investor in technology driven ventures over the last decade, I believe there is a large opportunity in bringing new intellectual property to produce products that solve large problems. India has a large, growing economy with its own unique problems and opportunities. There are several opportunities for companies to solve large problems in India through developing products/solutions with corresponding constraints of price and value. Such products may have applicability in not just India but global markets.

We have invested in companies like Sedemac that have embedded software solutions to increase efficiency of small engines in motor bikes, scooters, auto rickshaws and gensets for telecom towers. Sedemac’s products have a superior architecture as they have been designed for small engines that have received scant attention from global companies. However, now Sedemac’s solutions are finding interest in developed country geographies as they provide superior value at an affordable price for small engine applications.

In health care, we have supported companies like Consure Medical that have designed and developed first in class fecal incontinence products for Indian needs. Consure’s products built around novel indwelling catheters are patented in global markets, have received several regulatory approvals and are being piloted in developed markets. Mitra Biotech has developed personalized cancer treatments for patients in India. Mitra’s solutions built around strong intellectual property are now being taken to markets like the US. There are several other companies that are developing unique, affordable solutions for healthcare in India. Remedio is building affordable products for ophthalmology around innovation in optics. Remedio has built a retinal imaging system on a smart phone. Janacare has built a comprehensive diabetes diagnostic and a lifestyle coaching platform around the mobile phone.

There seem to be several innovative companies that are being built out of India. In addition to building novel products with global applicability these companies are also capital efficient in a manner that is not possible with a solely developed country cost base. By employing a frugal/global model we can build

technology companies solving real problems that leverage India for early development and customer validation and then scale in India, other emerging markets and also in developed markets. As the amount of equity investment needed for early development, validation and visibility to scale is low there is a higher level of capital efficiency and such companies have the opportunity to grow to be large, global companies with the right support. Subsequent rounds of capital can be focused on building scale rather than on product development and early customer validation.

However we need to make it easier for these products to reach larger markets in India. Despite the existence of many validated solutions, distribution and scaling is difficult in a diverse country like India with geographically dispersed and heterogeneous health care facilities. Could the government and private sector get together to build a technology driven, internet enabled platform to connect novel point solutions to hospitals and health care providers across India? Small companies could be able to access a larger, market in a easier fashion through a platform that can help aggregate demand for innovative healthcare products and solutions. Of course the process of validation would have to remain robust. However, a transparent process with checks and balances would help both hospitals seeking solutions and companies looking to distribute their products in a time and cost efficient manner. Emerging companies targeting the home health care market could also

provide a good channel for distribution of innovative products.

On the regulatory side, we need to be make it easier for high-tech startups to interact and do business with vendors and partners around the world. There has been a lot of good work done by governmental agencies in supporting small business with early stage funding. However, capital is still scarce for innovation driven companies. Could we provide additional incentives for angel investors and larger corporations to work with smaller, emerging companies? I believe, large companies should be working closely with smaller innovative companies not just out of goodness of heart but also to help themselves become more innovative!

Novel medical device and health care product companies could help solve significant problems for a large number of people. However, these companies are skill intensive and may not directly lead to large-scale employment immediately. There could be an opportunity though to build resource clusters where facilities are available for prototyping, design, manufacturing of novel products for a large number of small companies that may lead to significant job creation.

With the right enablers, we have a unique opportunity to use technology and talent to solve health care problems in India thus positively impacting a large number of people. We could also potentially take some of these products/solutions to global markets. 'Make in India, for India and then sell anywhere?' ■

Translational Research for Affordable Healthcare

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The Smart Cane is an innovative device that can be mounted on a traditional white cane to enhance its functionality, resulting in improved mobility and safety, while reducing dependence on sighted assistance.

White canes are currently the most commonly used visual mobility aid; however, a white cane can only detect certain types of obstacles within a limited range and cannot detect obstacles that are above the knee (e.g. a steel bar on the road) or protruding (e.g. a tree branch or an open window). The Smart Canedevise uses ultrasonic sensors to detect obstacles up to 3m away, and the range of the detected obstacles is conveyed using vibratory signals with different vibration characteristics. It is designed as a user-detachable unit and is powered by rechargeable Li-ion battery. The design emphasis has been on

making an affordable device, and it is currently expected to cost less than Rs 2000 (£30) to the end user. This project targets the design of a manufacturable device, optimizing it based on user feedback from field trials and making it ready for regulatory approvals and certification. It has been proposed that extensive user trials should be carried out at multiple locations in the next 18 months.

This example helps us to understand the 360 deg concept of project management were you have an academic group, an industrial partner and an validation group to take the programme ahead and have the capability of delivering the desired milestone.

Views expressed are of the author and does not subscribe to that of Wellcome Trust. ■

Encouraging Innovation Entrepreneurship Near the Himalayan Foothills

The North East region (NER) of India is a landscape full of floral and faunal biodiversity and other natural resources and also bestowed with climatic conditions suited for the growth and development of agro-biodiversity. NER covers 5.2% of India's geographical area with significant levels of endemism in all floral and faunal groups. Contribution of agriculture to the Net State Domestic Product is as high as 30% with three quarters of NER's population being dependent on agriculture for employment. Vast reservoir of traditional knowledge lends itself for the development of the region. In this background promotion and development of agri-biotechnology is of great importance for NER.

Recognising this potential, BIRAC, in partnership with the Confederation of Indian Industry (CII), organized two Grant Writing and IP workshops at Gangtok (Sikkim) and Guwahati (Assam)

respectively (17-21 November 2014). The workshops focussed on stimulating and fostering the innovation entrepreneurship capabilities of the region. Each workshop was attended by around 50 participants. The speakers included academicians, industry experts, IP experts and entrepreneurs.

The sessions on 1st day of the workshops were aimed at sensitizing the audiences (comprising of participants from academia, industry entrepreneurs, and masters', doctoral and post-doctoral students) about the support for entrepreneurship available at BIRAC, through its programmes such as BIG, SBIRI, BIPP and CRSS and infrastructure available at bio-incubators. The second day sessions focussed on making the audience aware of the IP regime in the country and the importance of harnessing the benefits of the knowledge and innovations they possess through the exploitation of IP. ■



Creating Next Nawabs of the Start Up World

Uttar Pradesh, a northern state in India, covers around 93,933 square miles (243,290 km²), equal to 6.88% of the total area of India, and is the fourth largest Indian state by area. With over 200 million inhabitants in 2011, it is the most populous state in the country. With a GDP of INR 7080 billion (USD 114 billion), Uttar Pradesh is the fourth largest contributor to the economy. Agriculture and service industries are the largest parts of the state's economy.

UP, being a populous state, industry centric and agro-focused economy, there exist an opportunity for Bio-innovation based entrepreneurship. With aim of sensitizing the researchers and academia in Uttar Pradesh, and encourage them to test their ideas and take them to commercial level, BIRAC organized a Road Show and Grant-writing workshop at Lucknow Biotech Park on 15-16 Dec. 2014. ■



Engaging Stakeholders

Bangalore INDIA BIO 2015

Bangalore INDIA BIO 2015, organized from 09-11 Feb. 2015 brought together stakeholders from various facets of the Biotech ecosystem in the country and abroad. The three day conference brought together global leaders from the Life Sciences, Biotechnology and Agri-Biotech sectors for a comprehensive overview of this rapidly changing industry envisaging India as a 100 Billion USD Biotech Hub. The deliberations included



multi track conferences focussing on Biotech Investment, Agri-Biotechnology, Biopharmaceuticals, Bio Medical Innovations & Diagnostics among other areas of the biotechnology industry.

BIRAC participated in panel discussions pertaining to start-ups scaling and funding issues. The event provided BIRAC with a platform to showcase its contribution to the biotech industry for encouraging innovation and product development. ■

Bio Asia 2015

Bio Asia 2015 conclave was organized at Hyderabad from 2 -4 February 2015. Technology Conferences of Bio Asia act as a Science-Business bridge, that aims to bring together a trans-disciplinary environment for driving innovations in the life sciences industry. The event witnessed the participation of around 1200 delegates from 51 nationalities. The international event was promoted by Federation of Asian Biotech Associations, Government of Telangana and Pharmaceutical Export Promotion Council of India. The focus theme was - New Era of Life Sciences: opportunities in transition.

BIRAC participated in the event by organizing a focused session in the Drug Discovery Conference-Showcasing India's Innovation Pipeline. The theme of the session was - Accelerating India's Biopharmaceutical Discovery. BIRAC also put up a stall at the exhibition area to enhance the outreach and branding of BIRAC activities and initiatives. ■





BIOTECHNOLOGY INDUSTRY RESEARCH ASSISTANCE COUNCIL

Empowering and Enabling the Biotech Innovation Ecosystem for Affordable Product Development

BIRAC is a Public Sector Schedule B Undertaking under the aegis of Dept. of Biotechnology, Ministry of Science and Technology, Govt. of India. BIRAC was established as an interface agency of DBT, to foster and nurture innovation research, specifically focusing on start-ups and SMEs.



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