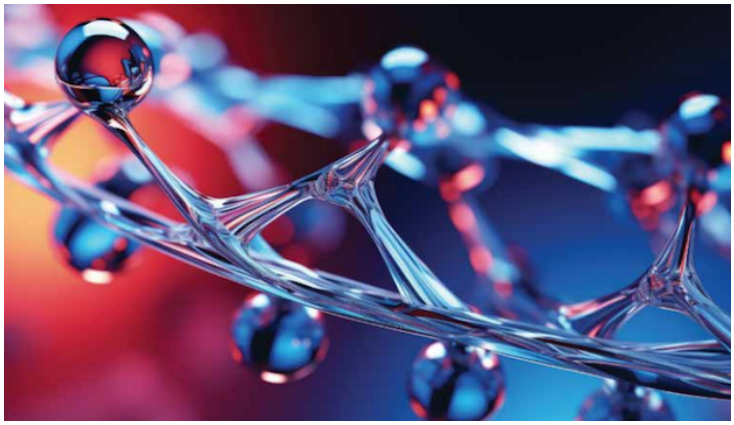
BioSpectrum
the business of Bi
24 years of leveraging the business of Bio
www.biospectrumindia.co

How Deep Tech is Powering India's Biopharma Future

31 May 2024 | Features | By Shivani Thakar

Advancements in cutting-edge innovative technologies and the increasing availability of data have enabled various domains of the biotech and pharma industries to leverage resourceful approaches in driving progress, maintaining competitive advantage and accomplishing the ultimate goal of improved patient outcomes. Deep tech ventures, also referred to as hard tech as opposed to regular digital platforms, primarily focus on the fundamental core issues of a business. For India to become an â??innovation hubâ??, with concerted transformative efforts of leaders and experts in life sciences, biotech, pharma, and healthcare, deep tech is pivotal. Experts opine that the next wave of startups from India, which is already gaining considerable traction, would be on deep tech and IP-based devices. Let's take a closer look at Indiaâ??s deep tech startup landscape and the vision of a successful deep tech ecosystem.



Scientists and industry experts define deep tech ventures as those startups or companies that expressly work on innovations that are based on existing substantial scientific, technological, or engineering discoveries and breakthroughs. Deep tech startups operate around the idea of providing palpable solutions to complex problems in existing health solutions, as well as in business models and operations, to pave the way not only for improved products and innovative scientific methodologies but also bring about large organisational changes in the pharma and healthcare sectors.

Industry leaders also delve deeper into describing deep tech ventures as those that work to identify certain physical constraints of industries that have 'not been solved for decades' and then focus on developing/improving the physical product(s) using big data and digital platforms based on advanced technologies. It seems like a consensus among industry players operating at various levels that even though the proportion of deep tech startups among new businesses may be lower, their impact will tend to be noteworthy, as their science and business models, harbouring a forward-looking objective, could help to tackle big problems.

The speedy growth and evolution of computational approaches, systems biology, Artificial Intelligence (AI), quantum computing, etc., combined with ease of access to computing and the trend shifting towards data-driven science, are paving the way to overcome barriers to scientific innovation. This seems to have set the stage for the establishment and development of diverse deep tech startup ventures in India.

According to the India Deep Science Tech analysis report published by Ankur Capital & Tech Sprouts, 'it is the right time to build in India for the world – With its efficient capital use, competitive talent pool, and large domestic markets, India offers an ideal ecosystem for developing and scaling deep science tech solutions'. As per a 2021 report published by Nasscom, India is home to over 3000 deep tech startups, which make up 12 per cent of the Indian startup ecosystem. This is a rapidly growing sector with a 53 per cent CAGR over the last decade. Approximately $2.7 billion in funding was raised by the deep tech startup ecosystem in 2021, and over 30 mergers and acquisitions in this space occurred in 2021 alone.

There are multiple areas within the life sciences sector where India is seeing the emergence and growth of deep tech ventures. Experts weigh in that the nascent drug discovery ecosystem in India has the potential to take huge strides by leveraging AI, where the ultimate gains are in the form of significantly reduced costs and timelines for a potentially superior product delivered. A recently published analysis by Loestro Advisors opines that such advances help in 'leveling the playing field from a resources standpoint and enable smaller, under-resourced players to pursue cutting edge scientific innovation'. While the use of AI for drug discovery is becoming increasingly popular within this niche, other areas of focus include immunotherapies (like CAR-T), novel therapeutics (like CRISPR, stem cells), genomics and proteomics, novel drug delivery systems, small and large molecule therapeutics (biologics, peptides).

Trending areas

According to Ankur Capital report, the Indian deep science AI companies have predominantly focused on spectral image and genomic data analysis for applications ranging from diagnostics to robots. India's biotechnology sector has seen a significant rise in investments following COVID-19. The data from the report states that nearly $900 million was allocated between 2013 and 2023, driven by a focus on therapeutics, diagnostics, and sustainable agri-food technologies. Key investments include Molbio Diagnostics and Bugworks.

Multiple reports by industry experts and researchers in the past few years demonstrate that in the life sciences sector, deep tech is being utilised in several areas like computational pharmacology, in silico clinical trials, synthetic biology, synthetic data, generative AI, genomics and multi-omics-powered targeted therapeutics, nanomedicine, blockchain technologies. Additional fields being cited as a part of deep technology by experts also include robotics, quantum computing, and 3D printing. There has been an upward trend in R&D-intensive sectors. While other technologies have been coming up at significant pace and depth, AI stands out as the consistent facilitating technology of the last decade.

From the perspective of funding priorities, trends in deep tech ventures are being shaped overall, in India as well as globally. Sharing his insights, **Dr Amandeep Singh, Project Lead, MP Advisors, San Francisco, California** said, "Given that the macroeconomic conditions are not very favourable, VCs are focused on some subcategories of life sciences deep tech that either have less regulatory challenges, give a chance for early cash flow, or address a very large challenge. In the areas of personalised medicine and diagnostics, OMIC technologies are becoming crucial as the drugs become increasingly specific. Deep tech technologies that aid in diagnosis are hot in space. In the pharma sector, antibody and protein engineering fields saw the highest funding in 2023. This is directly related to synthetic biology and drug discovery field, with impact going beyond biopharma to agro-industry, industrial enzymes, food industry and more."

Data-centric startups that are building proprietary niche biology datasets, like pathology-EHR-Claims linked datasets for a particular disease area and companies that are building deep tech driven robotics to automate biopharma R&D are also some of the dominating trends in the deep-tech ventures.

He further added that in the healthcare space, the focus will be on aspects like workflow automation and remote patient monitoring utilising AI health chatbots, sensor-based detection of disease progression using AI, etc. where technologies that improve back-end processes like patient intake, triaging, and summarising patient history, etc. to give back the time to doctors.

Startups in India - a glance

Several deep tech startups in India in the life sciences space are showing promising growth trajectories. ImmunoACT, an IIT Bombay spin-off company, incubated at SINE is focussed on driving India's first CAR-T cell therapy 'NexCAR19', which is a recent success story stemming from a deep science venture. 'Eyestem', a C-CAMP incubatee, is working on scalable cell replacement therapies in ophthalmology. C-CAMP, one of the largest innovation centre and incubator for startups in India, is home to seven such deep tech startups that have been making significant strides in their respective areas.

Achira, a Bengaluru-based medical technology company, focuses on developing innovative, point-of-care (PoC) testing solutions. Achira has developed its proprietary lab-on-chip platform to perform rapid, multiplexed assays. Bugworks, a C-CAMP resident incubatee, aims to discover novel biopharmaceutical assets for treating antibiotic-resistant bacterial infections and oncology solutions using a systems biology approach.

String Bio, another Bengaluru-based company, has developed a platform - SIMP (String integrated methane platform) – to deliver methane from wastes and natural resources using engineered microorganisms. Pandorum Technologies Pvt Ltd develops platforms to manufacture personalised 'homo-chippiens' and human organs on demand. CogniAble, supported by the Division of Electronics Engineering and Computer Science (EECS) at the Indian Institute of Sciences, Bangalore, was founded by researchers and scientists from the Indian Institute of Technology Delhi along with paediatricians, psychologists, and BCBAs from India and USA.

CogniAble brings affordability, accessibility, and high-quality management solutions for neurodevelopmental disorders like autism right to the client's doorstep. Another deep tech startup at EECS, IISc is Mimyk that is building intelligent and immersive solutions and simulation platforms for medical procedures. These systems are powered by AR/VR, Robotics, and visual computing technologies. Mimyk is co-founded by EECS and Mechanical alumni.

Hyderabad-based D-Nome aims at democratising molecular diagnostics with their cell-free synthetic bio tech enabling rapid, accurate & scalable diagnostics and other platform applications. Their proprietary D-LAMP diagnostic technology enables deviceless nucleic acid amplification. MedGenome, the Gene Box are other examples of successful ventures in the area of deep data analytics-based genetic and genome science for diagnostics, precision medicine and predictive healthcare.

What will DeepTech startups need?

According to the Nasscom report 'India's DeepTech startups – poised for impact', about 60 per cent of deep tech startups cited their two main challenges to be talent and market access; and 55 per cent of deep tech startups seek to engage with academia for research guidance.

Skills and talents required for deep tech startups are very niche and specific, and conscious measures to bridge the gap between talent demand and existing skilled workforce can boost the country's deep tech ecosystem. Entrepreneurs, industry experts, and leaders aim to bridge this gap through various shifts in the sector's infrastructure, such as launching initiatives to boost industry-academia alignment, reskilling employees with technical skills to keep up with evolving trends and uplifting the expertise to convert their strong knowledge base in science and technology to commercial products.

Prof. Ajay Sood, Principal Scientific Advisor to the Government of India, emphasised a couple of factors that will be crucial in achieving future preparedness in the emerging domains of science and technology. "Capacity building, boosting R&D, having in place conducive policies and regulations to encourage innovation while safeguarding society from potential risks." He also added that global collaborations and a stronger Intellectual Property Rights (IPR) Regime can help boost the technological and innovation landscape in India, thus fostering its DeepTech start-up ecosystem.

An increased focus and investment in achieving future preparedness in technology, along with an already flourishing biotechnology research and entrepreneurship landscape may help India's deep tech startup ecosystem to develop and grow.

Jaswinder Chadha, President & CEO, of Axtria Inc., shared his views on strategies for scale-up and product commercialisation for India's deep tech startups focussed on 'precision medicine' and 'personalised healthcare' areas of therapy. "As the focus of pharma companies shifts from generic drugs to specialty medicine, deep tech startups have significant opportunities in niche areas like precision medicine and personalised healthcare. Conducting a thorough market analysis and identifying target customer segments are vital for these startups. Collaborating with industry experts who understand customer needs and the healthcare environment can provide valuable insights and guidance throughout their journey.

With resources stretched thin, startups must make careful decisions from the start. One of the most critical areas for initial investment is data infrastructure. Given the regulated nature of the data, setting up the right security, anonymity, and process for handling the data is essential. The amount of structured and unstructured data available from many sources has exploded, making it easy to acquire masses of fragmented data that can be difficult to manage and enrich in the future. Strict data governance, along with the right infrastructure, is the key, and giving your customers the confidence that you know how to handle their patients' data is required for success."

Investments

According to the findings published in Nasscom's 2022 report "India's DeepTech Startups – Poised for Impact", access to seed capital and dedicated deep-tech thematic funds seems to hold benefits for new and upcoming deep-tech startups. According to Ankur Capital & Tech Sprouts report, investment in deep science tech startups has consistently doubled every three years since 2010, with projections to surpass $10 billion by 2029, indicating robust growth and investor confidence. Also, the number of investment rounds exceeding $5 million has doubled every three years; and since 2017, follow-on rounds have outpaced fresh funding, demonstrating increasing investor interest and commitments in the deep tech sectors.

AI and biotechnology lead funding

AI and biotechnology have historically dominated India's funding landscape (80 per cent of total investments since 2010), with advanced materials gaining momentum in recent years. ?Recent years have seen a notable increase in follow-on funding for early AI ventures, with 2022 witnessing five investments exceeding $10 million, underscoring a growing interest despite a slowdown in fresh investment.

Experts believe that investments in the deep tech space will be highly rewarding for investors, owing not only to their societal and market impact but the yet untapped potential of the sector as new technological advances come to the forefront with rapid rates.

Considering the inherent characteristic of demand for the large early-stage funding for R&D and prototype development, combined with deep tech startups' lengthy life cycle, Dr Amandeep Singh shared that a good strategy for investment in this sector would be phased funding. Implementing a staged investment approach that aligns with key developmental

milestones usually flies well with investors. Startups should plan what are the key milestones in development, and what funds, timelines, and resources would be needed for each phase. For an asset-focused startup, proof of concept at the activity stage or preclinical data, and clinical trial initiation phase act as key milestones. For a SaaS/software company, it can be the launch of an MVP, the addition of a second offering, and so on", he said.

In line with this, **Rema Subramanian, Co-Founder & Managing Partner of Ankur Capital** said, "Entrepreneurs should focus on what is the money that will be required for achieving (the next) milestones", further adding that if a startup stays undercapitalised to reach the milestone, follow-up rounds of funding may become an issue.

Adding another dimension, **Dr Vishal Gandhi, Founder & CEO, BioRx Venture Advisors** said that monetisation is a very important part of any startup ecosystem. The importance of inducing a distinctive mindset of a vision and motivation to cover not just technological milestones, but also carry out organisational shifts and milestones where entrepreneurs should hold the passion to monetise themselves.

On strategies to boost the deep tech startup landscape, Dr Amandeep Singh opined, "Aim for revenue, aim for global markets, keep your IP in the US. Even if you build in India, also register an entity in US that holds your IP. While this seems trivial, many VCs feel more comfortable investing in the US."

Commenting on whether the traditional mergers and acquisitions (M&A) strategy would benefit deep tech venture space, instead of sticking to a deep tech startup ecosystem, Rema Subramaniam added that M&A is a very important part of any startup ecosystem, as every innovation may not go on to become a stand-alone large business. "Not every kind of business may not get the kind of capital required to reach that stage in a market even though the innovation is great. So, there may be various disruptive innovations that may have gotten buried in the M&A process, but overall, M&A is a crucial part of any startup ecosystem, including the deep tech sector", she added.

Dr Amandeep Singh elaborated, "An M&A path has several advantages, such as access to the deep knowledge of navigating existing commercial frameworks including market channels and know-how regulatory guidelines, which can be beneficial in scaling operations. However, the M&A path is only successful when there is a greater than 90 per cent match between the DNA of companies. If the goals and priorities of two companies are different, it is better to just collaborate with larger companies. The best path for a startup is to stay agile, continuously refine its go-to-market strategy, and achieve a sizeable scale while catering to the dynamic needs of the sector. Any startup should consider an M&A before reaching saturation in an 'S-curve', where increasing the scale anymore is going to be very difficult without raising large capital or believes that growth will not be possible without a large partner."

Innovation in deep tech-biotech ventures is forming an exciting new landscape for India's life sciences sector. It remains to be seen how the future of deep tech in India shapes up and how the deep tech sector shapes India's biotech landscape.

Shivani Thakar

shivani.thakar@biospectrumindia.com