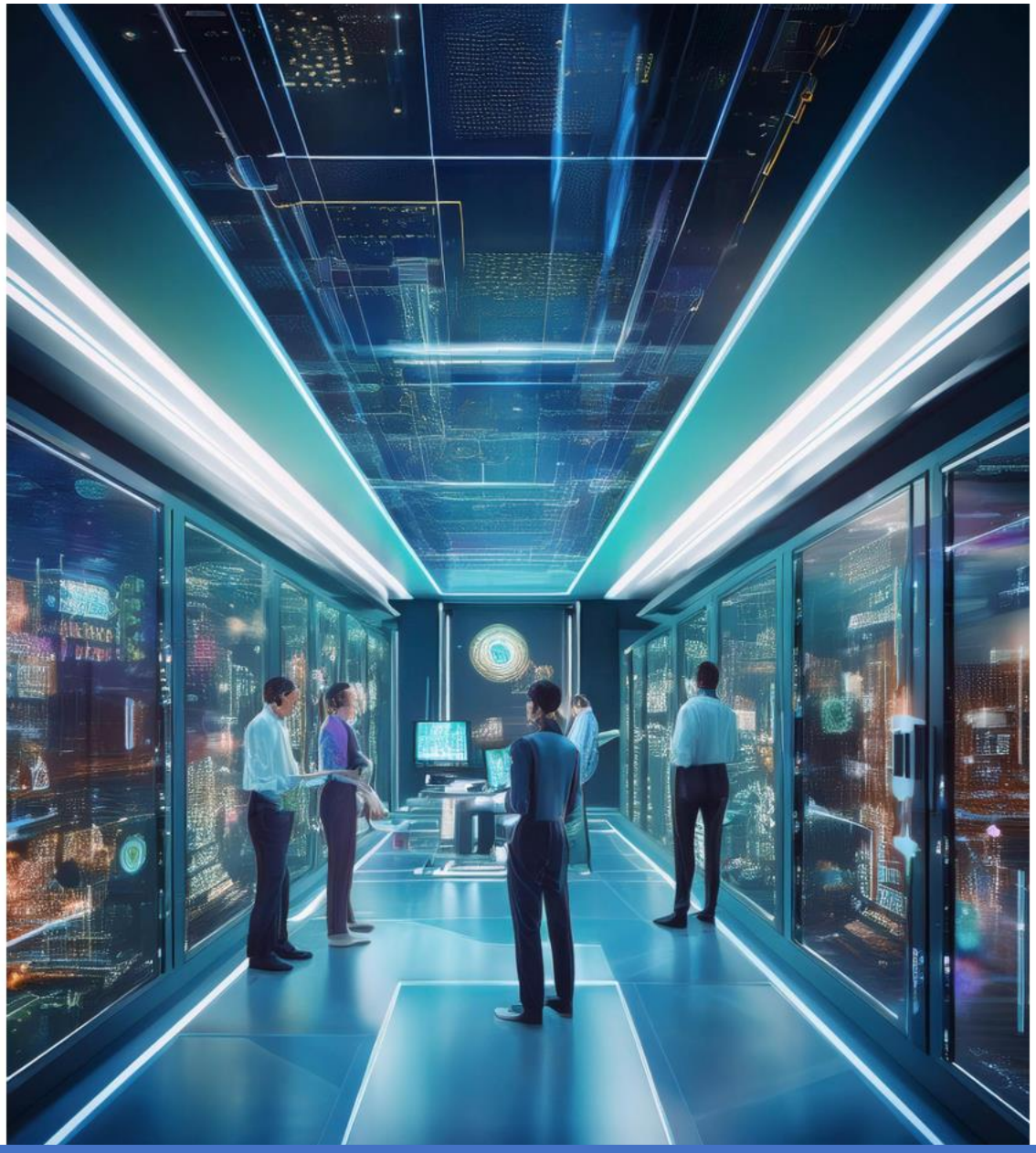

Driving Deep-Tech Startups in India

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Consider *Plansys*, specializing in cutting-edge technologies like marine robotics, non-destructive testing, and analytics. This idea for the startup came from collaborative academia-industry projects initiated in 2012. It took another three years of research efforts before the company was founded by IIT Madras alumni and faculty. And several more years before it executed hundreds of projects in three countries and transformed underwater asset inspections in the maritime, infrastructure, and energy sectors. *MicrobioTx* is another startup, founded in 2022, which has revolutionized gut health science. Developed by a leading researcher from NISER Bhubaneswar, the company launched the world's first fingerprick-based gut profiling test. It uses proprietary metabolite mapping and recommendation engine to derive gut microbe profile and wellness advisory. Or consider *COMRADO Aerospace from ARTPARK at IISc,* which develops commercial and military applications leveraging high-performance UAV or drone technology.

What's common to these examples? All of them belong to what are called *"deep-tech"* startups.

What Defines a Deep-Tech Startup?

Deep-tech startups are enterprises that leverage cutting-edge technologies like AI, robotics, biotechnology, quantum computing, and more to solve complex industrial or societal challenges. Unlike conventional startups, deep-tech ventures demand extensive R&D, require long development cycles, and operate at the intersection of science and engineering. Their breakthroughs often stem from university laboratories, characterized by their reliance on scientific discovery and technological ingenuity.

Nurturing deep-tech startups is challenging. They face hurdles in the following areas:

1. **Capital and Funding**: High R&D costs and long timelines demand patient capital, thus deterring many investors.
2. **Talent and Infrastructure**: Finding skilled personnel and accessing advanced infrastructure remain pressing issues.
3. **Scalability Risks**: Transitioning innovations from the lab to industrial-scale applications is fraught with technical uncertainties.

4. **Regulatory Complexity**: Navigating sector-specific compliance, for instance in healthcare or life sciences, adds to delays.
5. **Market Adoption**: Introducing disruptive technologies can face resistance, making thorough market research and early customer engagement vital.

Recommendations for Nurturing Deep-Tech Startups

To unlock India's deep-tech potential, I propose the following:

1. **Create Mission-mode Translational Research Programs:** India must increase its research funding to 3% of GDP, with private industry and philanthropy contributing 1.5%, and focus on mission-mode research programs. For instance, DST's *National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS)*, which I chair, was launched in December 2018 with a budget of ₹3,660 crores, and aims to position India as a global leader in CPS technologies such as AI, robotics, cybersecurity, and more. A key differentiator is its focus on translational research, establishing 25 Technology Innovation Hubs as Section 8 companies to drive high-TRL, market-ready products aligned with national priorities. In just six years, over 1500 new technologies and tech-products have come from over 650 startups / spinoff companies, resulting in over 16000 jobs and over 150,000 people trained on entrepreneurship. In the future, more such programs are required, and the private industry has a significant role to play here.
2. **Strengthen Academia-Industry Collaboration:** Partnerships between academia, startups, and corporates can accelerate deep-tech innovation. *IIT Madras Research Park*, India's first university-based research park, fosters collaboration between industry and academia by translating fundamental research into commercial applications. Its unique Credit Point System promotes sustained engagement with IIT Madras through multiple models – sponsoring employees as students, undertaking R&D projects and consultancy, offering internships, and more. For instance, at Saint-Gobain Research India, the collaboration resulted in the launch of over 20 new products and 5% of their patents.

The Indian industry has an important role in nurturing such research and innovation parks / hubs, by funding and co-creating their next innovations there. This includes both domestic companies and the over 1000 MNC engineering and R&D Global Capability Centers that are driving innovation in sectors like pharmaceuticals, automobiles, and IT. For instance, *Samsung Research International – Bangalore* became the highest patent holder in India in 2022 (7500 patents) and partners with research institutions like Vellore Institute of Technology, IIT Kanpur, and IISc.

3. **Establish Robust Incubation and Capacity-building Ecosystems**: Incubation centres like *C-CAMP* (Centre for Cellular and Molecular Platforms) provide critical support, from infrastructure to funding. C-CAMP has nurtured over 200 startups, fostering biotech innovation through grants, technical facilities, and expert mentorship. Such deep-tech incubation centres can come from the private sector too. For instance, Axilor Labs supports deep-tech startups with processes like patent-filing, validation studies, getting regulatory approvals, and commercialisation, besides providing grants and funding. MicrobioTx, featured in the introduction, came from the Labs.

   In addition, significant capacity building efforts are required to equip stakeholders with the knowledge to navigate the startup ecosystem. For instance, *CII CIES* facilitates corporate accelerator programs that connect startups with large companies to co-develop solutions, thus providing startups with market access and a platform to pilot their innovations. It also regularly conducts capacity building programs for various stakeholder's such academia, Indian family offices, C-suite executives & government officials. Besides, awards encourage deep-tech startups. The CII Startupreneur Awards 2024 went to ventures such as Newtrace (green hydrogen), Minimines (battery recycling), Jidoka (AI-powered quality control), and MedPrime (digital microscopes).

4. **Expand Funding and Incentives:** Government-backed funds, like the Fund of Funds for Startups and IN-SPACe Fund, can provide much-needed financial lifelines to deep-tech startups, ensuring long-term sustainability.

   At CII, we have recommended that startups, under the proposed National Deep Tech Startup Policy, be granted a reduced income tax rate, specifically an exemption for

the first 10 years, followed by a 15% tax rate for the next 7 years, before transitioning to the applicable rate from the 16th year onward. Additionally, they should be permitted to claim GST refunds on imported raw materials or equipment used in R&D. Furthermore, there should be provisions allowing these deep-tech startups to claim enhanced deductions for R&D expenditures, with compensation at 200% or higher of their actual spending.