
**EMPOWERING INNOVATION: SUSTAINING GROWTH IN DEEP TECH STARTUP
LANDSCAPES**

*“People have only as much liberty as they have the intelligence to want and the courage to take.” –
Emma Goldman*

1. INTRODUCTION

With the success of the initial phase of the Startup India Initiative¹ and the emergence of tech focused startups, the attention of the Government has shifted to strengthen India’s deep tech startup ecosystem. The Office of the Principal Scientific Adviser along with the National Deep Tech Startup Policy Consortium,² on July 31, 2023, released the Draft National Deep Tech Startup Policy³ (“**NDTS Policy**”) for public feedback. It is a comprehensive framework to address the challenges faced by deep tech startups and aims to enhance the deep tech ecosystem through policy interventions.

The NDTS Policy is anchored on four prominent pillars: (a) ensuring the security of India’s economic future, (b) progress towards a knowledge-driven economy, (c) strengthening national capability through the *Atmanirbhar Bharat* imperative, and (d) encouraging ethical innovation. Aligned with India's deep tech vision, the NDTS Policy emphasises on positive impact of deep tech in critical areas such as food security, healthcare, and sustainability, while also focusing on diversity, inclusion, and skilled workforce development.

The support from the Government towards the development of deep tech start-ups can be seen through initiatives such as the recent proposal to set up an INR 1 trillion corpus with fifty-year interest free loan, to fund certain sunrise domains.⁴

2. WHAT IS A DEEP-TECH STARTUP?

The NDTS Policy does not provide an exhaustive definition of a deep tech startup and only attempts to lay down certain attributes of the same. The NDTS Policy recognises the evolving nature of deep tech startups in India and tries to address the need for development in this area by identifying the key attributes of their business, such as the maturity level of emerging technologies, applicability in different sectors, geographical boundaries, time frame, etc.

¹ Launched on January 16, 2016 by the Ministry of Commerce and Industry, <https://www.startupindia.gov.in/content/sih/en/about-startup-india-initiative.html> (accessed on March 21, 2024, at 21:45 hours, India time).

² Chaired by the Principal Scientific Adviser to the Government of India, the National Consortium represents a broad spectrum of stakeholders including high-level representatives from the Department for Promotion of Industry and Internal Trade (DPIIT), Atal Innovation Mission (AIM), NITI Aayog, Ministry of Electronics and Information Technology (MeitY), Department of Biotechnology (DBT), Indian Space Research Organisation (ISRO), National Security Council Secretariat (NSCS), Defence Research and Development Organisation (DRDO), National Association of Software and Service Companies (NASSCOM), Confederation of Indian Industry (CII), and Federation of Indian Chambers of Commerce & Industry (FICCI).

³ See: <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1944369> (accessed on March 21, 2024, at 21:31 hours, India time).

⁴ Interim Union Budget Speech for FY 2024-25, https://www.indiabudget.gov.in/doc/budget_speech.pdf (accessed on March 21, 2024, at 20:15 hours, India time).

While the NDTS Policy recognises the lack of a standard definition, it attempts to lay down certain parameters or features that aid in identifying a deep tech startup. These include:

- i. An early-stage technology based on scientific or engineering advancements, which are yet to be developed for any commercial applications.
- ii. Typically produces a solution along an unexplored pathway based on new knowledge within a scientific or engineering discipline or by combining knowledge from multiple disciplines.
- iii. Carries a large technical or scientific uncertainty and hence presents a large opportunity or risk depending upon whether it succeeds.
- iv. Is characterised by extended development timelines and requires high capital intensity.
- v. Typically, where the investment in Research & Development (“R&D”) is high and academic research is advanced, deep tech startups tend to have a wider application, longer gestation period and sustain through higher financial investments.
- vi. The technology/product should have a disruptive, problem-solving potential for the most pressing issues faced by India.⁵

3. KEY THEMATIC AREAS FOR NURTURING INDIA’S DEEP TECH STARTUP ECOSYSTEM

According to the *Startup India’s* database⁶, there are approximately 10,300 startups recognised by the Department for Promotion of Industry and Internal Trade (DPIIT) that are classified across sub-sectors within the larger deep tech space. These are entities that are typically engaged in activities such as artificial intelligence (including Natural Language Processing (NLP) and Machine Learning (ML)), internet of things, security solutions, analytics (including big data, data science), robotics, augmented and virtual reality, nanotechnology, etc.

There has been a notable rise in the number of mergers and acquisitions and substantial funding for Indian deep tech startups since the last decade, which has demonstrated the appeal of deep tech startups for investors and their considerable potential. New businesses have entered the deep tech startup landscape in India, thereby strengthening the entrepreneurial culture in the field of advanced science and new-age technology.

With nine thematic priorities being the central focus of the NDTS Policy, it aims to engage a diverse range of stakeholders to create a conducive environment for innovation, entrepreneurship, and technological advancement. In this article, we have tried to summarise the key principles underlying the nine themes, for which the Government believes policy intervention is specifically required.

3.1. *Nurturing Research, Development & Innovation*

One of the priorities of the NDTS Policy is to increase the gross expenditure on R&D, with development of suitable fund allocation opportunities from both public and private sources. The impact of focussed investments into R&D activities and curiosity driven scientific research is significant for development of know-how, scientific breakthroughs and even ensuring growth and utilisation of skilled workforce. To address these issues, the NDTS Policy proposes formation of the “*Centre for Deep Tech Translation*” for facilitating seamless partnership, establishing collaborative platforms, and providing guidelines for strengthening translation and commercialisation.

3.2. *Fortified IP Regime*

The NDTS Policy recognises that effective IP protection is critical for commercialisation and global competitiveness of Indian deep tech startups. The NDTS Policy addresses specific challenges and offers relevant solutions such as establishing a single window platform for, (a) creation of a unified IP

⁵ See: <https://www.psa.gov.in/deep-tech-policy> (accessed on March 21, 2024, at 21:58 hours, India time).

⁶ Annexure I(b), draft National Deep Tech Startup Policy.

framework; (b) providing guidelines for developing design IPs; (c) implementing robust cybersecurity measures; (d) monitoring access and use of confidential information; and (e) streamlining the patent application process.

The NDTs Policy also recommends participation in global IP related conventions and integrating provisions in free trade agreements for protection of IP created by Indian deep tech startups. Further, in case where technologies are developed for strategic sectors relying on Government funding, the NDTs Policy suggests granting Government Purpose Rights (GPR) such as non-exclusive, non-transferable licenses for internal use or manufacturing and even recommend a license fee to be paid by the Government for use of such GPRs. It also recommends enabling 'March-In' rights in cases concerning national security, including seeking a prior governmental approval where the management and control of the Indian company shifts to a foreign entity.

3.3. Fuelling Growth by Facilitating Funding

Access to funding for deep tech startups is particularly necessary due to their high capital requirements and long gestation periods for determining market fit. Currently, to secure funding, startups are tapping into diverse sources ranging from government grants, seed funding programs, accelerator programs, to Venture Capitalists, angel investors, or private equity firms in exchange for equity ownership.

The "Valley of Death" is a critical phase in a startup's lifecycle where it requires substantial funding to progress further but faces the risk of failure due to lack of resources or revenue. Startups often struggle with funding limitations during this period, hindering crucial activities like technology development and commercialisation. Overcoming the Valley of Death is essential, and relatively challenging for deep tech startups to sustain growth and successfully bring their innovations to the market. By addressing funding challenges and provision of targeted policy support, startups can navigate this phase and emerge stronger on the other side. Accordingly, the NDTs Policy proposes certain funding related initiatives such as:

- i. Creation of a centralised single window platform capturing the lifecycle of government grants (including disbursement, tracking and feedback) to streamline financing and enhance transparency. The technical feasibility of a deep tech startup shall be assessed by a committee of experts from industry, academia, and R&D. Participation of technical experts from higher education institutes shall be incentivised through compensation and factoring it in their appraisal evaluation.
- ii. CSR funding for long term patent grants for select science-based research institutions.
- iii. Dedicated deep tech capital guidance fund to be established for early-stage startups, where government, private Limited Partners (LPs) and foreign investors commit to a new fund in the form of a Fund of Funds (FoF), with the sub funds focusing on high-risk deep tech. The tenure of the fund should be longer than other funds given the longer gestation period for deep tech startups.
- iv. Pre-commercial funding support through a 2-stage common grant framework. These two phases of the grant are:
 - a. Minimum grant of INR 20 million for proof of concept; and
 - b. Minimum grant of INR 30 million for tested prototype.
- v. Pilot testing fund for select startups to conduct field trials for the Government and demonstrate on ground feasibility. The issuance of these funds may be conditional, or milestone based, sanctioned with seed funds.
- vi. Creation of a debt fund in accordance with the Securities and Exchange Board of India (Alternative Investment Funds) Regulations, 2012, which allows for borrowing or leveraging to meet the exclusive needs for operational and working capital requirement of deep tech startups, supported by the Credit Guarantee Scheme for Startups.
- vii. Fiscal incentives and tax rebates to attract General Partners (GP) and LPs from the investor community for allocation of certain funds from their corpus towards deep tech startups.

- viii. “Technology Impact Bond” model attracting investment during development phase and addressing the hurdles of long gestation period and financial investment.

3.4. Pillars of Infrastructure

The NDTs Policy acknowledges infrastructure challenges and underscores collaborative efforts between startups and research institutions to mitigate upfront capital burdens through shared scientific infrastructure. It emphasises on establishment of frontier scientific infrastructure to provide shared equipment and infrastructure to deep tech startups at nominal fees, reducing business risks. This infrastructure will be continuously upgraded through various financing modes and located strategically near industry clusters with shared governance involving academic institutions and industry representatives. The focus is on technology domain-specific infrastructure tailored to the needs of deep tech startups, incentivising academic institutions to open their labs and implementing central repositories and online booking platforms for equipment access.

For strategic sectors such as defence and security, space and atomic energy, these startups must have access to field test and experiment. One such effort could be seen by IN-SPACe which has facilitated access to infrastructure such as sub-subsystem testing, launch facilities, tracking support, and more, for non-governmental entities, at an affordable price.

3.5. Conducive Regulation & Certification Standards

No amount of boost could translate into a reality towards solving core Indian social problems unless a streamlined regulatory landscape paves the way. The NDTs Policy proposes to establish regulatory sandboxes for convening startups, end-users, industry, and regulatory experts to test the technology on functionality and potential risks. The involvement of international players has a major role in defining the certification standards. However, appropriate levels basis sectoral sensitivities, strategic implications and other important considerations need to be factored in for defining the certification standards in India and ensuring global scalability for deep tech startup products.

The Government bodies should streamline the regulatory landscape, dismantle bureaucratic barriers for startups and cultivate an environment conducive to innovation and progress. Further, subsidies for these startups along with exemption in certification costs and relaxed standards for early-stage deep tech startup products is suggested.

3.6. Attracting Human Resource

Another priority area for nurturing deep tech startups is through initiatives focusing on attracting, affording, and retaining high-quality talent. This initiative aims to empower entrepreneurs from Tier II/III cities, or marginalised communities, or women to foster inclusive, socio-economic development with a lasting national impact. Students and entrepreneurs benefit from mentorship and capacity-building programs, while academic institutions incentivise entrepreneurial risk-taking.

The NDTs Policy advocates for gender diversity as it gives preference to investments in women run startups and recognition of women scientists in the scientific and technical fields. Moreover, it also encourages venture capitalists to set aside 15% of their funding corpus for women led startups to improve gender parity in the area and strengthen the position of female entrepreneurs. This is also to be backed by implementation of awards and recognition programs to highlight the achievement of women in the deep tech space.

The NDTs Policy also suggests simplifying the tax on ESOPs to encourage entrepreneurs to use them as a means of attracting and retaining talented people. Some existing initiatives such as Digital India *Bhashini* aim to boost digital inclusion by offering digital access in local languages and advocating use of AI and allocation of resources for MSMEs and individual innovators in rural areas. Additionally, IN-

SPACE is also working towards establishing a team of retired ISRO experts for providing technological assistance to deep tech startups in space sector.

3.7. Promoting Procurement

The NDTS Policy highlights the importance of public procurement as an important initial market for deep tech solutions. Public procurement shall help in validating the developed products of deep tech start-ups, thereby addressing the challenges of long gestation periods and looming market uncertainty. To support participation of deep tech startups in public procurement various measures are highlighted under the NDTS Policy such as (i) mandatory procurement from deep-tech startups, (ii) unbundling of large projects for their involvement, (iii) capacity building in the Government for technology procurement, (iv) improved grievance redressal mechanisms for India's public procurement systems and (v) providing exemptions to startups in qualifying for public procurement processes.

3.8. Program Interlinkages

The NDTS Policy aims to create a deep tech supportive ecosystem and set up an "Inter-Ministerial Deep Tech Committee" to facilitate a comprehensive government wide initiative for development of the deep tech by (i) identifying synergistic opportunities between different sectors; and (ii) streamlining administrative processes. The NDTS Policy also provides for promotion of participation of deep tech startups in international trade agreements and foreign delegations to promote global market access.

Various existing policies, schemes, and initiatives support India's Deep Tech Startup ecosystem. Examples include the Tamil Nadu Technology Hub (iTNT Hub) linking startups with colleges, Next Generation Incubation Scheme (NGIS) for software and electronics startups FIRE for industrial innovation, and NECTAR for Northeastern challenges. International collaborations like the Indo-US Joint Working Group on AI, Indo-Israel Deep Tech & Life Sciences Mission, and Indo-Japan Deep Tech & Startups Partnership further fuel innovation.

3.9. Deep Tech Startup Sustainance

Last but not the least, targeted interventions are needed to help deep tech startups overcome challenges like the "Valley of Death" and sustain their growth beyond the initial product development phase. Thus, as startups navigate the challenging landscape of funding constraints and resource limitations, stakeholders are encouraged to step in with tailored solutions to meet these constraints. Additionally, the NDTS Policy aims to enhance the capabilities of deep tech startups through funding sensitisation programs for founders, promoting partnerships with strategic investors and establishing a centralised core mission office to promote deep tech startups.

4. SECTORAL DYNAMICS

The sectoral dynamics outlined in the NDTS Policy highlight the need for tailored strategies to address the unique challenges faced by deep tech startups across different sectors. The NDTS Policy emphasises the importance of avoiding a 'one-size-fits-all' approach and instead implementing interventions customised for specific sectors, such as hardware and software deep tech startups. It also recognises that challenges and opportunities vary based on factors like end-user led product development, talent pool, IP, and infrastructure availability. The NDTS Policy underscores the significance of considering contextual specificities unique to each sector or technology domain, and the need for a clear demarcation and definition of different sectors and technology areas within the deep tech ecosystem.

5. WAY FORWARD

Following the release of the NDTS Policy and collection of public feedback since then, the Principal Scientific Advisor to the Government of India, has revealed plans to submit a comprehensive 'deep

tech' policy for the approval of the Union Cabinet⁷. We understand that the Government is poised to endorse a new 'deep tech' policy, and the final version of the NDTs Policy is pending Cabinet approval.

Although the NDTs Policy is expected to work for the benefit of the deep tech startups, the very term "deep tech startup" has not been explicitly defined anywhere in it. While the Policy aims to lay down parameters in this regard, it still remains largely subjective. In the pursuit to create an objective definition of deep tech startups, appropriate balance needs to be drawn to ensure that the policy is inclusive and future-looking in nature, to include within its ambit startups that are also working on cutting-edge ideas or technologies which may not seem plausible today.

The NDTs Policy bestows a vital handholding and support for deep tech startups solving India's most pressing societal issues. The proposed policy interventions under the NDTs Policy, such as increased investment in R&D, the establishment of standardised test sites, mentorship, and exchange programs, reflect a forward-looking approach aimed at creating a thriving ecosystem for deep tech startups. When the final policy is issued, it would be riveting to see the *Atmanirbhar Bharat* imperative in action along with a revolution in the Indian deep tech startup space, setting the stage for a dynamic and supportive environment that can propel India to the forefront of deep tech innovation.

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⁷ See: <https://www.financialexpress.com/business/defence-what-is-deep-technology-all-you-want-to-know-3398550/> (accessed on March 21, 2024, at 22:21 hours, India time).