India Deep Tech Alliance

AI & Deep Tech Investments Landscape

A report from India Deep Tech Alliance (IDTA)

2026

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Released at

India AI Impact Summit 2026

February 17, 2026

New Delhi

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Foreword

Kris Gopalakrishnan, Chairman, Axilor Ventures; Co-Founder, Infosys

India's deep tech investment landscape has entered a period of sustained acceleration and growing global relevance. Since 2016, cumulative capital deployed into deep tech has reached approximately $28 billion, representing close to a four-fold increase over the decade, with deep tech now constituting nearly 15% of overall private equity and venture capital activity in the country. This expansion has been broad-based, spanning artificial intelligence (AI), space technologies, semiconductors, energy systems, defence, and advanced manufacturing. What is particularly encouraging is the consistency of this momentum across cycles, reflecting a structural re-rating of deep tech from a niche allocation to a core component of India's innovation and growth engine.

Public policy and sovereign capital are reinforcing this momentum in a decisive and confidence-building manner. The establishment of the Research Development and Innovation (RDI) Fund (₹1 lakh crore (approx. $ 12 billion)) marks a landmark commitment to science and engineering-led growth. By providing patient, long-duration capital for research, translational development, and early commercialisation, the RDI Fund helps address a long-standing gap in the innovation financing continuum that has constrained many deep tech ventures at the stage where technical risk remains high but commercial validation is still emerging. In doing so, it strengthens the foundation for innovation in sectors characterised by long gestation periods and capital intensity, and signals India's intent not only to generate innovation, but to systematically scale, deploy, and retain it within the country.

This capital momentum must now be matched by a deeper and more sustained commitment to research. While India's deep tech entrepreneurial base has visibly widened, the next phase of progress will depend on strengthening the quality, depth, and continuity of research across universities, public institutions, and industry laboratories. The rise in early-stage company formation across AI, life sciences, climate technologies, and advanced engineering reflects improving linkages between academia, corporate research, and entrepreneurship. At the same time, building globally competitive deep tech capabilities will require greater investment in foundational research, applied science, and long-horizon experimentation. Innovation is increasingly moving beyond software-centric problem solving toward hardware-linked and infrastructure - critical technologies, where success depends on rigorous testing, validation, and systems integration. Advancing this transition will require research capacity that is sustained well before ideas become products.

As this ecosystem matures, the scale and structure of capital will become increasingly decisive. Deep tech companies require significantly larger pools of long-horizon capital to support scale-up, manufacturing readiness, regulatory navigation, and global market access. While early-stage activity has expanded meaningfully, the transition from innovation to global leadership calls for sufficiently large specialist deep tech funds, with a focus on the growth stage. Building such funds is therefore not only a financial necessity, but a strategic one.

In this context, the formation of the **India Deep Tech Alliance (IDTA)** is both timely and strategically important. IDTA represents a critical step toward building alignment across investors, policymakers, researchers, and entrepreneurs around a shared long-term vision for deep tech in India. By fostering collaboration, knowledge-sharing, and coordinated capital formation, IDTA has the potential to strengthen the entire innovation stack—from early research and venture formation to growth-stage scaling and global

market integration. Its objectives speak directly to the structural challenges facing deep tech: fragmented capital, uneven research translation, and insufficient scale at later stages.

The emergence of IDTA reflects a recognition that deep tech ecosystems are built not by isolated actors, but by networks of capital, capability, policy, and trust. As India seeks to position itself as a trusted global node in AI and advanced technologies, the IDTA and other institutional platforms should work together to play a vital role in accelerating learning curves, reducing friction, and crowding in both domestic and international capital.

Encouragingly, the building blocks are coming together across policy alignment, research depth, and entrepreneurial ambition. The next phase of India's deep tech journey will depend on matching this technological progress with capital platforms that are commensurate with the ambition, complexity, and time horizons of deep tech innovation.

The India Deep Tech Alliance (IDTA): An Introduction

Arun Kumar, Managing Partner at Celesta Capital; Chair, IDTA and
Sudhir Sethi, Founder and Chairman, Chiratae Ventures

India stands at an inflection point in its economic and technological journey. The country possesses the scale, talent base, policy intent, and geopolitical relevance to be an impactful player in today's AI-led technology and industry transformation. Semiconductors, AI, advanced manufacturing, space technologies, bio-convergence, clean energy, and intelligent infrastructure are core determinants of economic resilience and global competitiveness.

This is India's opportunity to build the capability to translate innovation into enduring industrial capability at scale.

This is the context in which the IDTA has been convened: as a catalytic platform to align long-term capital, venture expertise, industrial partnerships, and public policy around India's most critical deep technology priorities.

Ecosystem for Deep Technology Entrepreneurship

Over the past decade, India has built one of the world's most vibrant startup ecosystems. Digital platforms, software-as-a-service (SaaS), fintech, and consumer internet companies have demonstrated India's ability to innovate rapidly, attract global capital, and scale for hundreds of millions of users. This success has been transformative.

Deep technology comes with a different set of challenges and needs.

Deep tech is capital-intensive, time-intensive, and system-dependent. It requires patient capital, long development cycles, strong links to manufacturing and supply chains, regulatory clarity, and close collaboration between government, academia, industry, and investors. The potential exists for successes to redefine entire industries and national capabilities.

India's next phase of growth therefore demands an intentional focus on ecosystem-level capability building, the primary objective of IDTA.

The Global Context: Technology as Strategy

The global environment has changed fundamentally. Technology has become a strategic arena shaped by geopolitics, industrial policy, and national security considerations. Countries are reshoring supply chains, subsidizing strategic industries, imposing export controls, and forming technology blocs.

In this new world, technological capability is critical for strategic autonomy.

Semiconductor shortages exposed vulnerabilities in global supply chains. AI governance debates revealed the concentration of critical infrastructure in a few countries and firms. Energy transitions highlighted dependencies in materials, manufacturing, and intellectual property. The current trade era is increasingly defined by industrial strategy rather than market liberalism.

India, uniquely, is positioned as both a trusted partner to advanced economies and an emerging voice for the Global South. To sustain and advance this position, India must build depth in critical technologies, in research, development, and manufacturing.

The Capital Gap in Deep Tech

Despite policy momentum exemplified by Production Linked Incentives (PLIs), Research & Development (R&D) incentives, semiconductor missions, space reforms, and public digital infrastructure—India still faces a structural challenge in the absence of sufficient coordinated risk capital for deep technology.

Traditional venture capital often struggles with:

- Long gestation periods
- High technical risk
- Hardware-software-manufacturing integration
- Large upfront capital requirements
- Regulatory and geopolitical complexity

Public funding, while essential, cannot by itself drive commercialization, global scaling, or market discipline.

What India needs is informed, blended, and aligned capital, that understands technology cycles, industrial pathways, and policy constraints; capital that can bridge early innovation with late-stage manufacturing and global markets.

The IDTA was conceived to address this need.

What the India Deep Tech Alliance is

The IDTA is a coalition model bringing together experienced deep tech investors, strategic industry partners, policymakers, research institutions, and global networks.

Its purpose is threefold:

1. To mobilize risk capital into India-relevant deep tech sectors
2. To align private investment with national technology priorities, without compromising commercial discipline
3. To help accelerate the journey from academia to manufacturing to global markets

Venture capital needs policy clarity. Policy needs execution capability. Startups need patient capital and industrial partners. Global corporations need trusted innovation pipelines. Academia needs commercialization pathways.

IDTA exists to connect these dots.

India's Unique Advantage

India's advantage lies not in replicating Silicon Valley or Shenzhen, but in building a distinct deep tech model that builds on its special position:

- Cost-competitive engineering talent including those in the Global Capability Centres (GCCs)
- A trusted geopolitical posture
- Strong public digital infrastructure
- A domestic market as an accessible test bed that allows early scaling
- Growing alignment between policy and private capital

Coordination, credibility, and capital at scale will be needed to accomplish meaningful outcomes.

The IDTA provides a platform to advance these capabilities. Crucially, the Alliance is about fostering capability creation.

Success will not be measured solely in exits or valuations, but in:

- Indigenous technology platforms built
- Supply chains localized and diversified
- Jobs created in high-skill manufacturing
- Global standards influenced
- Strategic dependencies reduced

In this sense, the IDTA represents a new philosophy of investing — one that recognizes that national outcomes and investor returns can reinforce each other when designed thoughtfully.

A Call to Participate

The IDTA is an open invitation to investors seeking long-term asymmetric returns, to corporates looking for innovation partnerships, to policymakers shaping India's industrial future, and to founders building technologies that matter.

India's deep tech moment must be built patiently, collaboratively, and deliberately.

The IDTA exists to seize this moment.

India's Emerging Deep Tech Champions

India's deep tech moment is here, now. Across healthcare, AI infrastructure, semiconductors, robotics, education, and financial systems, a new cohort of Indian companies is quietly building foundational technologies going beyond features, apps or services to create core infrastructure designed for scale, resilience, and real-world complexity.

This generation of startups is distinguished by technical excellence as well as where and how their systems are built. They are forged in India's uniquely demanding environments: large-scale, fragmented data, linguistic diversity, regulatory complexity, cost sensitivity, and operational constraints. These challenges have the potential to produce globally competitive, defensible deep tech champions.

The following notes provide an illustrative list of AI-based companies in which IDTA members have invested. Details of each of these companies are provided in an **Appendix**.

Healthcare & Life Sciences AI: From Clinical Scale to Global Intelligence

India is emerging as a global proving ground for healthcare AI through live clinical deployment at a population scale.

5C Network exemplifies this shift. Rather than training AI on small, static datasets, 5C embedded itself directly into radiology workflows across India, transforming teleradiology operations into a continuous learning engine. The result is one of the world's most accurate medical imaging AI platforms, trained on tens of millions of real patient studies. Its AI now runs not only in the cloud, but inside X-ray machines themselves redefining how medical intelligence is deployed. Built entirely in India, 5C demonstrates that operational scale, data sovereignty, and AI excellence can combine to produce a globally competitive healthcare infrastructure.

KBCols, in biotechnology, represents an earlier but equally important frontier: sustainable bio-manufacturing. Leveraging India's microbial biodiversity, KBCols is developing bio-based colorants to replace environmentally harmful chemical dyes. Its journey highlights a critical system challenge India's pilot-to-commercial gap and underscores why patient capital and industry co-validation are essential if India is to lead globally in biology-driven deep tech.

Together, these companies show that India's healthcare and life sciences advantage lies not just in talent or cost, but in its ability to validate complex technologies in real-world conditions at scale.

AI Infrastructure & Decision Intelligence: Moving Beyond Chat to Action

A defining feature of India's emerging champions is their rejection of "AI as conversation" in favor of AI as execution infrastructure.

Questt AI is building decision intelligence for global enterprises, replacing slow, siloed planning systems with AI-native, agentic decision loops. Its enterprise knowledge graph is not a data integration layer but a semantic operating system, enabling multivariate decisions across pricing, inventory, supply, and demand. Deployed at Fortune500 scale, Questt proves that India can create enterprise-grade cognitive infrastructure, not just analytics tools.

IRIS Intelligence tackles a different but complementary problem: democratizing deep, domain-specific intelligence. Where global LLMs remain generic and shallow, IRIS enables domain experts such as doctors, engineers, researchers to convert their knowledge into autonomous AI agents capable of execution across 100+ output formats. Built entirely on sovereign Indian infrastructure, IRIS reframes AI as a shared national capability rather than a centralized foreign utility.

NeoSapien extends AI infrastructure into the human layer itself. By enabling real-time conversational intelligence without storing audio, NeoSapien introduces a new global standard for privacy-first AI. Designed natively for Indic languages and code-switching, it positions India as a leader in ethical, human-centric AI systems.

Collectively, these platforms mark a decisive shift: India has gone beyond just consuming AI platforms to building the operating systems of *intelligence*.

Semiconductors & Strategic Hardware: Owning the Critical Layers

Deep tech leadership ultimately depends on control of physical and computational foundations.

Agnit Semiconductors places India firmly inside one of the world's most strategically sensitive technology stacks: Gallium Nitride (GaN). Originating from nearly two decades of Indian Institute of Science research, Agnit is among a handful of global players with end-to-end GaN capability such as materials, devices, and RF modules. As GaN becomes essential for 5G, defense, power electronics, and space systems, Agnit represents a rare instance of India owning core semiconductor IP rather than remaining downstream.

Miko demonstrates that India can build trusted AI hardware at a global scale. Its consumer and human-centric robots are deployed in over 140 countries. Its emotionally intelligent, culturally adaptive AI systems have proven that safety-first, child-centric AI can succeed commercially. Its India-owned patent portfolio and global retail presence challenge the notion that advanced consumer robotics must emerge from Silicon Valley or East Asia.

Robotics, Logistics & Cyber-Physical Systems: Automating the Real Economy

India's complexity is becoming an advantage in cyber-physical systems.

Unbox Robotics has reimagined warehouse automation for high-density, fast-changing logistics environments. Its modular, swarm-based robotic systems deploy in weeks rather than months and scale incrementally, making them ideal for both emerging and developed markets. Built entirely in India and deployed globally, Unbox shows how Indian robotics companies can compete on speed, flexibility, and total cost of ownership.

TestMu (formerly LambdaTest) represents a parallel infrastructure story for quality engineering in software. With billions of tests executed annually and enterprise customers worldwide, TestMu's agentic AI testing systems automate one of the most time-consuming bottlenecks in software development. It demonstrates how India can lead not only in building software but in building the meta-infrastructure that ensures software quality globally.

Education & Human Capital Infrastructure: Measuring Learning at Scale

India's deep tech champions are also redefining education, not as content delivery, but as measurable cognitive development.

Educational Initiatives (EI) has spent over two decades building assessment and adaptive learning systems grounded in cognitive science and longitudinal data. With independent global evaluations showing dramatic learning gains, EI operates at full commercial scale across India and international markets. It exemplifies how India can lead in education AI by focusing on measurement, diagnostics, and outcomes rather than engagement alone.

Gooru expands this infrastructure by building a GPS for Human Development. Unlike generative AI that offers plausible guesses, it uses proprietary Active Sensing and Polyline Algebra to create mathematically validated pathways for mastery. From government schools to Tata Electronics, Gooru demonstrates that India is building the logic layer of human potential—moving beyond content consumption to assured, measurable outcomes.

Financial & Civic Infrastructure: AI for Trust, Risk, and Governance

Finally, India's emerging champions are modernizing the infrastructure of trust.

Navanc is transforming secured lending by converting manual collateral inspections into AI-driven risk intelligence. By training computer vision and geospatial models on Indian property conditions, Navanc enables faster credit decisions while strengthening risk controls. Its deployments across banks and NBFCs show how AI can safely expand access to capital in complex emerging markets.

KreditBee addresses the critical infrastructure gap in consumer credit for the new-to-credit segment. By layering a proprietary, real-time risk engine over India's Digital Public Infrastructure, it integrates disparate behavioral data to automate trust from onboarding to disbursement. This approach proves that solving financial inclusion at scale requires deep data integration where traditional metrics fail.

Videonetics operates at the civic scale, delivering sovereign vision AI for law enforcement, traffic management, and public safety. Built entirely in India and deployed across hundreds of cities and airports, Videonetics demonstrates that national-scale, mission-critical AI systems can be indigenously designed, owned, and operated.

Conclusion: Defining Categories

Taken together, these companies reveal a powerful pattern:

- They are infrastructure, going beyond apps
- They are operationally validated
- They are India-built, not India-adapted
- They convert India's challenges into global advantages

This is what distinguishes India's Deep Tech Emerging Champions. They are defining categories. With the right regulatory clarity, patient capital, procurement support, and compute infrastructure, companies like this cohort can anchor India's position as a trusted global builder of deep tech systems, from healthcare and semiconductors to AI, education, and civic infrastructure.

Section A - Report on Deep Tech and AI Investments

Compiled by Venture Intelligence for IDTA

Executive Summary

This report, compiled for IDTA by Venture Intelligence, shows that momentum is significantly increasing for AI and deep tech investments in India.

In 2025, even as overall venture activity moderated, capital continued to flow decisively toward technology-led sectors. Total VC investment in India held steady at about $10 billion, but within that headline number, AI and deep tech sharply outperformed.

AI startups emerged as the standout theme of the year. In 2025 alone, AI companies attracted 188 investments worth $1.2 billion, representing a 58% year-on-year increase in funding value. This surge reflects growing confidence in real-world adoption – across enterprise software, healthcare, financial services, cybersecurity, and industrial applications. Importantly, AI now accounts for about 12% of total VC funding, up from under 5% in 2020, representing significant growth.

Looking more broadly, deep tech investment has reached critical mass. Since 2016, India has seen nearly $28 billion invested across over 2,100 deep tech deals, with deep tech now representing 15% of total PE-VC activity, compared to just 4% a decade ago. This marks a fundamental shift in investor priorities, from consumer-led growth toward science, engineering, and IP-driven innovation.

The report also highlights a healthy diversification within deep tech. While AI dominates, strong momentum is visible in space technologies, semiconductors, robotics, advanced manufacturing, med tech, energy, and climate technologies. Encouragingly, early-stage deep tech investments have more than doubled over the past five years, indicating a widening pipeline of future category leaders.

Another important signal is the growing participation of private equity and growth-stage investors. Large investments into AI analytics, semiconductor design, and medtech platforms underscore rising confidence in scale-up potential. At the same time, the report is clear: growth capital remains a bottleneck, and the absence of large, specialist deep tech funds risks slowing India's transition from innovation to global leadership.

Policy support is emerging as a critical enabler. The ₹1 lakh crore Research Development and Innovation Fund has the potential to be a game-changing catalyst, bridging the gap between research, commercialization, and venture scale, especially in long-gestation sectors.

Finally, the report underscores the importance of institutional coordination, exemplified by the role of the IDTA as a unifying platform. By aligning private capital, policy priorities, technical expertise, and global market access, IDTA strengthens the ecosystem's ability to convert laboratory breakthroughs into globally competitive companies.

India's AI and deep tech ecosystem has moved beyond promise. The opportunity now is execution: scaling research, mobilizing growth-stage capital, and building enduring platforms that anchor India's position in the global technology landscape.

Background

In 2025, India's venture capital ecosystem continued to channel capital into technology-led sectors, even as overall investment activity showed signs of moderation. VC investments in the country stood at $9.9 billion for the calendar year - comparable to the $10.1 billion invested in 2024. Investment volumes, at 904 transactions, were below the previous year's 979, reflecting a more selective capital environment.

Pervasive AI

Given the saturation in markets like the US and China, where every other category has already produced winners, AI is almost the only theme that VC investors in those countries are interested in. While nearly two-thirds of all US venture investment is now AI-led, globally, over 50% in H1 2025 flowed into AI.

In India, there is far more balance. While AI startups are indeed fast gaining investor interest, they are not the only story among VC investors.

Investments in Indian AI startups are up from 4.5% of the overall VC funding pie in 2020 to 12.3% in 2025- significant, but not overwhelming. VC investors in India have many other themes to ride including underpenetrated consumption (spurring E-Commerce including Quick Commerce and Direct-to-Consumer or D2C brands), rising digital adoption (catalyzing segments like Fintech and Gaming), EV and other climate related opportunities, Healthcare (including healthtech) and other Deep tech verticals (like Space tech and Defense tech).

In 2025, Indian E-Commerce (including Quick Commerce and D2C) startups attracted the most VC funding at $2.39 billion across 162 deals, followed by Fintech with $1.89 billion across 123 deals. Enterprise Software as the next favorite, attracting $1.36 billion in 189 deals.

Sector Funding Overview 2025

Sector	Deal Count	YoY Change (%)	Funding ($M)	YoY Change (%)
E-commerce	162	-4%	2,397	-17%
Fintech	123	-12%	1,897	18%
Enterprise Software	189	-20%	1,361	-6%
AI/ML	188	8%	1,221	58%
Deep tech (Other than AI)	147	10%	1,186	-22%

Note: Companies are double counted if they fall in more than one sector. For example, if an entity is an AI based fintech company, it would be counted under both AI and fintech.

Investors are also clear that startups - across sectors and stages - need to leverage AI in their business processes. Net-net, AI and Deep tech are set to have a lasting impact on the Indian VC funding landscape in 2026 and beyond.

It is not just VC investors who are bullish on AI and Deep tech. Their later stage focused counterparts, Private Equity (PE) investors are becoming quite active in the sector. IPO bound AI and analytics solutions company Fractal for instance has attracted over $500 million across two rounds (between 2022 and 2025) from home-grown investment firms like Gaja Capital, Neo Asset Management and White Oak Capital Management as well as global PE giant TPG Capital. (This follows the over $300 million Fractal had attracted in previous funding rounds from other PE firms like Apax Partners and TA Associates as well as Malaysian Sovereign Wealth firm, Khazanah Nasional).

TPG has also invested $150 million in semiconductor design and engineering firm Tessolve. Warburg PIncus, one of the most experienced global PE investors active in India, has recently made significant bets on Indian medtech innovators like Appasamy Associates (ophthalmic equipment) and Meril Life Sciences (stents and surgical robots).

It is encouraging to see PE funds begin to take interest in the deep tech segment, since availability of Growth Capital is considered a key bottleneck that requires addressing in the years to come.

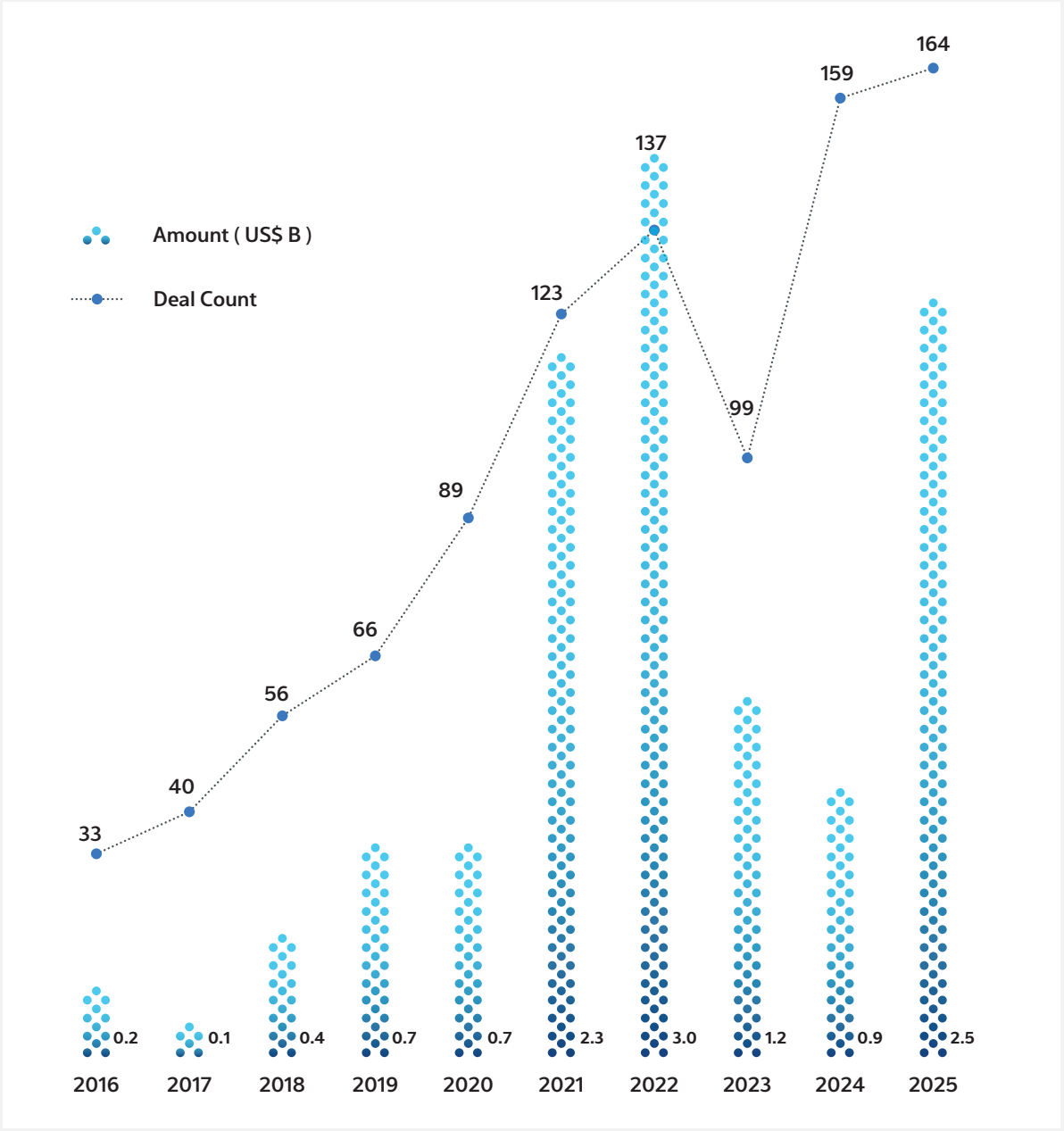
What is a Deep Tech Startup?

A deep tech startup is a technology-driven company that develops or applies advanced scientific and engineering innovations to create highly differentiated products or services. These startups are built on substantial research and intellectual property and leverage cutting-edge technologies such as AI, Machine Learning (ML), Internet of Things (IoT), Blockchain, Big Data and Analytics, Augmented and Virtual Reality, Robotics, Biotechnology, Nanotechnology, Advanced Materials, Semiconductors, and Cybersecurity. Unlike conventional technology ventures, deep tech startups focus on solving complex, real-world problems across sectors such as healthcare, manufacturing, energy, space, and climate, often requiring longer development cycles, deep technical expertise, and significant upfront investment.

Characteristics of a Deep Tech Startup

AI Investments in India

$12 BILLION ACROSS 966 DEALS (554 COS.)



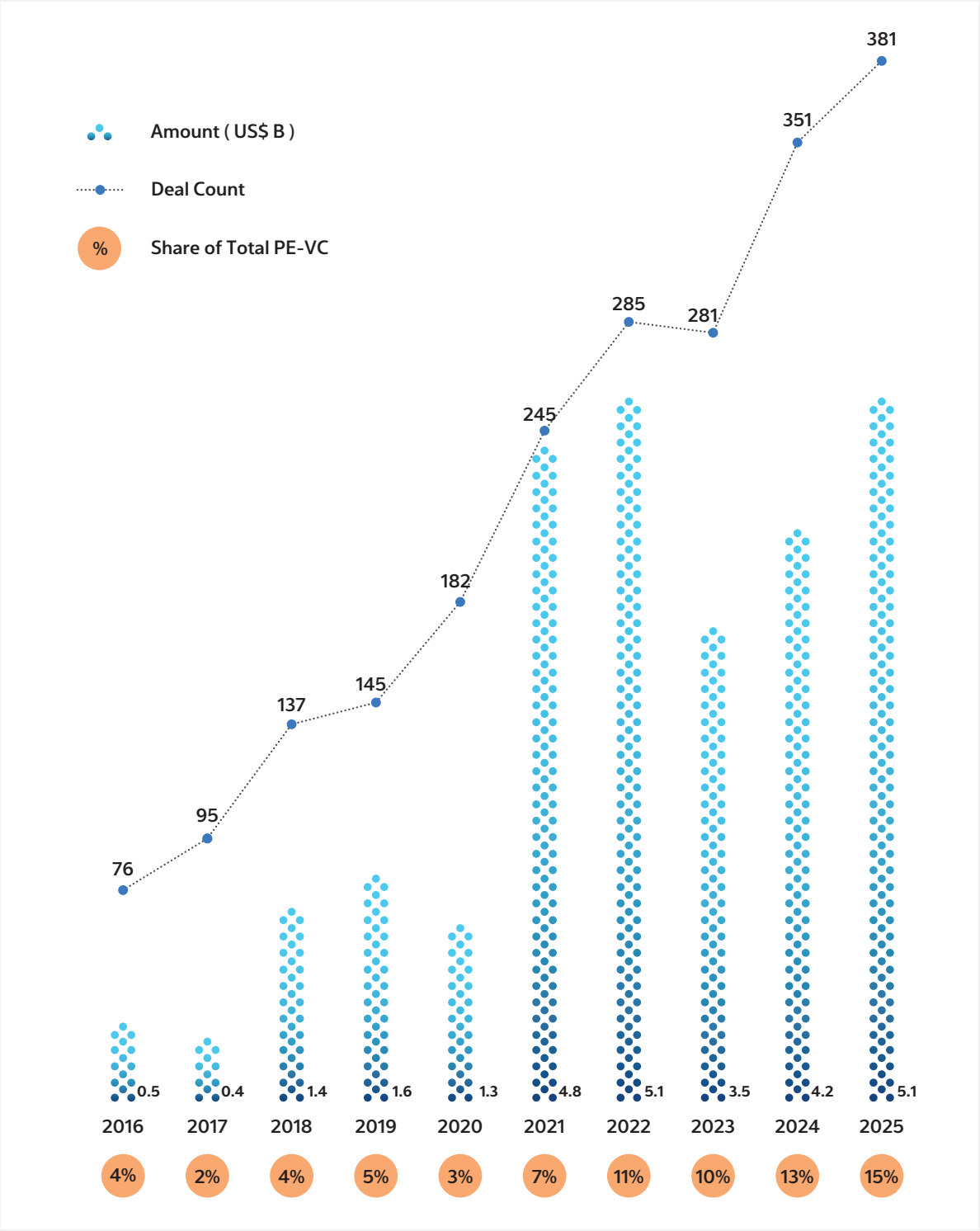
AI investment in India has evolved from a functional enabler to a central investment theme, attracting growing conviction from both generalist and specialist investors. Over the last decade, AI investment activity has expanded structurally, culminating in a cumulative $12 billion across 966 transactions involving 554 companies. Funding experienced substantial growth during 2021 and 2022, consistent with the global technology cycle, followed by moderation in 2023, even as the volume of deals continued to increase through 2024 and 2025.

This divergence between capital deployment and the number of transactions indicates a broadening base of AI startup formation and early-stage investment. This trend is underpinned by the increasing maturity of India's AI ecosystem, evidenced by deeper applied research talent, more established commercial frameworks, and shorter adoption cycles that enhance fundability. Concurrently, software- native deployment models and sustained enterprise and consumer demand for applied AI use cases, particularly across BFSI, enterprise software, and digitally-focused sectors, have reduced friction and accelerated adoption.

Furthermore, enhanced founder capability, improved access to open-source models and cloud infrastructure, and the expanding role of domestic venture capital have collectively lowered entry barriers, solidifying AI's position within India's deep tech landscape.

Deep Tech Investments in India

$27.9 BILLION ACROSS 2,178 DEALS (1,217 COS.)



Share of Deep Tech has risen to 15% from 4% a decade ago

Deep tech investment in India remains closely linked to real-world adoption pathways, with capital flowing preferentially into segments where deployment is anchored to clear institutional channels such as OEMs, hospitals, defence buyers, and systems integrators. Over the past decade, deep tech investments have scaled materially, aggregating $27.9 billion across 2,178 deals involving 1,217 companies, while the share of deep tech within total PE–VC funding has risen from 4% in 2016 to 15% in 2025.

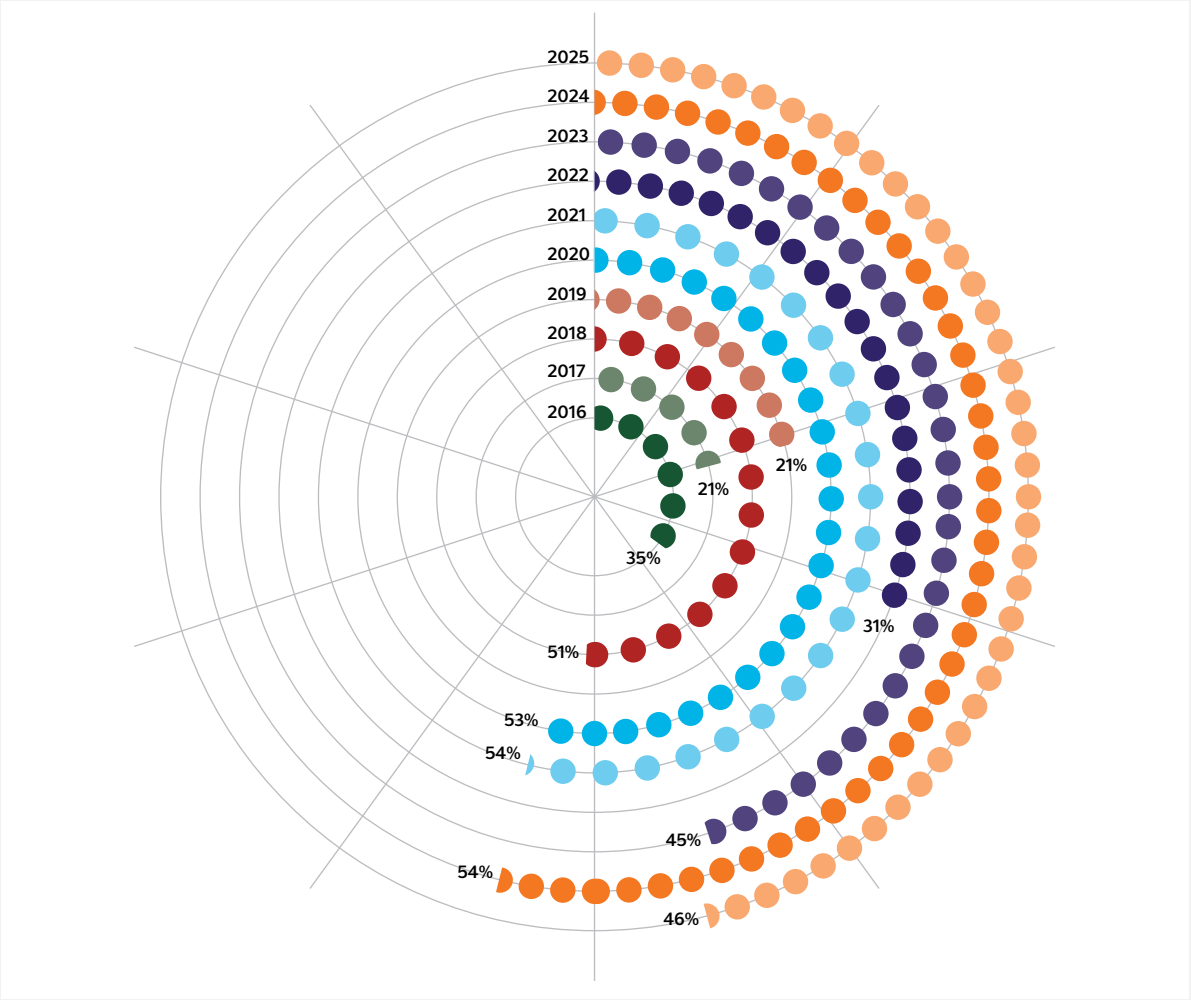
Although funding volumes peaked during the 2021–22 cycle and moderated thereafter, deal activity has continued to expand, indicating sustained participation rather than episodic capital inflows. This shift reflects broader institutional acceptance of deep tech categories including AI, spacetech, defence, climate, and advanced engineering, alongside increasing availability of patient, risk-tolerant capital suited to longer development and commercialisation timelines.

Policy alignment around indigenous innovation, most notably the formalisation of the ₹1 lakh crore Research Development and Innovation (RDI) fund, signals strong intent, though long-term capital mobilisation remains contingent on effectively bridging R&D with procurement, certification, and financing mechanisms.

Together, these dynamics distinguish deep tech investment from faster-cycle digital sectors, underscoring the importance of capital structures aligned with hardware intensity, regulatory dependencies, and extended gestation periods.

Investments in Cross-Border Startups* - AI

Percentage of Total AI Funding Raised



**Startups that have their main employee base in India or originally incorporated here, but have located/flipped headquarters overseas.*

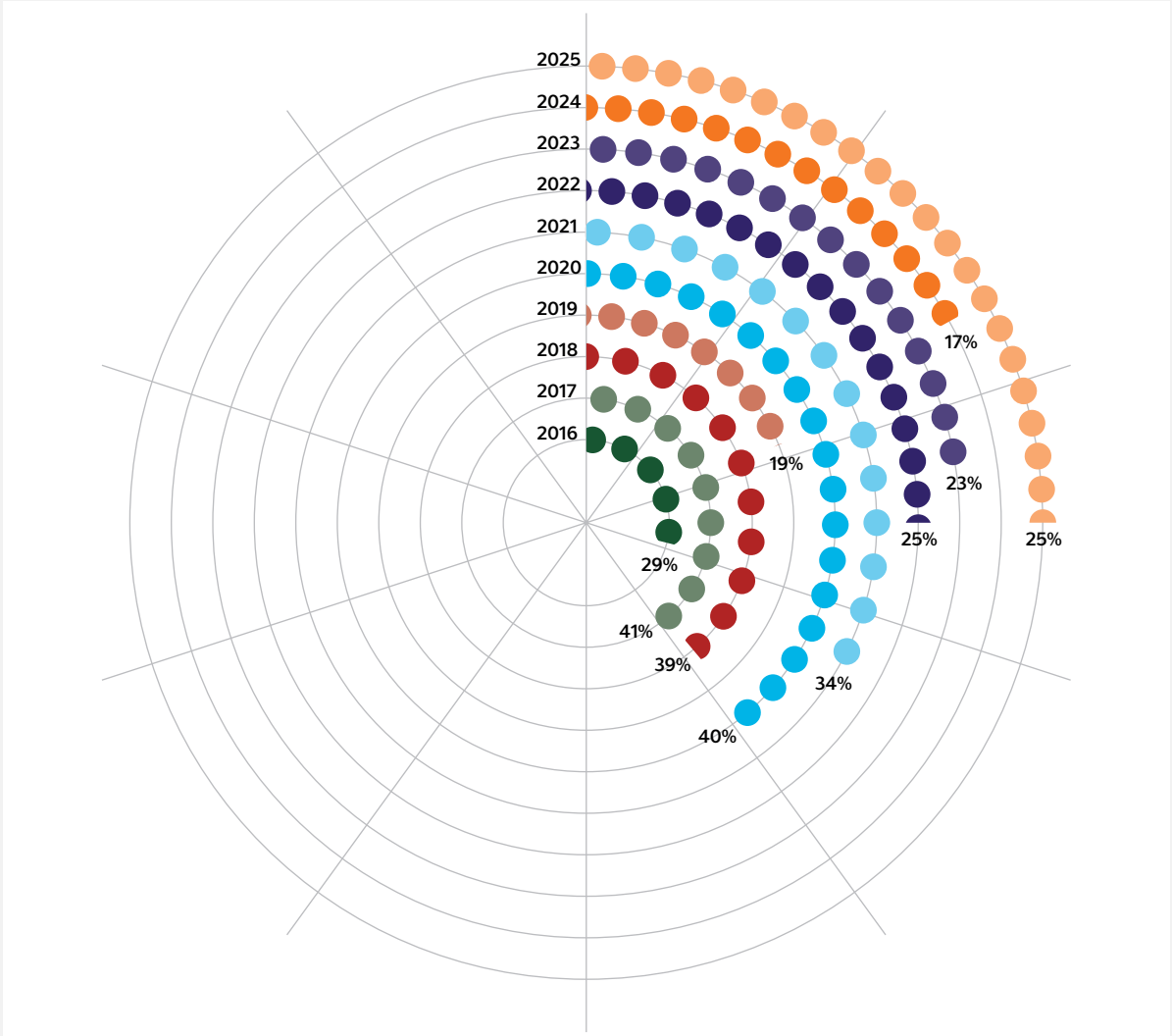
AI cross-border structuring among India-origin companies has remained a consistent feature of the ecosystem, with overseas-headquartered startups accounting for roughly 30 to 55% of AI funding over the past decade.

Periods of higher concentration have coincided with phases of increased global liquidity and internationally set valuation benchmarks, while moderation during global risk resets reflects shifts in capital availability. Offshore incorporation is driven by practical considerations cited by founders and investors, including access to global enterprise customers, predictable AI governance regimes, and deeper pools of late-stage capital. At the same time, India continues to serve as a primary base for talent and R&D activity, underscoring its role as a key execution and innovation hub.

This pattern is particularly evident among companies operating in AI infrastructure, developer tools, and enterprise-focused offerings, where global market access and capital availability shape organisational structure.

Investments in Cross-Border Startups - Deep Tech*

PERCENTAGE OF TOTAL DEEP TECH FUNDING RAISED



Startups that have their main employee base in India or originally incorporated here, but have located/flipped headquarters overseas.

Cross-border structuring has been a persistent feature of India-origin deep tech ventures, with overseas-headquartered startups historically securing a significant share of total deep tech funding, though with greater volatility than observed in AI-specific investments.

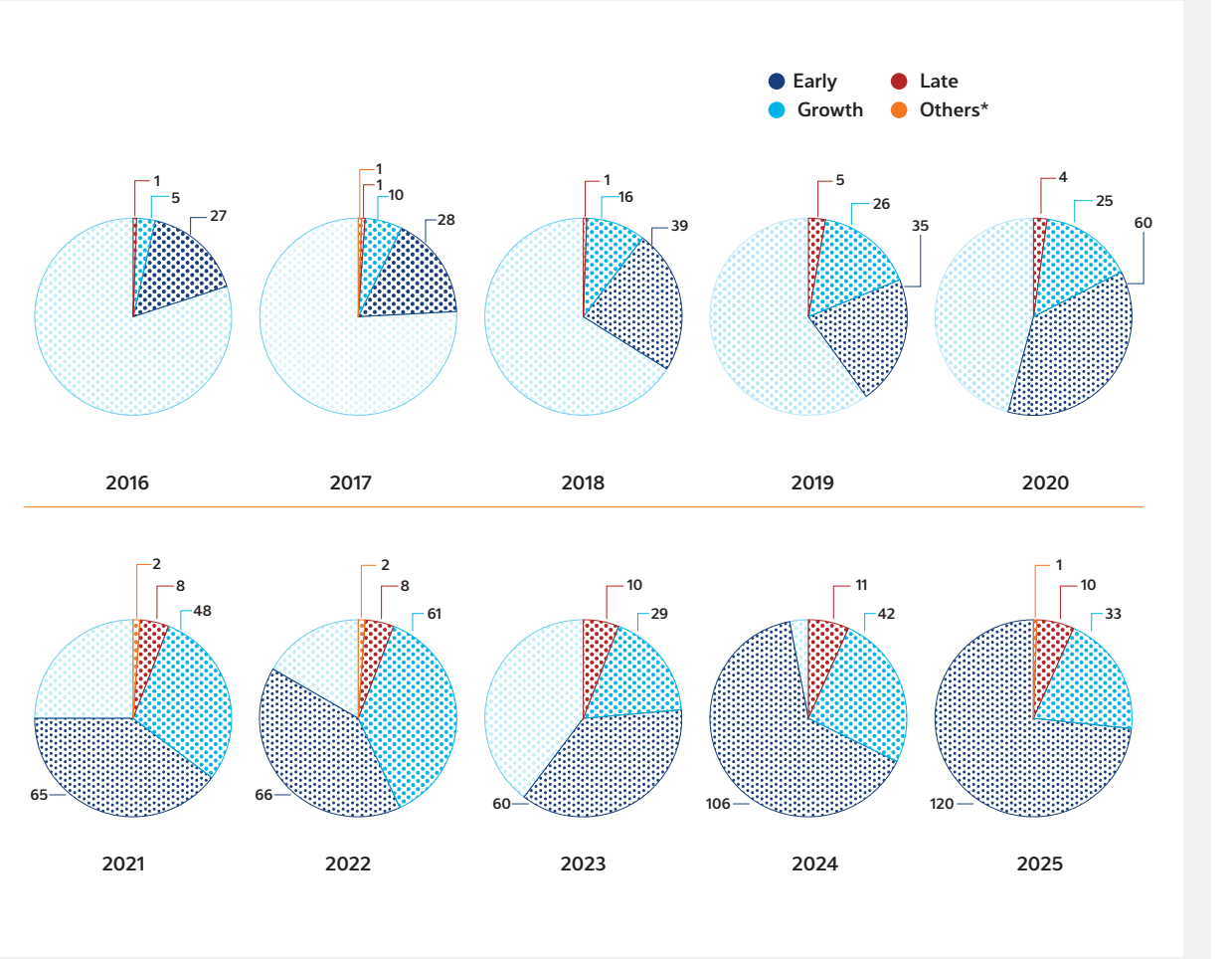
Periods of higher cross-border concentration, notably in 2017–18 and again around 2020, coincided with phases when international capital and specialised deep tech investors played a larger role in financing hardware-and science-led companies.

The subsequent reduction from 2021 onwards reflects a partial rebalancing towards India-headquartered entities, influenced by improved domestic funding capacity, greater availability of patient capital, and stronger government support for indigenous innovation in sectors such as defence, space, and advanced manufacturing.

At the same time, the continued prevalence of cross-border structures reflects the commercial realities of deep tech, where scale-up is often linked to global supply chains, certification regimes, strategic procurement channels, and access to global markets, partnerships, and late-stage capital.

While India continues to generate high-quality technical innovation, differences in testing infrastructure, standardisation, and deployment pathways shape organisational choices for deep tech companies pursuing faster commercialisation.

AI Investments By Stage (By Volume)



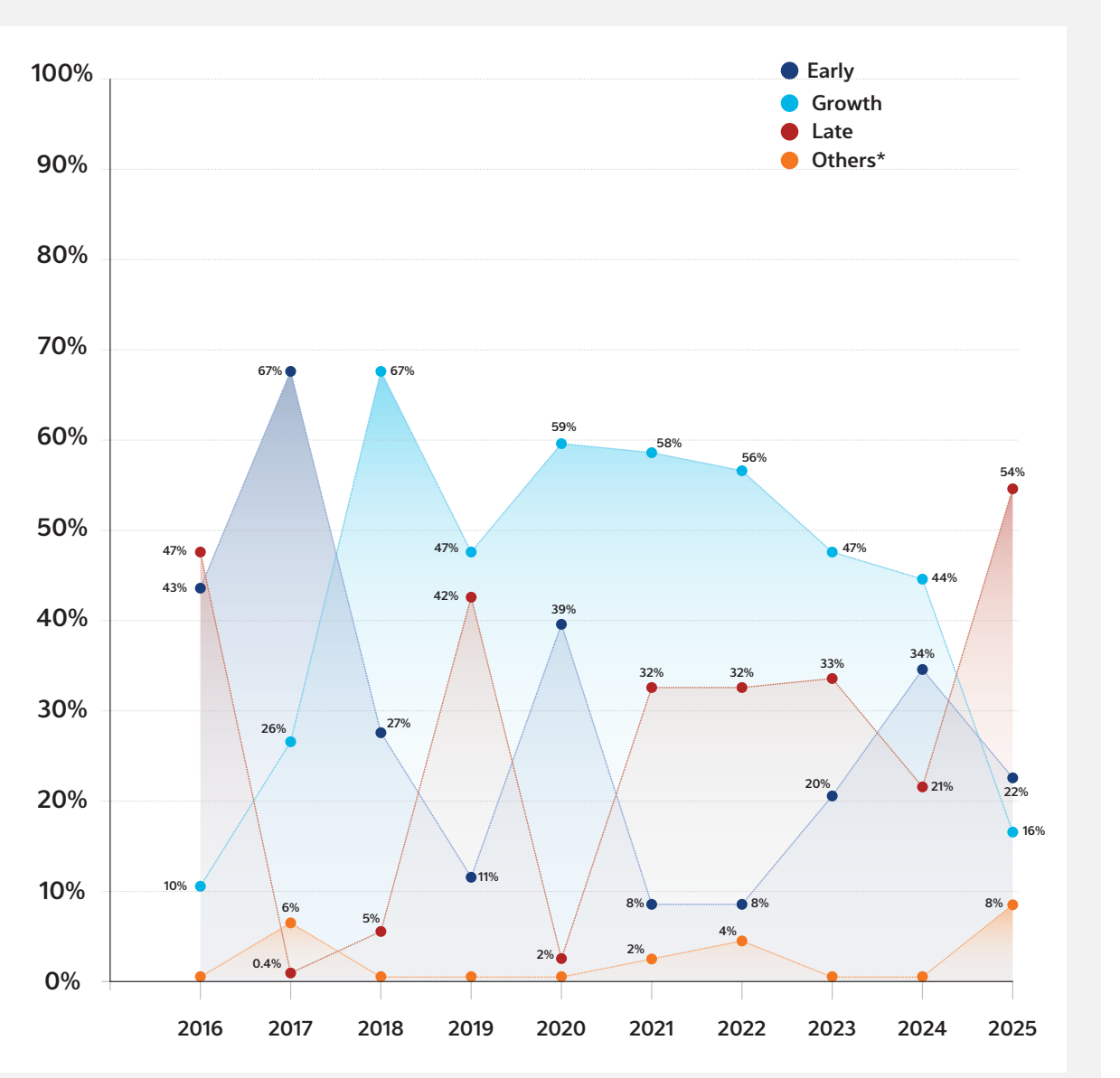
While Early Stage startups (> 5 years old), followed by Growth Stage startups (5-10 years old) account for a higher share of the number of investments...

AI investments in India are concentrated at the early and growth stages by deal volume, with early-stage transactions consistently forming the largest share across the period. Growth-stage activity increased materially during the 2020–2022 cycle, while late-stage deal volumes have remained limited and uneven. This distribution reflects a broad experimentation phase, with a large number of founders building application-layer AI solutions across sectors.

The pattern has been enabled by rapid company formation driven by talent emerging from large technology firms, startups, and global R&D centres, alongside shorter experimentation cycles and faster proof-of-concept validation. As a result, many companies have raised multiple smaller rounds prior to reaching scale, while only a narrower subset has progressed to maturity levels typically associated with sustained late-stage funding.

Increasing emphasis on operational deployment and measurable outcomes is shaping investor attention towards AI solutions embedded within enterprise workflows across sectors such as BFSI, healthcare, manufacturing, and logistics.

AI Investments By Stage (By Value)



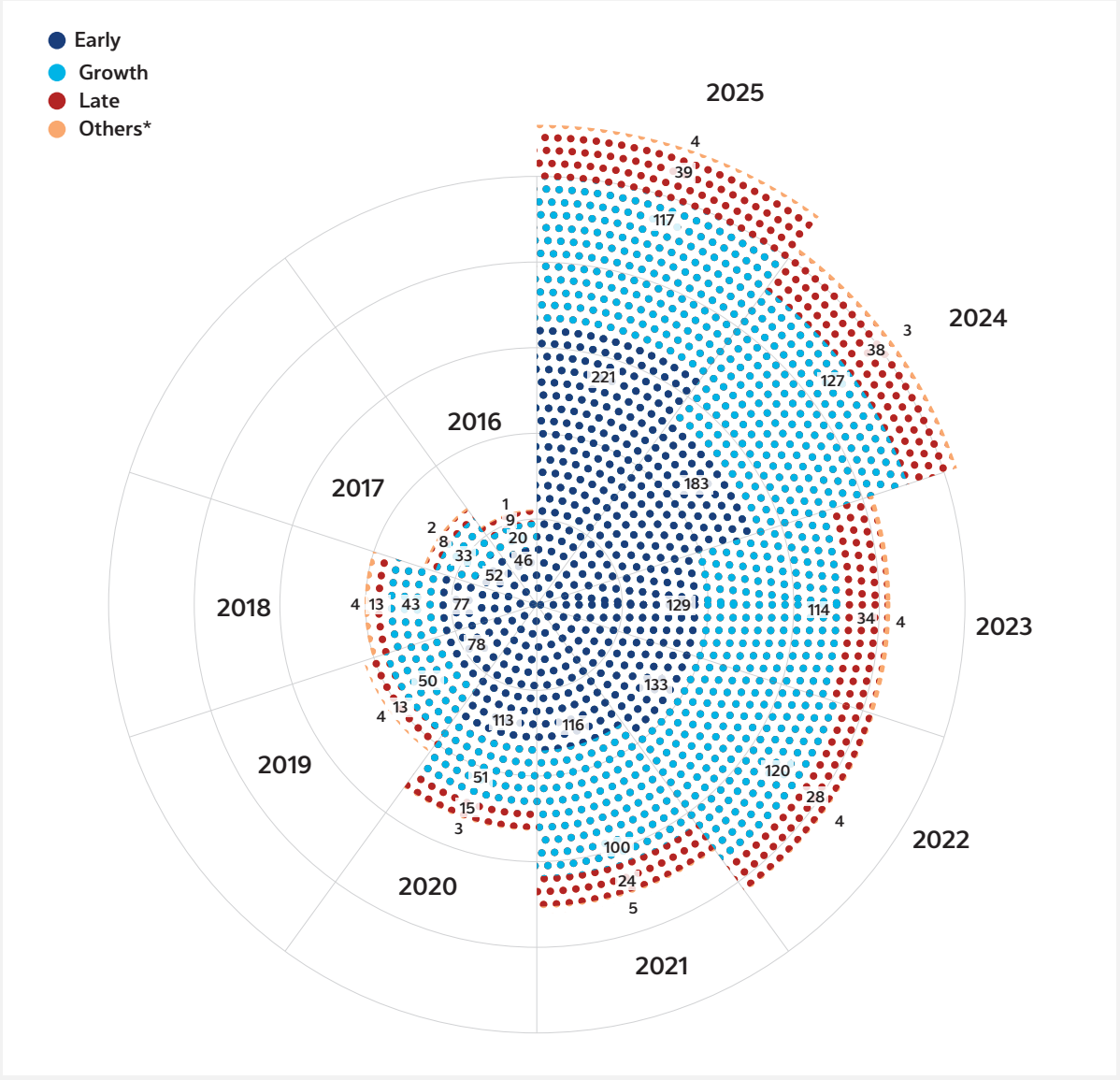
.. the larger $ share goes to Later Stage Cos (>10 years), especially cross-border companies

AI investment by value in India continues to be skewed towards later-stage companies, even as the majority of transactions occur at earlier stages. Across funding cycles, a relatively small group of established AI companies has accounted for a disproportionate share of capital deployed, reflecting investor preference for businesses with proven business models, scaled adoption, and stronger governance frameworks.

Capital concentration at later stages has also been influenced by benchmarking against global peers, particularly for companies with international customer bases and visible revenue streams. This has resulted in funding value being concentrated in fewer, larger transactions, while early-and growth-stage rounds remain more frequent but smaller in size.

The pattern indicates that AI capital allocation increasingly favours companies demonstrating repeatable enterprise monetisation and distribution strength, alongside technical capability, as the ecosystem matures.

Deep Tech Investments By Stage (By Volume)



Investments in Deep Tech have been on a consistent rise, with early-stage bets doubling over the past five years

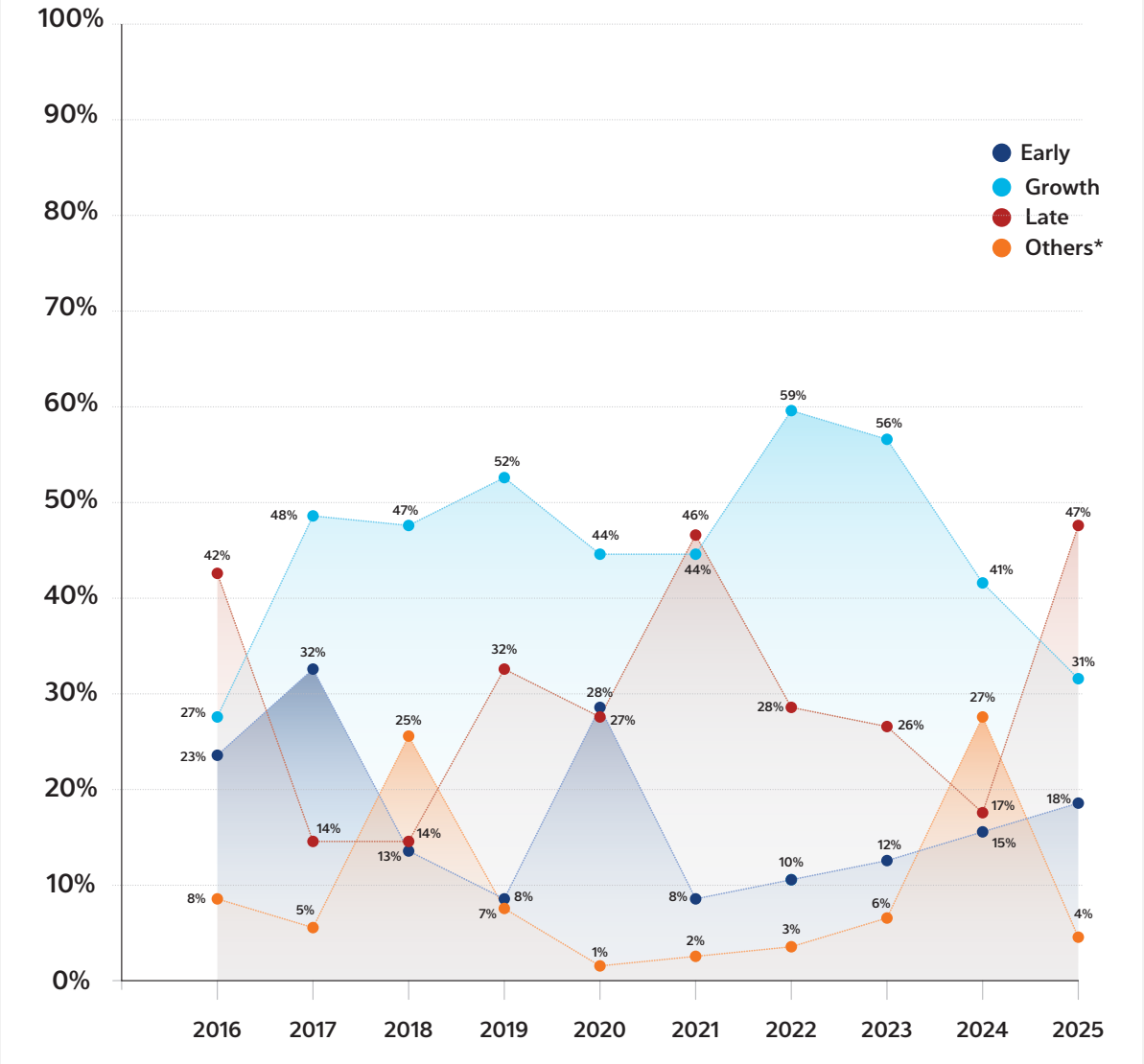
Deep tech investment in India has shown a steady increase in deal volume across stages, with early-stage transactions accounting for the largest share of activity. This reflects an expanding pipeline of deep tech company formation, supported by academic spin-offs, research incubators, and mission-driven entrepreneurship across scientific and engineering disciplines.

The rise in early and growth-stage deal activity is associated with growing confidence in India's innovation pipeline, alongside stronger engineering talent, more established startup playbooks, and policy support for strategic technologies.

Government-backed pilot programs and corporate innovation initiatives have further enabled early experimentation by lowering initial commercialisation risk. At the same time, higher deal volumes alone do not translate directly into commercial outcomes, as deep tech scale-up remains dependent on effective pathways from research to market deployment.

Consistent with this dynamic, late-stage deal volumes remain lower, reflecting the longer validation, integration, and deployment cycles characteristic of hardware- and science-led ventures.

Deep Tech Investments By Stage (By Value)



Early-stage investments have rebounded, even as late-stage investments continue to account for a significant share

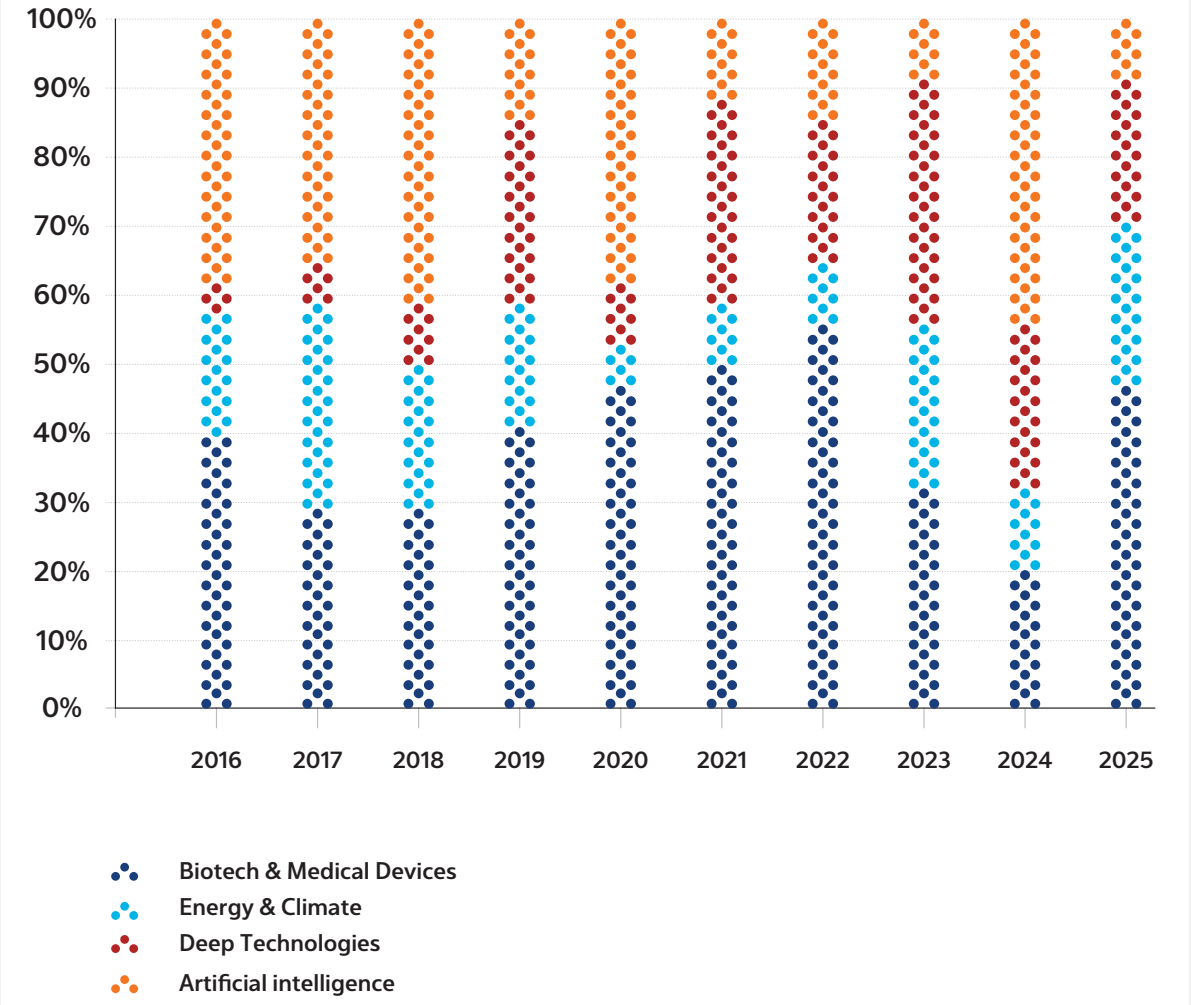
Deep tech investment in India, when viewed by both stage and value, continues to show a clear concentration of funding in growth and late-stage companies, even as early-stage deal volumes have expanded across the ecosystem. This reflects the substantial capital requirements associated with scaling hardware-and science-led innovation, where deployment, validation, and integration costs remain high and maturation cycles are extended.

The pattern indicates that while early-stage experimentation is increasingly well funded, a smaller subset of companies captures a disproportionate share of capital once commercial traction is established. This structure points to a persistent gap at the growth and scale-up stage, shaped by the availability of patient capital, access to institutional adoption channels, and procurement-linked demand mechanisms.

At the same time, the presence of early-stage value across the ecosystem signals confidence in upstream innovation pipelines feeding into later-stage outcomes.

Collectively, these dynamics reinforce a barbell funding structure in deep tech, with broad experimentation at the base and capital consolidating as technologies mature and move towards deployment.

Investments in Sunrise Sectors* (By Value)



Share of Artificial Intelligence startups grew rapidly in 2025

**As per Research Development and Innovation Fund (RDIF)*

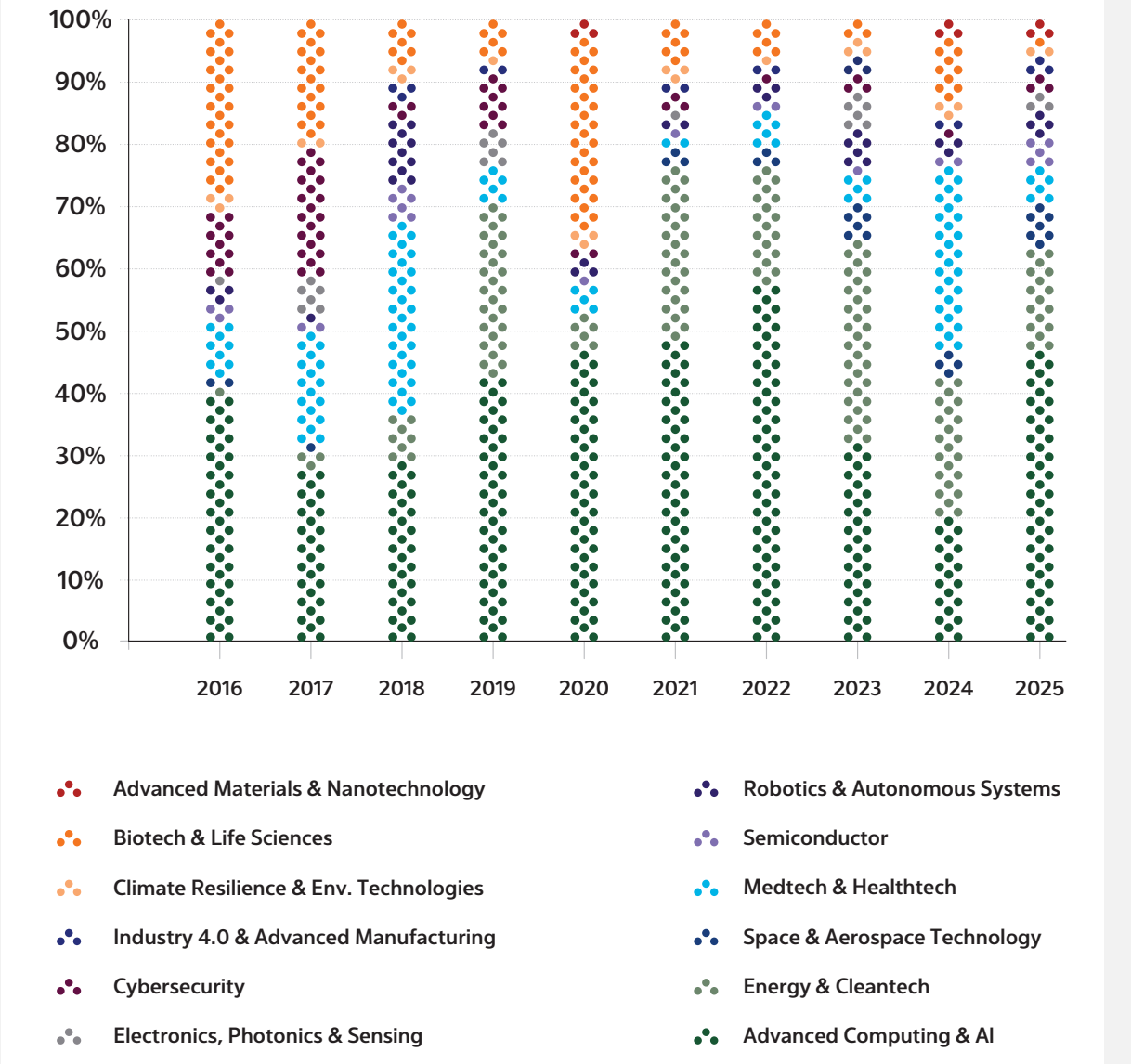
AI has emerged as the largest recipient of capital within the broader sunrise sectors landscape, with its share of total funding value increasing sharply by 2025. Earlier periods showed a more even distribution of capital across emerging sectors, reflecting exploratory investment as multiple innovation themes evolved in parallel.

Over time, capital has increasingly concentrated in AI-led applications and platforms, driven by software-native innovation models with shorter feedback loops, faster monetisation timelines, and clearer enterprise go-to-market pathways, particularly across SaaS, BFSI, and consumer platforms.

At the same time, deep tech and energy and climate sectors have continued to attract a steady share of investment, though their scale-up remains more closely tied to policy support, deployment infrastructure, and institutional partnerships. Biotech and medical devices have maintained consistent but comparatively lower funding levels, reflecting longer gestation periods, clinical risk, and milestone-based capital deployment.

Overall, the allocation pattern highlights a sectoral bifurcation, with AI scaling more rapidly due to lower adoption friction and export-oriented models, while other deep tech domains progress in alignment with industrial readiness and national mission priorities.

Deep Tech Sub-Sectors including AI (By Value)



AI continues to dominate, with space tech and other emerging sub-sectors gaining traction in recent years

AI continues to be the largest and most capitalised deep tech sub-sector by value, reflecting its role as a horizontal capability spanning enterprise, industrial, and scientific applications rather than a standalone vertical.

At the same time, the investment distribution across 2023–2025 highlights increasing capital allocation to SpaceTech and aerospace, semiconductors, robotics and automation, and Industry 4.0, as these categories progress closer to real-world deployment and scale.

SpaceTech and aerospace investments have shifted from proof-of-concept launches towards subsystem manufacturing and intelligence, surveillance, and reconnaissance applications, attracting both private and strategic capital.

Semiconductor funding has gained traction in design-led and fabless models, particularly in compound materials and application-specific integrated circuits aligned with industrial and electric vehicle use cases.

Robotics and automation investments have benefited from growth in logistics, warehousing, and industrial operations, while medtech and cybersecurity continue to attract capital driven by regulatory compliance requirements, institutional adoption, and integration into critical risk and operating layers.

Overall, the distribution reflects a maturing deep tech ecosystem, where capital is increasingly allocated across complementary sub-sectors based on readiness for adoption, procurement alignment, and infrastructure intensity rather than rotating sharply between themes.

Seed-Stage Deep Tech Investments in IDTA Members' Portfolios

Company	Sub-Sector	in million USD	Last Round Date
Finarkein Analytics	Advanced Computing & AI	7.3	Oct-25
BrainSightAI	Advanced Computing & AI	6.7	Dec-24
Zocket	Advanced Computing & AI	5.1	May-24
Phyx44	Biotech & Life Sciences	4.8	Sep-24
HerKey	Advanced Computing & AI	4	Mar-23
Expertia AI	Advanced Computing & AI	3.5	Mar-25
Nexstem	Biotech & Life Sciences	3.5	Oct-24
Pascal AI Labs	Advanced Computing & AI	3.1	Sep-25
Leumas	Industry 4.0 & Advanced Manufacturing	3.1	Jun-25
Equilibrium Earth	Climate Resilience & Environmental Technologies	3	Sep-25
SimYog Technology	Electronics, Photonics & Sensing	2.9	Dec-23
KBcols Sciences	Climate Resilience & Environmental Technologies	2.7	Jul-23
Clientell	Advanced Computing & AI	2.6	Mar-24
CtrlB	Advanced Computing & AI	2.5	Nov-25
FlyNava	Advanced Computing & AI	2.5	Jun-24
BluJ Aero	Energy & Cleantech	2.3	May-23
Gushwork	Advanced Computing & AI	2.1	Jul-23
Mili	Advanced Computing & AI	2	Dec-24
Contiinex	Advanced Computing & AI	2	Mar-23
LatentForce	Advanced Computing & AI	1.7	Dec-25
DeepMatrix	Advanced Computing & AI	1.6	Aug-24
Litemed	Biotech & Life Sciences	1.5	Jun-25
Nudgebee	Advanced Computing & AI	1.4	Oct-24
Bharat Semi	Semiconductor	1.4	Sep-25
Tvaster Genkalp	Biotech & Life Sciences	1.3	Apr-25

Series A - Stage Deep Tech Investments in IDTA Members' Portfolios

Company	Sub-Sector	in million USD	Last Round Date
QpiAI	Semiconductor	38.5	Mar-25
EtherealX	Space & Aerospace Technology	25.8	Oct-25
Dozee	Biotech & Life Sciences	24.8	Feb-25
Onecell Diagnostics	Biotech & Life Sciences	16	Nov-24
Pantherun	Cybersecurity	15.3	Oct-25
Baaz Bikes	Energy & Cleantech	12.3	Jul-25
Avammune Therapeutics	Biotech & Life Sciences	12	Apr-25
Aether Biomedical	Robotics & Autonomous Systems	11.5	2023
Chara	Energy & Cleantech	11.5	Oct-25
Mihup Communications	Advanced Computing & AI	10.2	Sep-24
Modulus Housing	Advanced Materials & Nanotechnology	9.8	Dec-25
Hyperbots	Advanced Computing & AI	8.6	Mar-25
Clean Electric	Energy & Cleantech	8	Aug-24
Manastu Space	Space & Aerospace Technology	7.3	Nov-24
Skye Air	Robotics & Autonomous Systems	6.9	Jun-24
Ahammune Biosciences	Biotech & Life Sciences	6.8	Sep-24
Frinks AI	Advanced Computing & AI	6.1	Apr-25
byteXL	Advanced Computing & AI	5.9	Jul-24
Cron AI	Robotics & Autonomous Systems	5.7	Jun-23
Goodmeetings	Advanced Computing & AI	1.9	Apr-25
Get Ambee	Climate Resilience & Environmental Technologies	1.5	Aug-23
Kcat Enzymatic	Biotech & Life Sciences	0.5	May-23

Seed and Series A investment activity in India's deep tech ecosystem between 2023 and 2025 reflects a strengthening early-stage innovation funnel alongside a disciplined progression toward scale. Seed-stage funding is concentrated in advanced computing and AI, with meaningful participation from biotech, climate resilience, electronics, and Industry 4.0, indicating sustained confidence in applied research, technical experimentation, and early productisation. These rounds are typically structured to support proof-of-concept validation, pilot deployments, and foundational R&D, particularly in software-led and science-enabled platforms.

As companies advance to Series A, capital deployment becomes more selective and materially larger, spanning semiconductors, space and aerospace, robotics, energy, cybersecurity, and life sciences, where funding requirements rise sharply due to system integration, certification, and initial commercialisation needs. This shift highlights a clear filtering dynamic, with capital concentrating around ventures that demonstrate technical robustness, early market traction, or credible pathways to enterprise or industrial adoption.

Collectively, the progression from seed to Series A illustrates a maturing deep tech pipeline, characterised by broad experimentation at inception and disciplined capital allocation as technologies approach deployment readiness and early scale.

Top Deep Tech Investments (By Size)

Company	Sub-Sector	Region	Date	Amount (US$M)
Healthium	Medtech & Healthtech	India (Bangalore)	2017-2024	1,178
TATA .ev	Energy & Cleantech	India (Mumbai)	2021	1,000
OLA ELECTRIC	Energy & Cleantech	India (Bangalore)	2019-2023	903
UNIPHORE	Advanced Computing & AI	USA (California)	2016-2025	865
fractal	Advanced Computing & AI	USA (New York)	2016-2025	830
innovaccer	Advanced Computing & AI	USA (California)	2016-2025	651
Meril	Medtech & Healthtech	India (Vapi)	2022-2025	445
ATHER	Energy & Cleantech	India (Bangalore)	2019-2024	424
druva	Cybersecurity	USA (California)	2016-2021	408
gupshup	Advanced Computing & AI	USA (California)	2021-2025	400

Company	Sub-Sector	Region	Date	Amount (US$M)
MAHINDRA ELECTRIC SUVs	Energy & Cleantech	India (Mumbai)	2022-2023	386
GreyOrange	Robotics & Autonomous Systems	USA (Georgia)	2018-2023	385
Builder.ai	Advanced Computing & AI	London	2018-2023	380
ADVANTA Modern Science - Traditional Values	Biotech & Life Sciences	India (Mumbai)	2024	350
IMPETUS	Advanced Computing & AI	USA (California)	2024	350
Biocon Biologics	Biotech & Life Sciences	India (Bangalore)	2020-2021	331
APPASAMY ASSOCIATES Empowering Vision®	Medtech & Healthtech	India (Chennai)	2024	300
netradyne	Advanced Computing & AI	USA (California)	2016-2025	288
INDIA	Energy & Cleantech	India (Chennai)	2023-2024	272
kore.ai	Advanced Computing & AI	USA (Florida)	2018-2024	246
OBSERVE·AI	Advanced Computing & AI	USA (California)	2018-2022	213
PiXiS	Advanced Computing & AI	India (Bangalore)	2017-2023	210

Company	Sub-Sector	Region	Date	Amount (US$M)
leadsquared	Advanced Computing & AI	India (Bangalore)	2019-2022	209
TREDENCE Beyond Possible	Advanced Computing & AI	USA (California)	2020-2022	205
eka ENVIRONMENT CONSCIOUS MOBILITY	Energy & Cleantech	India (Pune)	2023-2025	204
atlan	Advanced Computing & AI	USA (California)	2019-2024	203
QBurst	Advanced Computing & AI	USA (Virginia)	2025	200
EULER Sustainable. Electric. Future.	Energy & Cleantech	India (Delhi)	2019-2025	198
TESSOLVE	Semiconductor	India (Bangalore)	2021-2025	190

The largest deep tech investments in India have been concentrated in a select group of companies operating at the intersection of scale, capital intensity, and sustained market leadership. The prominence of medtech, energy and cleantech, and advanced computing among the biggest transactions reflects alignment with structural national priorities such as energy security, healthcare resilience, and industrial productivity. These sectors benefit from clearer adoption pathways, as demand is anchored by large institutional buyers including utilities, OEMs, hospitals, and government-linked programs.

Several of the most funded companies have raised capital over extended periods, indicating staged funding aligned with execution milestones, manufacturing build-out, certification readiness, and deployment scale rather than one-time funding events.

The mix of India-headquartered and overseas-headquartered firms highlights varied capital pathways, with globally oriented platforms often accessing deeper international pools. Overall, the distribution reinforces the pattern observed across deep tech, where capital value concentrates in a limited set of execution-heavy companies while a broader base of innovation continues to develop.

Top Advanced Computing & AI Companies*

Company	Amount (US$M)
UNIPHORE	865
fractal	830
innovaccer	651
gupshup	400
Builder.ai	380
netradyne	288
kore.ai	246
OBSERVE.AI	213

** by Size of Funding*

Funding within advanced computing and AI has concentrated in a relatively small group of top-funded companies, reflecting a maturing market that increasingly favours enterprises with demonstrated product–market fit, scalable distribution, and sustained commercial adoption.

The leading recipients of capital are characterised by enterprise-focused business models built around long customer relationships, repeat deployments, and significant investment in product depth and delivery capability. This concentration underscores a shift away from broad-based experimentation towards monetisation strategies anchored in predictable revenue streams and measurable returns on investment for customers.

Late-stage funding has particularly prioritised companies operating in areas such as customer experience automation, advanced financial services, and operational intelligence, where ROI can be clearly substantiated. Several of these companies have accumulated capital over extended periods rather than through isolated large rounds, indicating funding aligned with execution and scale milestones.

The presence of both India-based and overseas-headquartered firms reflects varied go-to-market structures, especially for companies serving global enterprise customers, while reinforcing the broader pattern of value concentration within a limited set of scaled AI businesses as upstream innovation continues to expand.

Top Energy & Cleantech Companies*

Company	Amount (US$M)
TATA ev	1,000
OLA ELECTRIC	903
ATHER	424
MAHINDRA ELECTRIC SUVs	386
INDIA	272
eka ENVIRONMENT CONSCIOUS MOBILITY	204
EULER Sustainable. Electric. Future.	198
GreenCell mobility	174
BatterySmart	174
SEDEMAC	122

** by Size of Funding*

Energy and cleantech have emerged as one of the most capital-intensive deep tech segments in India, supported by a convergence of policy momentum, strong demand pull, and a large addressable market linked to the energy transition. Capital deployment has been concentrated in a relatively small set of companies operating in electric mobility and adjacent infrastructure, reflecting the scale requirements of vehicle manufacturing, battery systems, and supply-chain integration.

Funding activity is increasingly extending beyond EV assembly toward enabling layers such as charging infrastructure, battery management, and energy optimisation, signalling growing investor interest in infrastructure-oriented and system-level solutions.

Several leading companies have raised capital across multiple rounds, indicating phased funding aligned with capacity expansion, localisation, and operational build-out rather than asset-light scaling. The mix of incumbent-linked players and venture-backed entrants highlights the convergence of industrial capabilities and venture capital within the sector.

Overall, the funding pattern reinforces the broader deep tech trend of capital concentrating in execution-heavy businesses with tangible assets and long deployment cycles.

Top Medtech & Healthtech Companies*

Company	Amount (US$M)
Healthium	1,178
Meril	445
APPASAMY ASSOCIATES Empowering Vision*	300
SMT	129
translumina LIMITLESS POSSIBILITIES	121
molbio	120
GOQii	100
ULTRAHUMAN	56
bioradmedisys science for people	55
SIGTUPLE	48

** by Size of Funding*

Medtech and healthtech funding in India has concentrated in a limited set of companies operating across diagnostics, medical devices, healthcare delivery platforms, and preventive health. Investment momentum in the sector has been shaped by affordability imperatives, increasing hospital digitisation, and the adoption of AI-enabled clinical workflows.

The largest fundraises reflect businesses that combine regulatory clearances, clinical validation, and scaled distribution, all of which require sustained capital over extended periods. Several leading companies have progressed through sequential funding rounds aligned with product approvals, manufacturing scale-up, and network expansion rather than rapid digital-only growth.

At the same time, the sector continues to face structural constraints, including long validation cycles, complex regulatory pathways, and slower institutional procurement processes. As a result, funding outcomes increasingly favour companies demonstrating execution maturity alongside technological capability, consistent with broader deep tech investment patterns.

Top Semiconductor Companies*

Company	Amount (US$M)
TESSOLVE A HERO ELECTRONIX VENTURE	190
thinci	80
Qπ AI	39
NETRASEMI Powering Intelligent Edge	14
OPTIMIZED ELECTROTECH	11
MINDGROVE	10
CAVLI wireless	10

** by Size of Funding*

Semiconductor and hardware infrastructure investments in India remain concentrated in a small set of design-led and IP-focused companies, with funding levels materially lower than in other deep tech categories. This reflects the capital intensity, technical risk, and long design cycles inherent in semiconductor development, which constrain the number of venture-scale opportunities.

India's current momentum is increasingly oriented toward fabless and design-first models, including advanced packaging, compound semiconductors such as gallium nitride and silicon carbide, and application-specific integrated circuits for electric vehicles, industrial control systems, and edge AI use cases. Most funded companies operate in specialised analog, mixed-signal, or edge compute niches rather than full-stack manufacturing.

Capital deployment has therefore been selective, favouring differentiated architectures, domain-specific applications, and early customer validation. At the same time, the ecosystem's progression remains linked to the availability of enabling infrastructure, including testing capabilities, packaging depth, and integration with OEM channels, underscoring the early and targeted nature of semiconductor capital deployment in India.

Top Robotics & Autonomous Systems Companies*

Company	Amount (US$M)
GreyOrange	385
Raphe mPhibr	100
HABER	65
MIKO	63
NewSpace Research & Technologies	61
ADDVERB	41
ideaForge	36

∗ *by Size of Funding*

Robotics and industrial automation investments in India have concentrated in a limited set of companies addressing logistics automation, defence use cases, consumer robotics, and industrial applications. Demand for these solutions has been supported by India's shift toward organised retail, export-oriented manufacturing, and supply chain digitisation, which has increased the need for automation designed around India-specific throughput, space, and cost constraints.

Growth in this segment has been driven by deployment-first approaches that prioritise reliability, modularity, and integration with existing infrastructure. Capital has been deployed primarily to improve system robustness, support field deployments, and enable customer-specific customisation rather than rapid horizontal scaling. In consumer robotics, companies such as Miko illustrate export-oriented models where product reliability, localisation, and repeat engagement support global adoption.

Overall, the funding pattern reflects a sector characterised by hardware-linked scaling, fragmented demand, and the need for patient capital to support iterative deployment and optimisation over extended gestation periods.

Top Industry 4.0 & Advanced Manufacturing Companies*

Company	Amount (US$M)
INFINITE UPTIME Production Outcomes. Delivered.	64
stellapps Smart Systems, Stellar Applications.	59
AMNEX	52
INTANGLES VEHICLE PERFORMANCE OPTIMISED	51
facilio	43
ETHEREAL MACHINES	21
UPTIME AI	20

∗ *by Size of Funding*

Industry 4.0 and advanced manufacturing deep tech represent a high-leverage opportunity area in India, with direct relevance to manufacturing productivity, export competitiveness, and cost efficiency at scale. Capital in this segment has been deployed across companies focused on asset performance, factory intelligence, predictive maintenance, quality automation, and AI-driven production optimisation.

The funding profile reflects the hybrid nature of these businesses, which combine software-led analytics with deep integration into physical manufacturing environments. Many companies operate close to the factory floor, where adoption is shaped by reliability, interoperability with legacy systems, and demonstrable efficiency gains rather than rapid user-driven expansion.

Capital has therefore been directed toward implementation depth, customer-specific configuration, and longer enterprise sales cycles typical of industrial buyers.

Overall, the funding pattern underscores the role of industrial software and automation as foundational enablers of India's evolving manufacturing strategy, with value creation closely tied to operational outcomes and sustained enterprise adoption.

Top Cybersecurity Companies*

druva	$408 million
SAFE	$165 million
SECLORE	$41 million
SPRINTO	$32 million
CloudSEK	$32 million
IoTium	$22 million
Scrut Automation	$20 million
TOOKITAKI	$19 million

** by Size of Funding*

Cybersecurity investment in India has concentrated in a small set of companies addressing data protection, compliance automation, identity security, and cloud-native risk management, reflecting the enterprise-driven nature of adoption where purchasing decisions are closely tied to regulatory exposure, audit requirements, and mission-critical risk mitigation.

The ecosystem has matured alongside rising enterprise cloud adoption, sector-specific compliance mandates, and increased exposure to nation-state, supply-chain, and operational threats. Capital deployment increasingly favours platform-grade and continuous risk monitoring capabilities over standalone point solutions, spanning threat intelligence, data security, and automated compliance.

The largest fundraises, including companies such as Druva and SAFE Security, illustrate cybersecurity's evolution from an IT control function to a board-level risk management layer integrated into enterprise architecture and insurance frameworks.

Mid-sized firms such as Seclore, CloudSEK, and Sprinto reflect growing demand for sector-and use-case-specific solutions, while platforms like Scrut Automation, Tookitaki, and IoTium demonstrate the extension of cybersecurity into financial systems, industrial environments, and critical infrastructure.

Overall, funding patterns align with a sector where trust, regulatory readiness, interoperability, and sustained enterprise relationships underpin the ability to attract larger and more durable capital commitments.

Top Space & Aerospace Technology Companies*

Company	Amount (US$M)
pixxel	108
SKYROOT AEROSPACE	99
DIGANTARA	65
AGNIKUL	56
CoreEL Technologies Enabling Excellence	46
RANGSONS AEROSPACE	38
SASMOS	37
SANLAYAN	34
unimech	30
SATSURE	27

* *by Size of Funding*

Spacetech and aerospace investment in India is increasingly oriented toward a commercially viable ecosystem, moving beyond a purely state-led exploration model toward applications aligned with defence, satellite services, and specialised aerospace manufacturing.

Capital has been directed to a focused set of companies operating across earth observation, launch systems, space situational awareness, and precision subsystems, reflecting the high technical complexity and long development timelines inherent in the sector.

Funding deployment has been incremental and milestone-driven, supporting engineering depth, testing infrastructure, certification readiness, and early customer programs rather than rapid commercial scale.

Several ventures are increasingly focused on propulsion, avionics, advanced sensors, materials, and mission-ready subsystems, where competitiveness is tied to manufacturing precision and regulatory compliance.

Close engagement with government agencies, defence organisations, and strategic partners continues to shape commercial pathways, underscoring the importance of procurement integration, system reliability, and certification maturity in translating technical capability into sustained adoption.

Top Climate Resilience & Environment Technology Companies*

Company	Amount (US$M)
AiDASH	92
blueplanet.	66
MWM MEMBRANE GROUP	50
Cropin	48
varaha Disrupting Carbon Footprint	42
AGNEXT Quality Food For Billions	33
Fasal	23
accacia	9
rite water	8
fyllo	6

∗ *by Size of Funding*

Climate and environmental technology investment in India has gained momentum as the economy faces heightened exposure to energy volatility, water stress, and climate-linked disruptions with direct implications for industrial continuity and export competitiveness.

Capital has increasingly flowed toward solutions with clear industrial relevance, spanning water management, agriculture resilience, waste processing, clean materials, and energy-efficient systems, rather than being driven primarily by ESG positioning.

The funding distribution reflects the project-linked nature of many climate ventures, where revenue realisation depends on on-ground deployment, regulatory approvals, and long-term contracts rather than rapid product scaling.

As a result, capital deployment has been selective and incremental, supporting pilots, infrastructure build-out, and validation across varied operating conditions. Within this context, the next wave of investable climate ventures is increasingly oriented toward models that integrate advanced AI, sector-specific hardware, and deployment-grade infrastructure, moving beyond analytical software toward solutions that deliver measurable carbon efficiency and operational resilience.

Top Biotech & Life Sciences Companies*

Company	Amount (US$M)
ADVANTA	350
Biocon Biologics	331
twin health	184
MEDGENOME	162
CONCORD BIOTECH Biotech for Mankind...	71
Plasmagen BIOSCIENCES	69
	67
SEEDWORKS	60
ENZENE Biosciences Ltd.	50
the Landorum	43

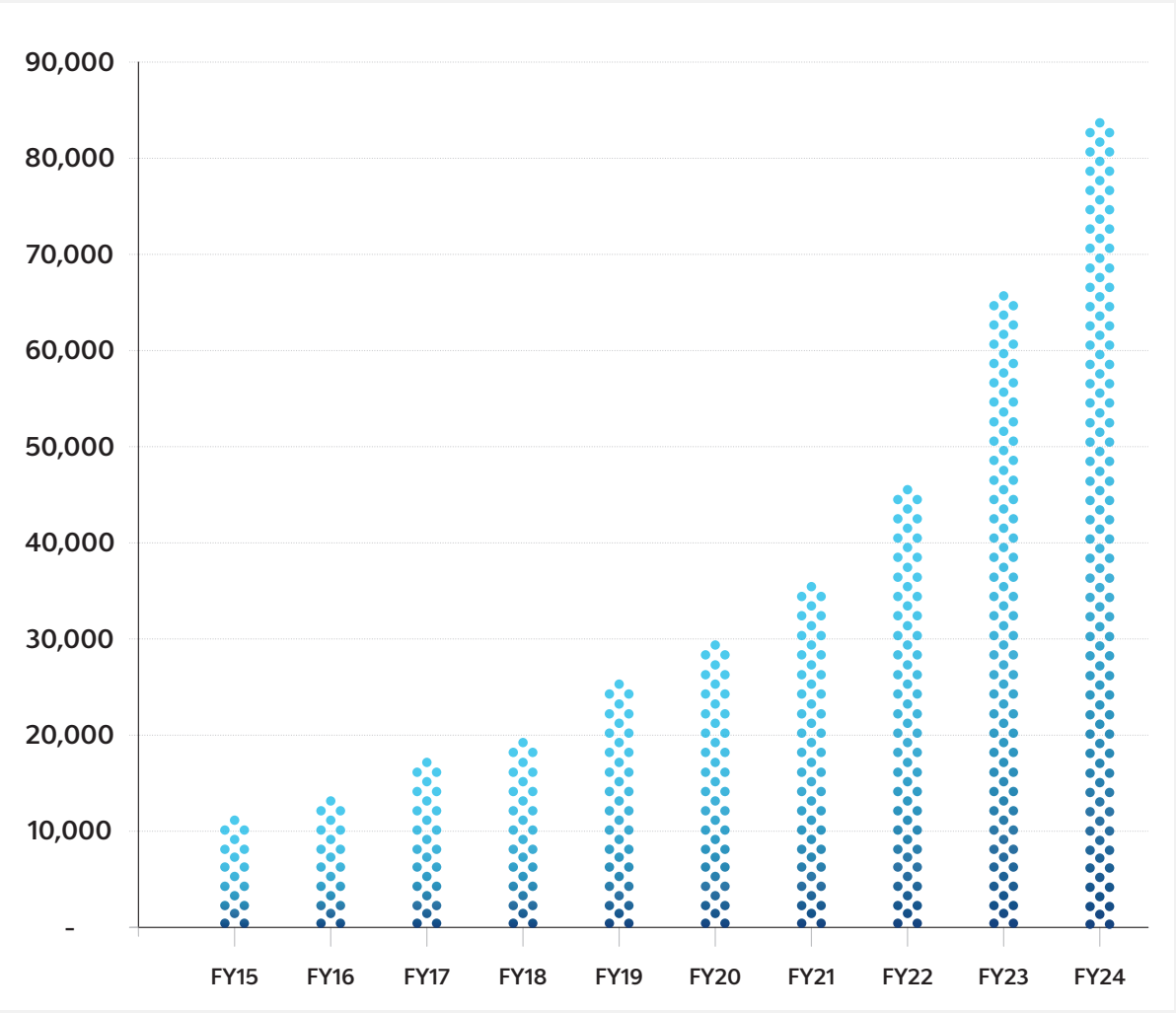
* *by Size of Funding*

Biotech and life sciences investments in India have concentrated in companies spanning seeds and agri-biotech, biologics, genomics, and clinical-stage platforms. The funding pattern reflects the science-led nature of the sector, where capital deployment is closely linked to laboratory validation, clinical development, and regulatory progression.

Larger fundraises have accrued to companies with established research pipelines, manufacturing capabilities, or global commercial linkages. Several firms have built scale through sustained R&D investment over extended time horizons rather than rapid market expansion.

Overall, the distribution highlights a segment where capital intensity is shaped by scientific depth, regulatory rigor, and the ability to translate research into repeatable and scalable outcomes.

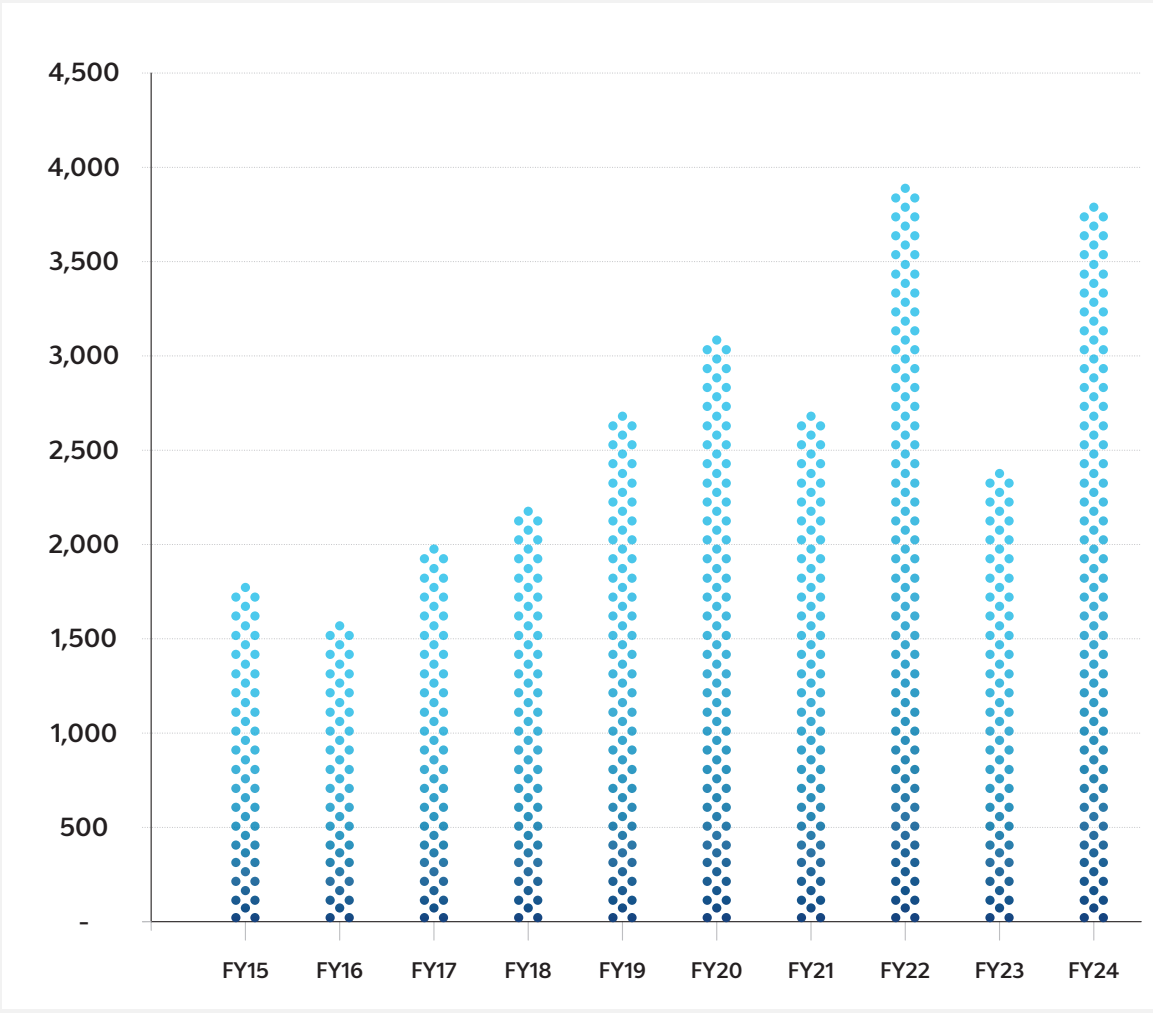
Revenue Growth of Deep Tech Companies*



Steady Growth in Year-on-Year Revenue Performance

* *Aggregate Revenue in INR Cr*

EBITDA Growth of Deep Tech Companies*



Profitable Growth Despite Heavy R&D Investments 34

* *Aggregate EBITDA in INR Cr*

India's deep tech sector has demonstrated sustained commercial maturation over the past decade, with aggregate revenues increasing nearly eightfold between FY15 and FY24, reflecting the scaling of deployable sub-sectors such as industrial technologies, MedTech, AI-led enterprise platforms, and energy systems.

Importantly, this revenue expansion has been accompanied by a concurrent improvement in aggregate EBITDA, indicating the emergence of operating leverage even as companies continue to invest in R&D, certification, testing, and productisation. The EBITDA trajectory highlights improving cost absorption as firms move from development-intensive phases toward repeatable deployment across enterprise, institutional, and infrastructure-linked customers.

Periodic moderation in profitability aligns with the capital-intensive and milestone-driven nature of deep tech businesses rather than cyclical weakness, particularly in hardware- and regulation-linked segments.

Overall, the data reflects a structural shift from pilot- or grant-led innovation toward commercially viable, revenue-generating deep tech platforms where execution discipline, regulatory readiness, and distribution depth increasingly underpin financial performance.

Fastest Growing Deep Tech Companies (By Revenue)

Company	Sub-Sector	FY24 (INR Cr)	FY23 (INR Cr)	YoY Growth%
TI Clean Mobility	Energy & Cleantech	181	4	4645%
TATA ev	Energy & Cleantech	10,355	276	3652%
Chakr Innovation	Energy & Cleantech	125	23	450%
Tonbo imaging	Electronics, Photonics & Sensing	432	99	337%
ULTRAHUMAN	Medtech & Healthtech	103	24	322%
EULER Sustainable. Electric. Future.	Energy & Cleantech	178	52	243%
BatterySmart	Energy & Cleantech	218	68	221%
gpa renewables	Energy & Cleantech	473	154	208%
Loom Solar	Energy & Cleantech	152	54	181%
qure.ai	Advanced Computing & AI	155	65	137%
molbio	Medtech & Healthtech	763	335	128%

** Revenue cut off used: INR 100 Cr*

Fastest Growing Deep Tech Companies (By EBITDA)

Company	Sub-Sector	FY24 (INR Cr)	FY23 (INR Cr)	YoY Growth%
TONBO imaging	Electronics, Photonics & Sensing	115	12	876%
bidgely	Advanced Computing & AI	79	8	855%
JUPITER	Energy & Cleantech	120	22	449%
ACCURATE GROUP	Robotics & Autonomous Systems	87	19	356%
molbio	Medtech & Healthtech	210	48	336%
advanced enzymes	Biotech & Life Sciences	164	85	94%
Genus energizing lives	Electronics, Photonics & Sensing	181	97	87%
fractal	Advanced Computing & AI	129	71	82%
bioradmedisys	Medtech & Healthtech	109	61	78%
FLASH	Electronics, Photonics & Sensing	193	109	76%
tynor	Medtech & Healthtech	129	75	72%

**EBITDA cut off used: INR 79 Cr*

Most Profitable Deep Tech Cos*

Company	FY25 PAT (INR Cr)
AMARA RAJA Gotta be a better way	964
Biocon Biologics	831
CONCORD BIOTECH Biotech for Mankind...	373
POLYMED	331
newgen	293
Genus energizing lives	293
mahindra LAST MILE MOBILITY	247
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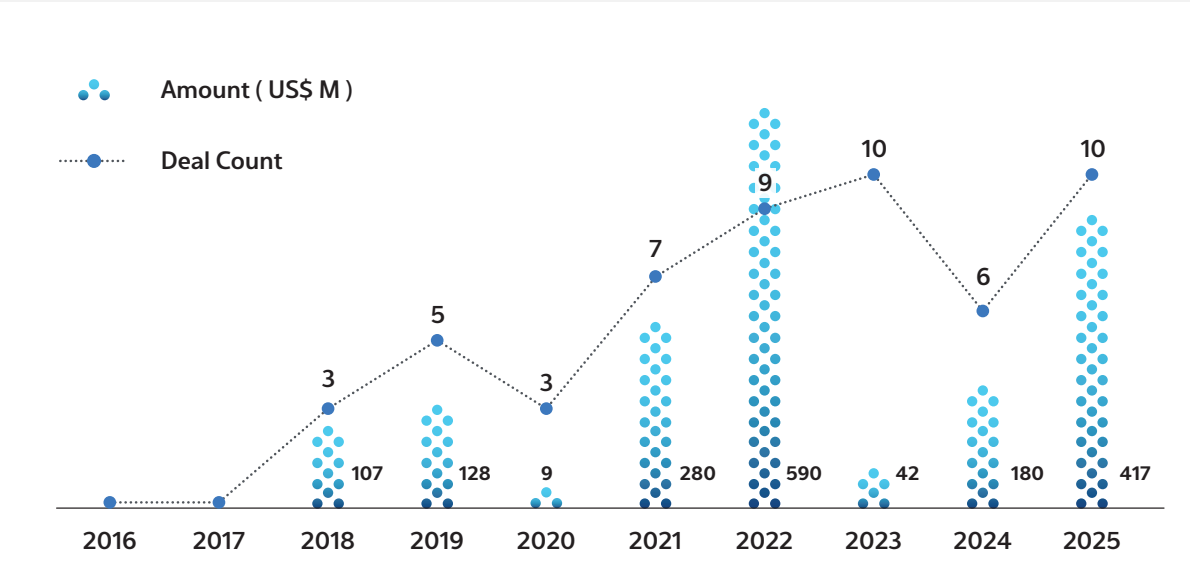
fractal	132
APPASAMY ASSOCIATES Empowering Vision®	130
JUPITER TOWARDS A GREEN FUTURE	126

**PE-VC backed companies, including private and public*

AI Exits



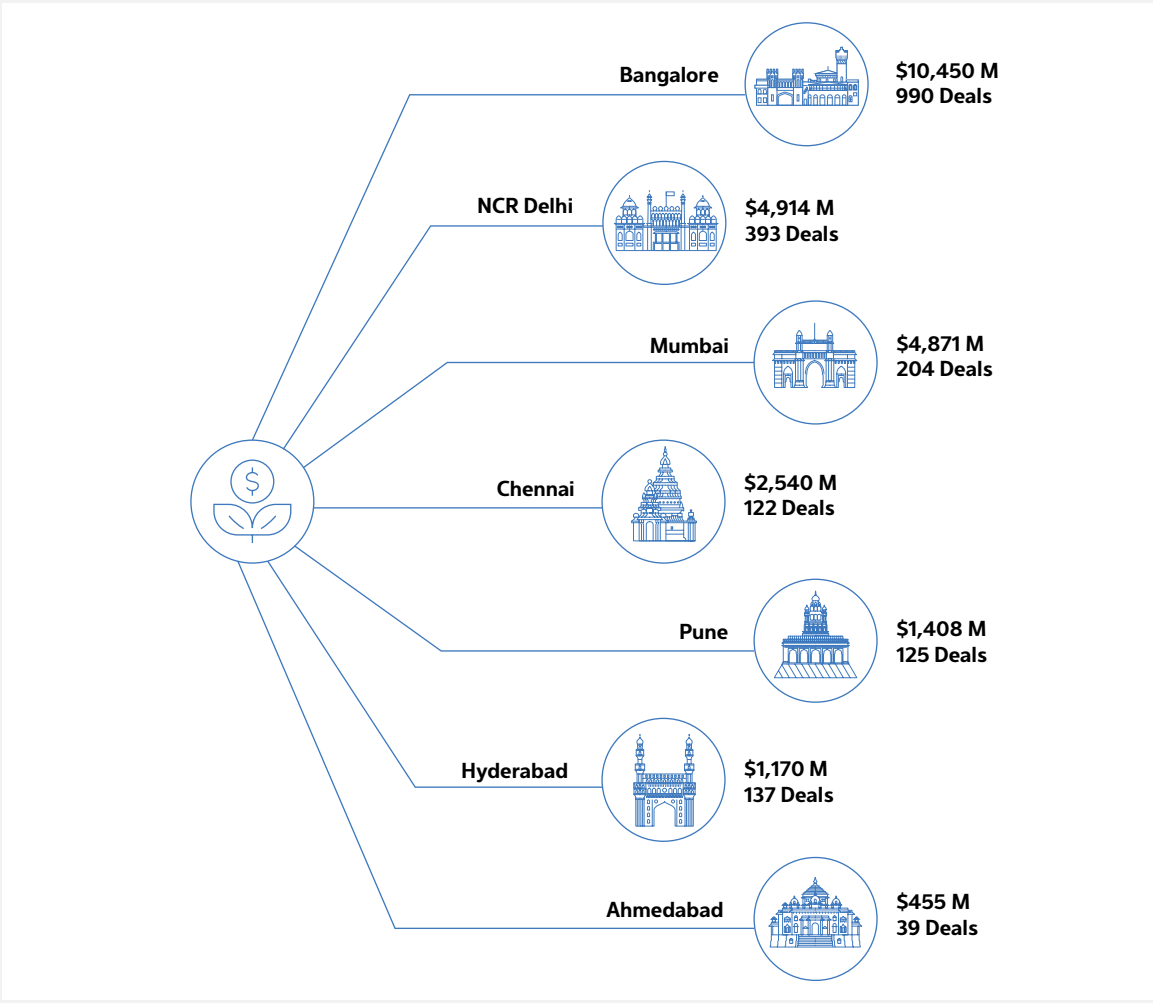
Top AI Exits

Company	Exit Date	Exit Amount (US$M)	Exiting Investors
fractal	2019-2025	557	Apax Partners, Khazanah Nasional, TA Associates
indegene	2021	531	Carlyle, Brighton Park Capital, Nadathur Holdings
ACQUEON	2022	100	Everstone, Solmark
Netcore UNBXD	2022	82	Eight Roads Ventures, Chiratae Ventures, Nirvana Ventures, Pratithi Investments, Athera Venture Partners
newgen	2018	52	Chiratae Ventures, Sapphire Ventures, Ascent Capital
ACTIVE.Ai	2022	30	Kalaari Capital, Chiratae Ventures, Vertex, Dream Incubator, Innocells
ABSENTIA	2022-2023	28	Exfinity Fund, Chiratae Ventures, Pi Ventures

Top Deep Tech Exits

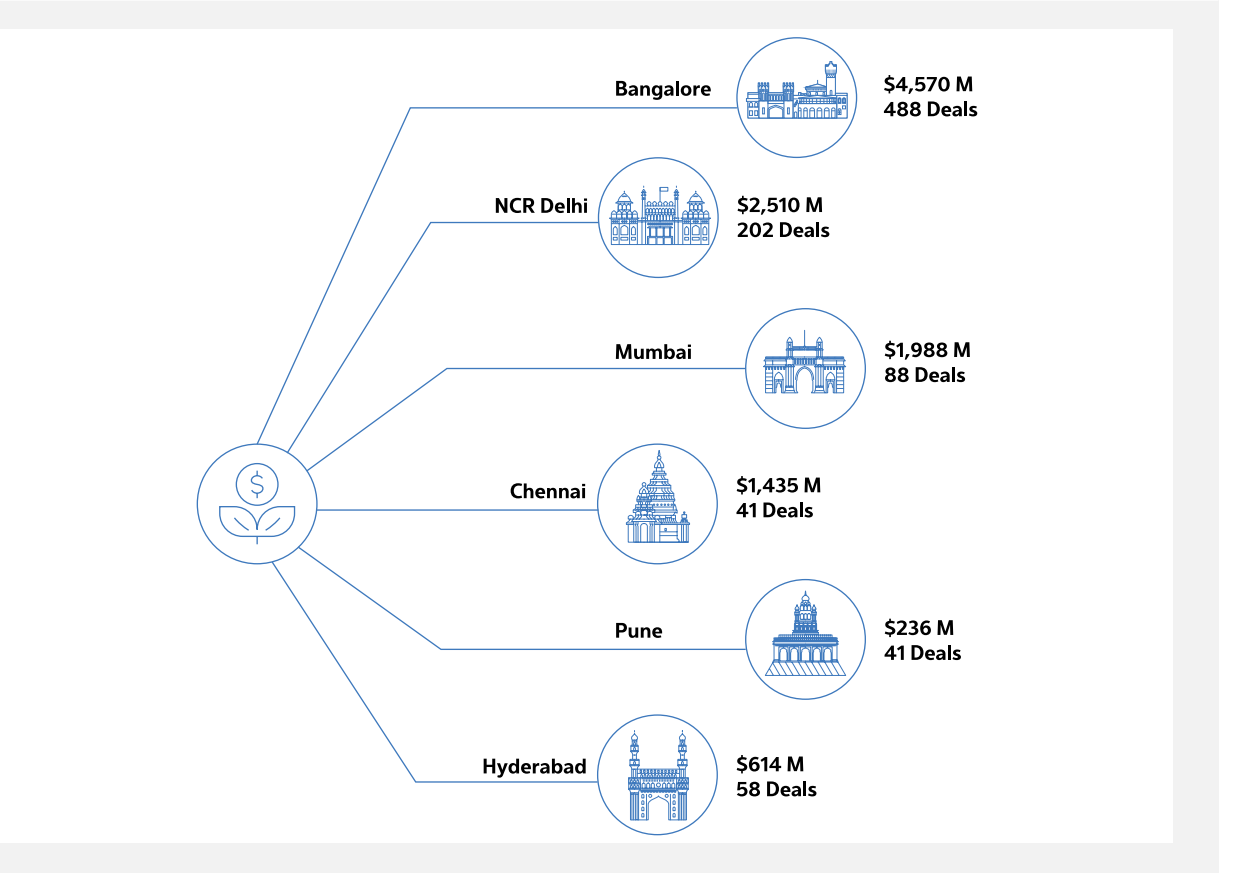
Company	Sub-Sector	Exit Date	Exit Amount (US$M)
Healthium	Medtech & Healthtech	2017-2024	1,151
fractal	Advanced Computing & AI	2019-2025	557
indegene	Advanced Computing & AI	2021-2025	531
Premier Energies	Energy & Cleantech	2024-2025	513
ATHER	Energy & Cleantech	2025	231
CONCORD BIOTECH Biotech for Mankind...	Biotech & Life Sciences	2016	212
DATA PATTERNS	Electronics, Photonics & Sensing	2024	133
MTAR®	Space & Aerospace Technology	2017-2022	124
OLA ELECTRIC	Energy & Cleantech	2024-2025	118
SEDEMAC	Energy & Cleantech	2017-2025	116
Netcore UNBXD	Advanced Computing & AI	2022	82

Deep Tech Investments - By City*



From 2016 to 2025

AI Investments - By City*



From 2016 to 2025

India's AI and deep tech investment landscape has evolved into a multi-city ecosystem over the past decade, reflecting both geographic diversification and sectoral specialization, even as Bengaluru continues to anchor national activity. Bengaluru leads decisively across both categories, with $10 billion-plus in deep tech investments across 990+ transactions and over $4 billion in AI funding across 480+ deals between 2016 and 2025, supported by a dense concentration of technical talent, R&D institutions, startup accelerators, and early enterprise adoption. NCR Delhi and Mumbai have emerged as strong secondary hubs, with NCR Delhi attracting nearly $5 billion in deep tech capital across 390+ deals and over $2.5 billion in AI funding across 200+ transactions, underpinned by policy-linked research and applied innovation, while Mumbai's deep tech activity is driven by enterprise software, financial automation, and compliance-led AI adoption aligned with large institutional buyers. Beyond these core hubs, Chennai, Pune, Hyderabad, and Ahmedabad have recorded sustained investment momentum, typically anchored in sector-specific strengths such as manufacturing and semiconductors in Chennai, healthcare and space technologies in Hyderabad, and industrial engineering systems in Pune. Overall, the distribution highlights a structural transition in India's innovation ecosystem, where AI and deep tech investment is increasingly organised around city-level clusters aligned with regional talent, industry linkages, and institutional capital rather than concentrated within a single geography.

Most Active Deep Tech Investors*

360 ONE	IAN Fund
3one4 Capital	Ideaspring Capital
Accel India	Info Edge
Anicut Capital	Kalaari Capital
Athera Venture Partners	Lightspeed Ventures
Avaana Capital	Nexus Venture Partners
Axilor Ventures	Peak XV Partners
Blume Ventures	Pi Ventures
Celesta Capital	Rainmatter Capital
Chiratae Ventures	Shastra VC
DeVC India	Speciale Invest
Elevation Capital	Tenacity Ventures
Endiya Partners	Unicorn India Ventures
Exfinity Fund	YourNest
Growx Ventures	Z47

**From 2016 to 2025*

Deep tech investing in India has been anchored by a cohort of venture platforms that have demonstrated sustained participation across technology-intensive sectors over multiple investment cycles. The investors mentioned have been consistently active across SpaceTech, Robotics, Industrial and Manufacturing technologies, Data and infrastructure, IoT, Quantum, and applied AI/ML, reflecting the breadth of deep tech opportunity areas currently being funded.

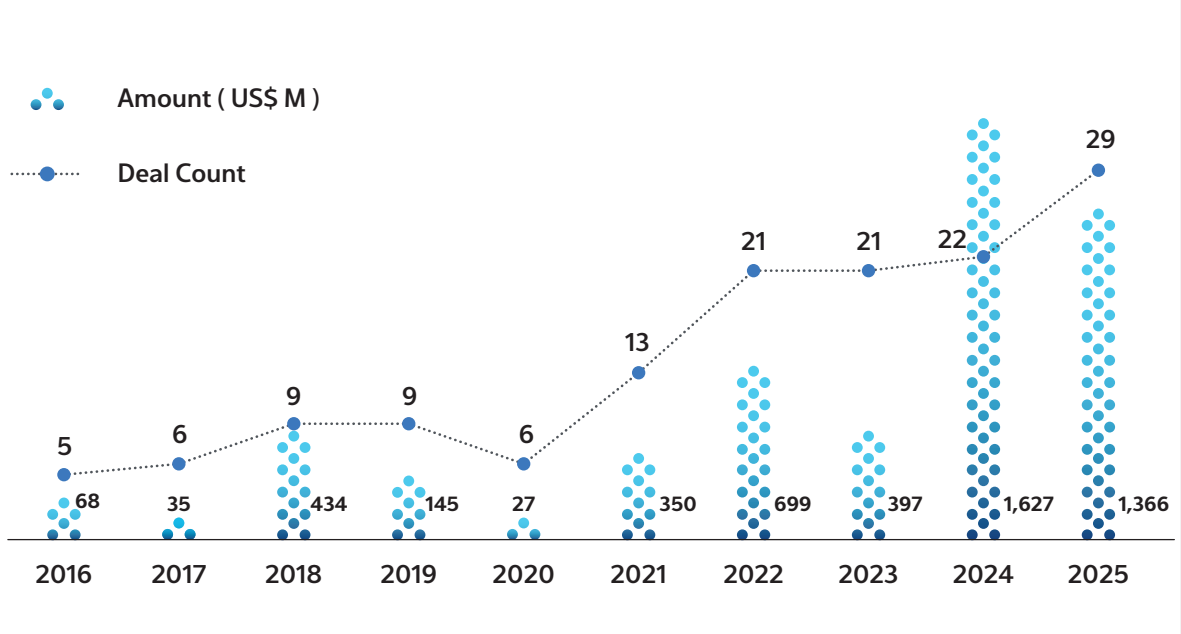
The mix of generalist investors with strong operating networks and specialist deep tech funds highlights the ecosystem's growing institutional maturity, where familiarity with regulatory pathways, commercialisation requirements, and longer development timelines is increasingly essential.

Overall, this pattern of activity underscores a capital base aligned with the structural realities of deep tech, supporting companies through deployment, scale-up, and market adoption rather than purely early-stage experimentation.

Section B – Thought Leaders' Forum

Deep Tech Exits in India

By Chiratae Ventures*

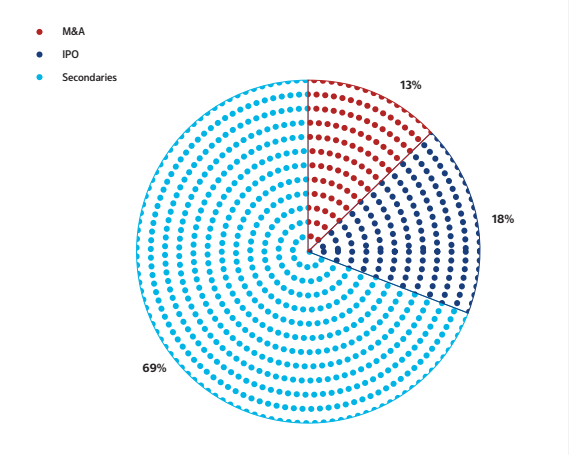


India's deep tech exit ecosystem remains at an early stage of maturity, but the direction of travel is becoming clearer. At Chiratae, we are among India's most active technology investors, having deployed over 1 billion dollars across technology and technology led businesses, including over 300 million dollars across more than 60 deep tech companies. Over this period, the platform has returned more than 1 billion dollars to investors and delivered 18 M&A, roughly one per year, with a meaningful share of liquidity historically realised through secondary led exits. This pattern reflects the structural realities of India's private markets over the last decade, where merger and acquisition exits have historically been limited and liquidity has often required deliberate and early secondary transactions.

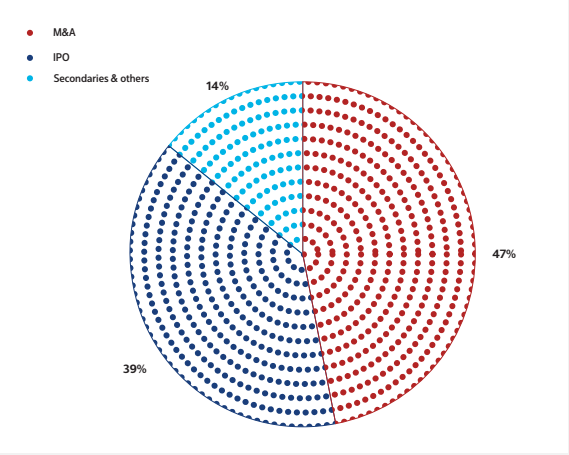
As deep tech investments scale, the mix of exit pathways is expected to evolve, with M&A naturally accounting for a larger share over time as has happened in the United States. In India, however, the depth of the M&A market has historically been limited and exit outcomes have therefore tended to rely on alternative liquidity mechanisms. Sample representative fund's exit profile offers a useful lens into this broader market reality.

Sudhir Sethi, Founder and Chairman & Divyam Dewan, Chairman's office: Strategic initiatives.

Exit mode for Representative Indian VC Fund



Exit mode for US VC backed companies in 2025



∗In absence of recent, accurate exit data, we have taken a sample representative profile of a large Venture fund

For the selected sample representative fund in India, the exit profile consists of approximately only 13% through mergers and acquisitions, 18% through IPOs and 69% of exits through secondary transactions. This distribution reflects an ecosystem where liquidity has often been created through structured solutions rather than consistent strategic acquisition demand.

In contrast, in the United States, 47% of the overall venture exits are driven by mergers and acquisitions, followed by 39% through IPOs, and 14% through Secondaries highlighting the role of a deeper and more active corporate buyer environment. The comparison underscores a structural gap in India's exit landscape rather than any limitation in the quality or ambition of Indian venture-backed companies.

Looking ahead, exits in India over the coming years for deep tech are likely to be driven by a combination with share of mergers and acquisitions rising. Secondary liquidity is expected to remain important as portfolios mature, while IPOs will naturally be relevant for a smaller subset of companies that reach sufficient scale and market readiness. In deep tech, value creation is often higher in the near term, as technology, intellectual property (Patents), and strategic relevance can become valuable well before companies are ready for public markets. This makes mergers and acquisitions a critical pathway for value realisation. For this value to be unlocked meaningfully within India, strategic M&A activity must expand, supported by greater participation from Indian corporates and a stronger base of domestic technology acquirers. At the same time, for highly differentiated deep tech companies, global investors and acquirers are often best positioned to fully value frontier technology originating from India. Broadening participation from both Indian and global buyers will be essential to deepening India's M&A market, increasing exit velocity, and enabling sustained capital recycling across the Indian venture ecosystem for deep tech.

From Foundation to Flywheels: Designing the Last Mile of AI Regulation for Market Creation, Not Market Control

By Nishith Desai Associates*

This article examines how India can catalyse the creation of AI-driven markets in critical sectors by designing the final stage of its regulatory architecture (the "regulatory flywheel"), building upon the institutional and policy foundations already in place. Our analysis focuses on the intersection of technological trajectories, the evolving legal landscape, and policy design. We examine two sectors healthcare and agriculture to demonstrate how targeted regulatory clarity can enable the emergence of scalable AI-driven markets in each.

For each sector, we identify the overarching policy objectives, assess how prevailing AI trends could materially advance these objectives if enabling markets are established, and analyse the relevant legal domains that intersect with such market formation. We evaluate how existing regulatory interventions provide a foundational layer for market development, draw lessons from regulatory experiments globally, and articulate the remaining "last-mile" regulatory design choices necessary to operationalise the regulatory flywheel in India.

Given the inherently transdisciplinary nature of this inquiry, the article prioritises breadth across technology, law, and policy over exhaustive depth within any single domain.

AI in Healthcare

Policy Objectives and Technology Opportunities

A healthy and productive population is foundational to national prosperity. Globally, healthcare policy is typically oriented around three overarching objectives:

- expanding access to healthcare services,
- improving affordability, and
- strengthening healthcare systems while safeguarding populations from potential harms.

**Dr. Chintan Vaishnav, Futurist and Techno-Policy Strategist.*

Improving healthcare outcomes has long been a policy priority for the Government of India. A particularly acute structural challenge lies in ensuring equitable access to quality healthcare in rural and underserved regions, compounded by persistent shortages of trained healthcare professionals. AI presents a meaningful opportunity to address these constraints by augmenting capacity, improving diagnostic accuracy, and optimising system-wide resource allocation.

Several AI-driven technological trajectories are especially well-suited for systematic integration into the Indian healthcare ecosystem in furtherance of these policy objectives:

- AI-augmented telemedicine to expand access and extend specialist expertise into remote geographies
- Personalised and precision medicine, particularly in tertiary care and rare disease management
- AI-enabled optimisation of healthcare infrastructure and workforce allocation
- Population-scale predictive analytics to inform public health strategy and evidence-based policymaking

Strategic deployment of these capabilities would not only advance domestic healthcare objectives but also position India to capture a meaningful share of the rapidly expanding global AI-in-healthcare market. Industry analyses project significant growth over the coming decade, driven by accelerating adoption of AI across diagnostics, clinical decision support, personalised medicine, and operational management. According to various reports, the market is projected to grow from approximately $39.34 billion in 2025 to over $1 trillion by 2034, with a compound annual growth rate (CAGR) of around 37-39%. This growth trajectory underscores both the economic and strategic relevance of enabling robust AI-driven healthcare markets through targeted regulatory design.

Unformed AI Markets and Legal Doctrines

The deployment of AI in healthcare intersects with multiple domains of law and regulation. For AI-driven markets to emerge, scale, and sustain, these domains require greater regulatory clarity and institutional coherence

- **AI-Enabled Clinical Decision Support & Autonomous Diagnosis Tools**: Many AI systems that assist in diagnosis, patient risk stratification, or automated decision making have no clear regulatory pathway for approval or deployment in India. India lacks AI-specific clinical regulatory standards for these tools. Regulators have not issued formal guidelines or certification pathways for AI diagnostic tools, leaving developers uncertain about safety requirements and liability.
- **AI Training on Real Clinical Data (Large-Scale Analytics)**: AI models often require vast amounts of clinical data (EHRs, imaging, genetic information). India's current data law framework (Information Technology Act, 2000 and Sensitive Personal Data Rules, 2011) predates modern AI needs and doesn't explicitly clarify consent, secondary use, cross-institutional sharing, or data portability for AI training.
- **AI in Drug Discovery & AI-Driven Therapeutics**: AI is increasingly used for in-silico drug discovery, molecular simulation, target identification, and repurposing. There is no AI-specific drug discovery framework at Central Drugs Standard Control Organization (CDSCO) or elsewhere in India — placing developers in a grey zone regarding pre-clinical validation, model trustworthiness, and approval requirements.

- **Algorithmic Public Health Surveillance**: AI has strong potential to predict outbreaks and model population health trends. Absence of formal regulatory framework for data collection, algorithmic transparency, and public health data governance. Some initiatives like AIIMS-Wadhwani AI show pilot usage, but no clear general policy for wide usage.
- **Telemedicine+AI Integration**: Telemedicine has been permitted since the Telemedicine Practice Guidelines (TPG) of 2020, but AI-enhanced telehealth platforms face uncertainty. Lack of clarity on legal status of AI recommendations in remote diagnosis, limits liability and reimbursement clarity

Opening these Market Interacts with Several Legal Doctrines

- **Liability & Accountability in Harmful Outcomes**: There are no bright-line rules for assigning who is accountable provider, developer, data custodian in case an AI misdiagnosis or harm occurs.
- **Absence of AI-Specific Regulatory Standards**: India does not yet have a dedicated AI healthcare regulation framework. This leaves developers and clinicians unable to confidently deploy higher-risk solutions.
- **Data Protection and Consent Ambiguities**: Current data legal frameworks do not explicitly treat health data as a special class of sensitive data for AI, secondary use of patient data, algorithmic processing consent requirements. There is no explicit pathway for AI model access to health records under modern data laws.
- **Lack of Certification Pathways**: India has no dedicated approval process for AI models intended for clinical use.

These regulatory gaps are not unrecognised. Beginning with early strategic articulations such as NITI Aayog's #AIforAll reports, and continuing through a series of digital health and data governance initiatives, the Government of India has signalled sustained engagement with AI policy questions. Collectively, these initiatives form an emerging regulatory foundation capable of supporting the next phase of AI integration in healthcare provided that the remaining "last-mile" regulatory design challenges are systematically addressed.

Regulatory Foundation for AI in Healthcare

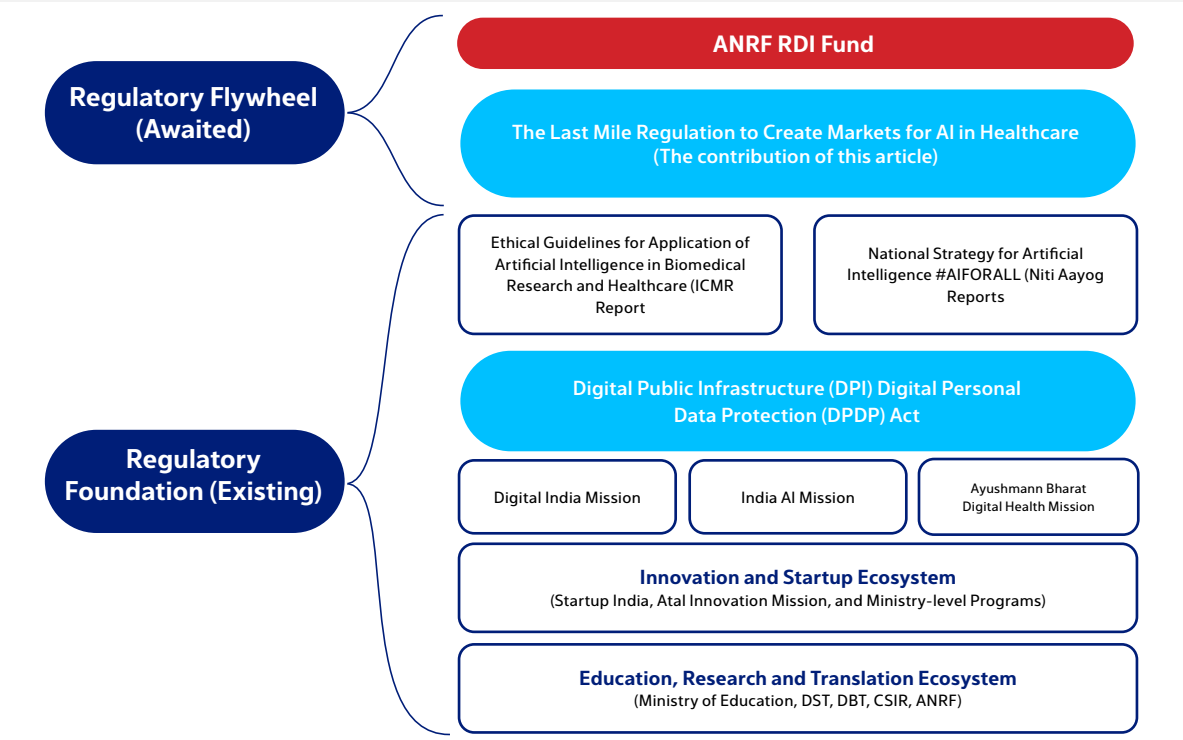


Figure 1. Foundation Enabling the Regulatory Flywheel for AI in Healthcare

Regulatory Foundation

Before articulating the design of the regulatory flywheel, it is necessary to examine the institutional and policy foundations India has built over time. These layers spanning education, research, innovation, digital infrastructure, and sector-specific governance collectively position India to enable AI-driven healthcare markets.

Education, Research, and Translational Capacity

At the base of this foundation lies a century-long investment in education, scientific research, and translational ecosystems. India today has approximately 210,000 schools and more than 1,300 higher educational institutions. School enrolment rates exceed 99% at the primary level, and roughly 28% of the relevant age cohort participates in higher education.

Institutionally, agencies such as the Department of Science and Technology (DST), the Department of Biotechnology (DBT), and the Council of Scientific and Industrial Research (CSIR) laboratories have played a central role in supporting fundamental research and translational science. In 2025, the establishment of the Anusandhan National Research Foundation (ANRF) further consolidated support for deep technology research and commercial translation. Together, these investments underpin the human capital and scientific base required for AI innovation in healthcare.

Innovation and Entrepreneurship Ecosystem

Layered atop this educational foundation is a rapidly expanding innovation and entrepreneurship ecosystem. India is currently the world's third-largest startup ecosystem, with over 200,000 startups, including more than 100 unicorns. The startup movement has extended across more than 15 central ministries and all states and union territories, reflecting broad-based institutional engagement.

The Atal Innovation Mission under NITI Aayog serves as an umbrella initiative to foster a culture of innovation through experimentation across schools, universities, industry, and community organisations. Complementing all efforts, the Startup India programme provides the policy and regulatory backbone for startup formation, scaling, and capital access. This ecosystem is critical for translating AI research into deployable healthcare solutions.

Horizontal Digital and AI-Enabling Missions

Two national missions provide cross-sectoral infrastructure that is particularly relevant for AI-enabled healthcare markets.

The Digital India Mission, launched in 2015, focuses on expanding digital infrastructure, improving connectivity, digitising government services, and promoting digital literacy. By extending broadband access across rural and urban geographies, it has created the digital backbone necessary for telemedicine, data exchange, and AI-enabled service delivery.

More recently, the IndiaAI Mission, launched in March 2024, aims to establish robust AI computing infrastructure and institutional capacity for AI model development and testing. By strengthening access to compute, datasets, and ecosystem support, the mission directly addresses one of the structural constraints in AI system development.

Cross-Cutting Regulatory Infrastructure: DPI and Data Protection

Overlaying these institutional layers are two cross-domain regulatory pillars: Digital Public Infrastructure (DPI) and modern data protection law.

India's DPI integrates digital identity (Aadhaar), real-time payments (UPI), document exchange systems (DigiLocker), and interoperable data-sharing frameworks. This open and modular digital architecture enables secure authentication, trusted transactions, and scalable service delivery across sectors. For healthcare, DPI lowers transaction costs in identity verification, consent management, payments, and data exchange all critical for AI-driven platforms.

The Digital Personal Data Protection Act, 2023 (DPDP Act) represents India's first comprehensive data protection framework. It establishes principles governing the collection, processing, storage, and transfer of personal data, balancing individual rights with legitimate data use. The Act introduces consent requirements, purpose limitation, and safeguards for children's data. While horizontal in scope, it provides an essential legal baseline for AI systems that rely on personal and health-related data.

Sector-Specific Digital Health Infrastructure: ABDM

Complementing these horizontal initiatives is the Ayushman Bharat Digital Mission (ABDM), launched in September 2021. ABDM aims to build an interoperable national digital health ecosystem through:

- **Integration of healthcare stakeholders** via digital identifiers for patients and providers
- **Standardisation and interoperability** through common data formats and protocols

- **Secure digital health infrastructure** for storage, retrieval, and exchange of health records
- **Patient empowerment** by enabling individuals to access and manage their own health data

ABDM provides detailed technical specifications, APIs, and integration frameworks that allow developers and healthcare institutions to build interoperable systems. User documentation and onboarding processes support adoption at scale. In effect, ABDM creates the structural precondition for lawful and interoperable health data exchange, a prerequisite for AI model training and deployment.

Normative and Ethical Guidance

Two additional streams of policy articulation strengthen the foundation.

First, NITI Aayog's 2018 #AIforAll report provided an early strategic framing of AI's transformative potential across sectors, including healthcare. Subsequent publications on Responsible AI articulated principles for ethical AI design, development, and deployment within the Indian context.

Second, the ICMR Ethical Guidelines for AI in Healthcare provide a sector-specific ethical framework. These guidelines emphasise transparency, accountability, fairness, data privacy, informed consent, and ongoing monitoring of AI systems. While not binding regulation, they establish normative expectations for responsible innovation.

Global Experiments

The integration of AI into healthcare is a global phenomenon. Several jurisdictions have moved beyond high-level policy articulation to establish concrete regulatory pathways that enable the formation and scaling of AI-driven healthcare markets. Three illustrative examples the United States, the United Kingdom, and China demonstrate distinct but instructive approaches to regulatory design.

United States: Risk-Based Regulation and Lifecycle Oversight

The United States has positioned the Food and Drug Administration (FDA) as the central authority regulating AI-enabled medical devices. Over the past decade, the FDA has developed structured guidance for AI and machine learning (ML)–based software, particularly Software as a Medical Device (SaMD).

Key features of the U.S. approach include:

- **Risk-Based Classification:** Regulatory scrutiny is calibrated to the clinical risk posed by the AI system. Higher-risk applications such as autonomous diagnostic tools are subject to more rigorous evidentiary standards.
- **Transparency and Documentation Requirements:** Developers must provide detailed information regarding model development, validation, performance characteristics, and risk mitigation strategies.
- **Total Product Lifecycle (TPLC) Framework:** AI systems are regulated across their lifecycle, including premarket review, post-market surveillance, real-world performance monitoring, and change management protocols for adaptive algorithms.

This structured and predictable regulatory pathway has reduced uncertainty for innovators and investors, catalysing substantial private capital inflows into AI-driven healthcare ventures.

United Kingdom: Institutional Enablement and Real-World Evaluation

The United Kingdom has adopted a coordinated, institution-led approach through the establishment of the NHS AI Lab, which functions as both a technical advisory body and an implementation catalyst.

Core elements of the UK model include:

- **Centralised Guidance for Adoption:** The NHS AI Lab provides tailored support to healthcare organisations integrating AI systems, reducing institutional friction in procurement and deployment.
- **Emphasis on Real-World Validation:** AI technologies are evaluated in live clinical settings prior to widespread adoption, ensuring contextual performance and safety.
- **Ethical and Data Governance Integration:** Regulatory guidance integrates patient safety, data protection, and ethical AI principles into operational frameworks.

The UK model demonstrates how regulatory enablement can be complemented by institutional capacity-building to accelerate responsible market adoption.

China: State-Led Acceleration and Coordinated Deployment

China has pursued a state-led strategy characterised by strong central coordination, substantial public investment, and rapid pilot-based deployment. Healthcare has been identified as a priority sector within national AI strategies.

Salient features of China's approach include:

- **Sector-Wide Integration Mandate:** AI deployment is encouraged across diagnostics, imaging, treatment planning, drug discovery, hospital administration, and predictive analytics.
- **Formal Regulatory Guidance:** Authorities have issued guidelines addressing safety, efficacy, data governance, algorithmic transparency, and bias mitigation.\
- **Structured Roadmaps:** Multi-year national plans outline staged AI integration targets (e.g., 2025, 2030), providing strategic clarity.
- **Pilot-to-Scale Model:** Pilot programs in designated regions test AI applications prior to broader national rollout.
- **Public Trust and Communication:** Government-led outreach efforts aim to build societal acceptance of AI-enabled healthcare technologies.

China's model illustrates how coordinated regulatory direction, infrastructure investment, and pilot experimentation can rapidly accelerate AI market formation.

India's existing initiatives including ABDM, DPI, the DPDP Act, and Responsible AI frameworks provide substantial foundational infrastructure. However, global experience suggests that market creation requires additional, AI-specific regulatory instruments that translate digital readiness into predictable compliance pathways and investable certainty.

The central question, therefore, is how India can design the final elements of its regulatory architecture to create a flywheel converting foundational policy infrastructure into a coherent, risk-calibrated, and innovation-enabling AI healthcare market.

Regulatory Flywheel

The substantial institutional and digital foundation India has established must now be converted into a regulatory flywheel a coordinated set of rules that actively induce market formation. The distinction between a foundation and a flywheel is critical. The foundation provides ingredients for the enabling environment; the flywheel offers a recipe for action.

In the context of healthcare, the regulatory flywheel must stimulate markets across the full value chain medical devices, diagnostics, drug discovery, patient management systems, preventive care, therapeutic interventions, and post-treatment monitoring addressing India's large population and substantial disease burden.

A Regulatory Flywheel must provide clarity to the four stakeholders without whom a market cannot be created:

- Producers of technology solutions (innovators and entrepreneurs, both new and existing)
- Consumers of technology solutions (end users, professionals, and organisations)
- Investors (individuals and institutions)
- Regulators (regional, national, and global)

India's regulatory flywheel must bridge the gap between opportunity and current enablement. It should build upon the existing regulatory foundation, incorporate lessons from global regulatory experiments, and be tailored to India's epidemiological profile, healthcare capacity constraints, and digital public infrastructure.

First, India has already taken a major step forward towards feeding this flywheel. The Research Development and Innovation Fund (RDIF), a flagship initiative under the Department of Science and Technology (DST) is designed to accelerate investment in India's R&D and Innovation ecosystem by supporting private sector enterprises, startups, and industries translating Deep Tech in sunrise and strategic sectors, transforming ideas into globally competitive technologies and products. The scheme was approved on July 1, 2025.

RDIF is a matching fund, where the Government of India will be akin to a Limited Partner (LP) who expects only muted returns in order to incentivise the private investors and ecosystem partners. With a total outlay of ₹1 lakh crore (USD 12 Billion) over six years, this is a serious effort to catalyse the Deep Tech ecosystem including AI. Of course, for RDIF to succeed, the rest of the regulatory flywheel must be put in place.

However, catalytic capital alone cannot generate market scale. For RDIF-backed innovation to translate into widespread deployment, the broader regulatory flywheel must be operational.

Core Components of the Regulatory Flywheel

To operationalise AI-driven healthcare markets, India's regulatory apparatus should incorporate the following elements:

1. *Explicit Policy Embrace and Public Awareness*

   India should formally articulate AI as an integral component of national healthcare strategy. Clear policy signalling reduces uncertainty for innovators and investors. In parallel, public awareness initiatives are essential to build trust, address fears regarding automation and data misuse, and encourage cooperative adoption.

2. *Measurable National Goals and Impact Tracking*

   India should define explicit, time-bound goals for AI-enabled healthcare access aligned with 2035 milestones and the 2047 Viksit Bharat vision. These goals should be disaggregated across primary, secondary, and tertiary care.

   Complementing goal-setting must be a mandatory monitoring framework that tracks:

   - Adoption rates of AI-enabled tools
   - Improvements in access to care
   - Reductions in practitioner shortages or diagnostic delays
   - Measurable health outcome improvements

   Without metrics, policy ambition cannot translate into accountability.

3. *Risk-Based Safety and Effectiveness Framework*

   India already has a robust regime for approving new drugs, devices, and processes for healthcare. To help startups, it also has a Medtech Mitra to facilitate the last mile market access. Building upon these, India must publish a clear framework for,

   - How it will evaluate the use of AI and ML technologies in developing drugs and medical devices is both safe and effective
   - How can innovators prepare for regulatory submissions and certification. This involves rigorous testing and validation processes to confirm that these technologies perform as intended without causing harm to patients.

   Given its disease burden, India must design a framework that is risk based, where the level of scrutiny is proportional to the potential risk posed by the AI technology.

4. *Transparency of Data and Model Usage*

   India must require that the development and functioning of AI and ML models is transparent to regulators, healthcare practitioners, and patients. This includes clear documentation of the algorithms used, the data sets they are trained on, and the decision-making processes they employ.

   Leveraging DPI and the DPDP Act, India can design consent-based and interoperable frameworks for responsible health data access. A structured pathway for anonymised or consent-driven secondary data use would enable innovation while preserving patient rights.

5. *Integration Oversight and Adaptive Governance*

   Given the rapid evolution of AI technologies, India should establish dynamic regulatory guidance for safe system integration. This includes mechanisms for rapid corrective action, periodic review of approved systems, and adaptive regulatory updates to accommodate technological improvements without stifling innovation.

6. *Workforce Training and Talent Development*

   Regulatory enablement must be accompanied by human capacity development. Structured training programmes should equip healthcare professionals - from specialists to ASHA workers - with the knowledge to safely deploy and supervise AI-enabled systems. This includes both clinical applications and administrative optimisation tools.

7. *Regulatory Sandboxes and Pilot Environments*

   India should institutionalise regulatory sandboxes for AI in healthcare. These controlled, real-world testing environments would allow innovators to validate technologies under regulatory supervision prior to nationwide deployment. Sandboxes can be integrated with existing incubators, accelerators, and public health institutions to facilitate pilot-to-scale transitions.

8. *Standardisation, International Collaboration, and Strategic Leadership*

   India should articulate an ambition to shape global standards for AI in healthcare, particularly for use cases relevant to emerging and developing economies. Given the alignment between India's healthcare challenges and those of the Global South — and given India's progress in digital public infrastructure — there is an opportunity for normative and technical leadership.

   By participating in international standard-setting bodies and forging strategic collaborations, India can both influence global governance norms and expand export markets for domestically developed AI healthcare solutions.

Completing the Flywheel

The regulatory flywheel is complete only when capital (RDIF), infrastructure (DPI and ABDM), legal certainty (AI-specific regulation), institutional capacity (training and sandboxes), and measurable public goals operate in coordination. When these elements reinforce one another, they create self-sustaining momentum: innovation attracts capital; capital accelerates deployment; deployment generates data; data improves models; improved models expand adoption.

India has constructed a substantial regulatory foundation. The task now is to design the final, action-inducing mechanisms that convert readiness into scaled market creation for AI in healthcare.

AI in Agriculture

Policy Objectives and Technology Opportunities

Food, feed and fuel security is fundamental to the progress of any nation. In India, with over 40% population working in Agriculture, this sector is most critical. Agriculture policy in India tries to achieve the following overarching objectives:

- Enhancing Agricultural Productivity and Resilience
- Availability and Transitions of Livelihood
- Environmental Sustainability and Protection

While productivity and sustainability are global policy concerns for the agriculture sector, the livelihood considerations are unique to India.

AI technologies can significantly enhance the performance of the agriculture sector. In particular, the following trends are ripe for systematic adoption in the Indian agriculture system to advance the above policy objectives:

- AI-driven discovery of improved agricultural inputs (seeds, fertilisers, pesticides, etc.)
- AI-augmented tools for farm management (soil nutrient management, farm management, precision farming)
- AI-augmented management of agriculture output (supply chain management)
- Population-scale predictive analytics for policy decisions (Livelihood transitions, environmental impact, national food portfolio)

The global market for AI in agriculture is still relatively young but growing very rapidly. As of the mid-2020s, the market is estimated at around USD 2–3 billion, depending on how broadly AI-enabled hardware, software, and services are defined. Despite this modest base, most industry forecasts project strong expansion over the next decade, with market size estimates ranging from USD 13 billion to over USD 50 billion by the mid-2030s. What is consistent across studies is the high double-digit growth rate, typically between 18% and 26% CAGR, reflecting accelerating adoption of AI tools across farming systems globally.

Growth is being driven by the increasing use of precision agriculture technologies, which currently account for the largest share of market value. These include AI-powered crop and soil monitoring, yield prediction, pest and disease detection, and variable-rate input application. Software, data analytics, and AI platforms form a significant portion of the market, often exceeding hardware in value, as farms increasingly rely on predictive insights rather than standalone equipment. AI is also gaining traction in livestock monitoring, farm robotics, drone analytics, and supply-chain optimisation, expanding its footprint beyond field-level operations into the broader agri-food system.

From a regional perspective, North America currently leads in adoption due to high farm mechanisation and early technology uptake. However, Asia-Pacific is the fastest-growing region, propelled by large agricultural economies such as China and India, where governments are investing heavily in digital agriculture, smart farming infrastructure, and data platforms. In India, the AI-in-agriculture market is still small in absolute terms but expected to grow several-fold over the next decade. Overall, the trend points toward AI becoming a core productivity and resilience tool in agriculture, driven by pressures around food security, climate change, labour shortages, and sustainability.

Food, feed, and fuel security are foundational to national stability and long-term economic progress. In India, agriculture occupies a uniquely central position: over 40% of the population derives its livelihood, directly or indirectly, from the sector. Consequently, agricultural policy in India is not solely about output maximisation; it is simultaneously an economic, social, and environmental imperative.

Indian agricultural policy is generally oriented around three overarching objectives:

- Enhancing agricultural productivity and resilience
- Securing and transitioning livelihoods
- Ensuring environmental sustainability and ecological protection

While productivity and sustainability are universal policy priorities, the livelihood dimension assumes particular salience in India, given the scale of smallholder farming and the sector's role in rural employment and income stability.

AI presents a significant opportunity to advance each of these policy objectives through systematic integration across the agricultural value chain. Several AI-driven technological trajectories are particularly suited for scaled deployment in the Indian context:

- **AI-enabled discovery and optimisation of agricultural inputs**: Including improved seed varieties, climate-resilient crops, precision fertiliser formulations, and targeted pest-control solutions.
- **AI-augmented farm management systems**: Encompassing soil nutrient diagnostics, crop health monitoring, precision irrigation, yield forecasting, and decision-support tools for smallholder and commercial farmers alike.
- **AI-driven post-harvest and supply chain optimisation**: Including demand forecasting, storage optimisation, logistics coordination, price discovery, and reduction of post-harvest losses.
- **Population-scale predictive analytics for policy and planning**: Enabling modelling of livelihood transitions, environmental impacts, climate risk exposure, and national food portfolio planning.

Deployed coherently, these capabilities can shift agriculture from reactive, input-intensive models toward data-driven, climate-resilient, and economically sustainable systems.

The global market for AI in agriculture remains at an early stage of maturity but is expanding rapidly. As of the mid-2020s, market estimates range between USD 2–3 billion, depending on definitional scope (including software, analytics platforms, robotics, sensors, and AI-enabled services). Despite this modest base, industry projections indicate substantial expansion over the next decade, with forecasts ranging from approximately USD 13 billion to over USD 50 billion by the mid-2030s.

Across studies, the consistent feature is a high double-digit compound annual growth rate (CAGR), typically in the range of 18% to 26%, reflecting accelerating global adoption of AI-enabled agricultural technologies.

Growth is primarily driven by the expansion of precision agriculture, which currently accounts for the largest share of market value. Key applications include:

- AI-powered crop and soil monitoring
- Yield prediction and risk modelling
- Pest and disease detection
- Variable-rate input application

Notably, software platforms and data analytics increasingly represent a greater proportion of value relative to standalone hardware, as farmers shift from equipment-centric to insight-driven operational models. AI adoption is also expanding into livestock monitoring, autonomous farm robotics, drone-based analytics, and supply chain optimisation — extending its impact beyond field-level operations into the broader agri-food ecosystem.

From a regional standpoint, North America currently leads in adoption due to high mechanisation and early technology integration. However, the Asia-Pacific region is the fastest-growing market, propelled by large agricultural economies such as China and India, where governments are investing in digital agriculture infrastructure, smart farming systems, and agricultural data platforms.

In India, the AI-in-agriculture market remains small in absolute terms but is projected to expand several-fold over the next decade. Structural pressures — including food security imperatives, climate variability, labour shortages, water stress, and sustainability constraints — are converging to make AI an increasingly central tool for productivity enhancement and resilience-building.

In this context, the strategic question for India is not whether AI will shape the future of agriculture, but whether regulatory and institutional design will enable India to capture both the developmental and economic benefits of this transition.

Unformed AI Markets and Related Legal Doctrines

Several areas of law interact with the idea of using AI in healthcare. These topics require the necessary regulatory clarity for the markets to form, scale and sustain.

- **Biotech Innovation**: Although not solely "AI," many AI-enabled agriculture innovations (e.g., genomics, gene-edited traits, AI accelerators for biotech) require greater clarity in biotech regulation. AI tools tied to genomic design and next-generation seed innovation cannot scale until the underlying biotech regulatory regime including approvals becomes more predictable.
- **Farmer Data Platforms (Agristack and Decision Support Systems)**: Farmers are among the poorest and most vulnerable population of India. They are often hesitant to share data due to privacy concerns, which is crucial for AI models to function effectively. AI services for predictive analytics, personalized advisories, and marketplace platforms are slowed since developers lack clear legal frameworks for collecting and using farmer data.
- **Precision Agriculture Tools (e.g., drones, sensing platforms)**: The development of such tools today face disparate regulations. Drones and sensing systems may require aviation, environment and agriculture clearances with inconsistent compliance requirements across states. Presently, the licensing pathway for Precision Tech startups is unclear. Fragmented compliance increases costs and delays deployment of AI-based robotics and IoT systems in farming.

Several legal doctrines interact with the above hinderances.

- **Biosafety & Environmental Law**: Indian regulators apply the precautionary principal broadly in genetically modified organisms (GMO) regulation, often prioritising environmental caution over commercial rollout. AI enables both creation of solutions as well as the analysis of its impact. These advances may bring back genetic engineering regulations into consideration.
- **Data Protection & Privacy Doctrine**: India's sector-agnostic privacy law lacks detailed rules for Agritech data. This legal void means farm data use for AI must navigate general privacy norms without sectoral certainty. Aggregated agricultural datasets also raise indirect privacy risks.
- **Regulatory Clarity, Competition & Ease of Doing Business Doctrine**: The regulatory foundation for agriculture is even weaker than that available for healthcare, in terms of clear timelines, definitions, procedures (e.g., licensing or approvals), and oversight. Greater ease of innovation and doing business will require work on all of it.

Regulatory Foundation

The figure below illustrates the institutional evolution that forms the regulatory foundation for AI-driven market creation in agriculture. This section focuses specifically on agriculture-linked components layered atop India's broader digital and innovation architecture.

Regulatory Foundation for AI in Agriculture

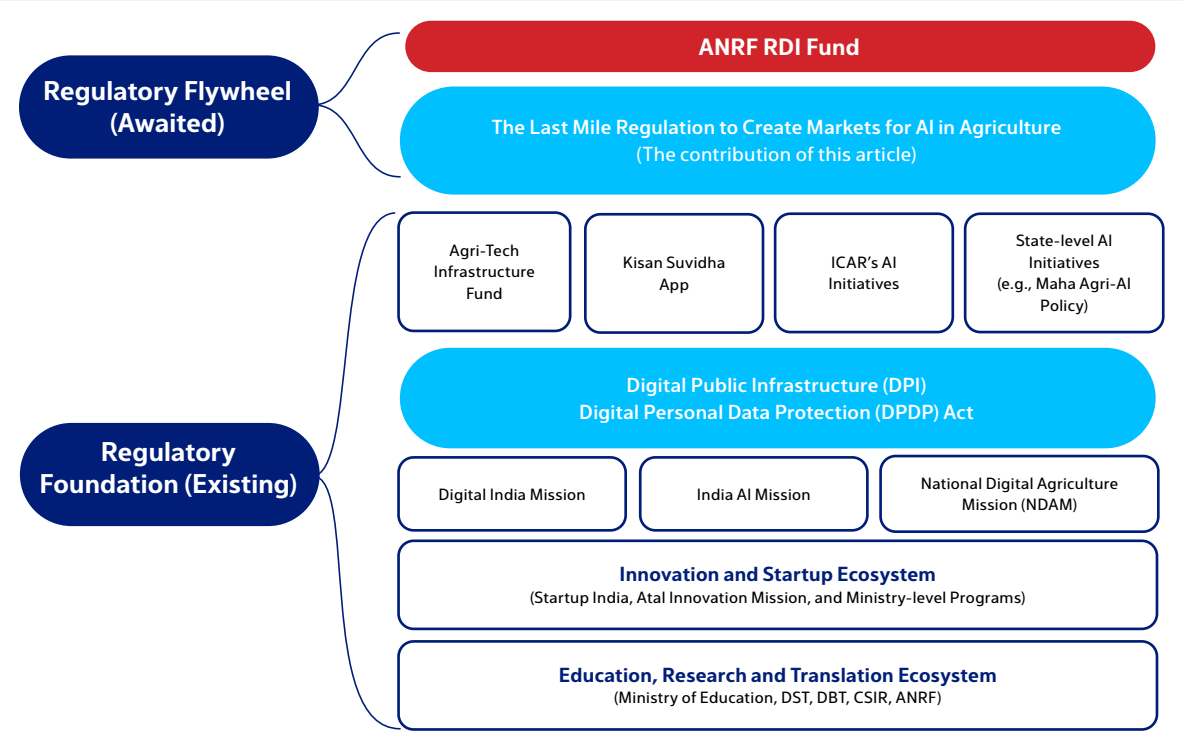


Figure 2. Foundation Enabling the Regulatory Flywheel for AI in Agriculture

The Digital Agriculture Mission (DAM)

Approved in September 2024, the Digital Agriculture Mission (DAM) represents the most significant structural intervention toward building a digital public infrastructure (DPI) for agriculture. Its stated objectives are to enhance productivity, sustainability, and farmer incomes through data-driven governance and service delivery.

At its core, DAM seeks to construct interoperable digital rails for the agricultural ecosystem through four primary components:

1. *AgriStack*

   AgriStack functions as a foundational database anchored by a digital identity (Farmer ID) linked to land records, crop data, livestock information, and relevant household details. By creating authenticated farmer identities, AgriStack aims to reduce transaction friction in accessing credit, crop insurance, subsidies, and other government services. For AI markets, this structured identity layer provides the potential basis for consent-driven data aggregation and service delivery.

2. *Krishi Decision Support System (Krishi-DSS)*

   Krishi-DSS integrates geospatial, satellite, weather, soil, and ground-level data into a unified analytics platform. It is designed to support crop planning, disaster response, yield forecasting, and policy monitoring. The integration of high-resolution spatial datasets creates a substrate for AI-driven predictive modelling at scale.

3. *Soil Profile Mapping*

   The mission includes comprehensive village-level soil mapping across approximately 142 million hectares of agricultural land at a 1:10,000 scale. Standardised soil intelligence enables precision nutrient management and optimised fertiliser application - foundational inputs for AI-enabled agronomic advisory systems.

4. *Digital General Crop Estimation Survey (DGCES)*

   DGCES leverages remote sensing and AI techniques to improve yield estimation accuracy. Reliable yield data is essential not only for policy planning but also for insurance underwriting, commodity markets, and supply chain optimisation.

   The Mission targets the creation of digital identities for approximately 110 million (11 crore) farmers in phased implementation – 60 million in FY 2024–25, 30 million in FY 2025–26, and 20 million in FY 2026–27. It also envisions a nationwide Digital Crop Survey rollout by 2025–26. Collectively, these efforts aim to simplify scheme access, improve targeting efficiency, and deliver timely advisories on pest management, weather, and crop prices – thereby enhancing farm-level profitability.

   From a market-creation perspective, DAM establishes structured datasets, identity-linked access, and interoperable platforms – prerequisites for scalable AI service deployment.

Financing Infrastructure: Agriculture Infrastructure Fund (AIF)

Launched in 2020–21, the Agriculture Infrastructure Fund (AIF) provides medium- and long-term financing for farm-gate and post-harvest infrastructure. Eligible beneficiaries include farmers, Farmer Producer Organisations (FPOs), Primary Agricultural Credit Societies (PACS), agri-entrepreneurs, and agri-tech startups.

The AIF supports investments in:

- Warehousing and cold storage
- Silos and grading/packaging units
- Supply-chain infrastructure
- Digital and e-marketing platforms

Importantly, AI-enabled and digital agriculture technologies are included within eligible project categories under smart/digital agriculture. This creates a financing channel through which AI-driven solutions can be embedded into physical infrastructure upgrades, linking capital formation with technological adoption.

Digital Advisory Platforms: Kisan Suvidha

The Kisan Suvidha App functions as a government-backed digital interface providing location-specific information on weather, market prices, crop advisories, input dealers, and agro-meteorological alerts. While not AI-native in its original conception, it creates a distribution channel through which AI-generated insights could be disseminated at scale, effectively serving as a digital public utility layer for farmer-facing intelligence services.

Research and Institutional Capacity: ICAR's AI Initiatives

The Indian Council of Agricultural Research (ICAR) has established a Virtual Centre of Excellence on AI in Agriculture to consolidate AI methodologies, datasets, and tools. ICAR institutes are increasingly integrating AI into advisory and monitoring systems – including drought management tools such as SukhaRakshak – and exploring generative AI applications for predictive modelling, resource optimisation, and crop health diagnostics.

Training programmes for researchers and faculty aim to strengthen internal AI capacity. National workshops and collaborative initiatives are intended to scale AI-enabled advisory systems across cropping systems and agro-climatic zones.

Although still at an early stage, these efforts represent the beginnings of institutional capability-building required for AI-driven agronomic innovation.

Subnational Policy Innovation: Maharashtra's Maha Agri-AI Policy (2025–2029)

At the state level, Maharashtra's Maha Agri-AI Policy (2025–2029) represents one of the most explicit regulatory articulations of AI integration in agriculture. The policy seeks to enhance productivity, resilience, and farmer incomes through technology-driven, farmer-centric interventions.

The framework outlines:

- Structured pathways for technology integration
- Innovation funding mechanisms
- Sustainability benchmarks
- A multi-year roadmap for AI adoption

By combining funding, standards, and implementation roadmaps, the Maharashtra model demonstrates how subnational regulatory experimentation can complement national digital infrastructure.

Collectively, these initiatives – DAM, AIF, digital advisory platforms, ICAR's AI integration efforts, and progressive state-level policies – constitute a substantial regulatory and institutional foundation. They establish identity rails, structured datasets, geospatial intelligence, financing channels, advisory distribution networks, and early-stage research capacity.

However, as in healthcare, foundational infrastructure does not automatically translate into market creation. The existence of digital public infrastructure and financing facilities must be complemented by clear regulatory pathways for AI-enabled agronomic tools, liability allocation frameworks, standards for algorithmic transparency, and predictable compliance mechanisms.

The central question, therefore, is whether India can convert this foundational architecture into a regulatory flywheel that catalyses scalable, investable AI markets in agriculture – while safeguarding livelihoods and environmental sustainability.

Global Experiments

The integration of AI into agriculture is a global phenomenon. Several jurisdictions have moved beyond pilot experimentation to articulate structured policy frameworks that enable AI-driven agricultural transformation. The experiences of the United States, Australia, and China illustrate distinct regulatory models for catalysing AI-enabled agricultural markets.

United States: Target-Driven Innovation and Public–Private Enablement

The United States Department of Agriculture (USDA) has adopted a proactive approach to agricultural innovation through its Agricultural Innovation Agenda (AIA). The AIA combines strategic targets, research funding, and institutional support mechanisms to accelerate the adoption of advanced technologies, including AI.

Key elements of the U.S. approach include:

- **Quantified Long-Term Targets:** The AIA aims to increase U.S. agricultural production by 40% by 2050 while reducing the environmental footprint of agriculture by 50% over the same period. These dual productivity–sustainability targets create measurable demand signals for technological innovation.
- **Research and Development Funding:** Federal funding supports AI-enabled precision agriculture, data analytics, pest and disease modelling, and resource optimisation systems.
- **Public–Private Partnerships:** The USDA collaborates with technology firms and research institutions to pilot AI solutions in live farming environments.
- **Data Governance Emphasis:** The agenda incorporates safeguards around farmer data privacy and security, reinforcing trust in digital agriculture systems.

Australia: National Strategy and Sovereign Digital Infrastructure

Australia's National AI Strategy explicitly identifies agriculture as a priority sector for AI-enabled productivity growth, alongside mining and renewable energy. This recognition situates agriculture within the country's broader economic transformation agenda.

Salient features include:

- **Sector-Specific AI Investment:** Dedicated funding streams support AI research and commercialisation in agricultural applications.
- **National Digital Twin for Agriculture:** Australia is developing an AI-enabled digital twin integrating satellite, sensor, climate, and farm-level data into a sovereign digital infrastructure. This platform is designed to support modelling, decision-ready intelligence, and research translation at national scale.
- **AI Governance Framework within DAFF:** The Department of Agriculture, Fisheries and Forestry (DAFF) has adopted AI transparency and governance guidelines to ensure that AI systems used in agricultural policy and services are safe, ethical, and legally compliant.

China: State-Led Digital Transformation and Platform Strategy

China has embedded AI-enabled agriculture within its broader national AI development strategy. The **National Smart Agriculture Action Plan (2024–2028),** issued by the Ministry of Agriculture and Rural Affairs, articulates a coordinated roadmap for digital transformation.

Core components of China's strategy include:

- Three Coordinated Actions:
  - Strengthening smart agriculture public service capacity
  - Expanding AI and digital technology applications across key agricultural domains
  - Demonstrating and scaling smart farms, ranches, and fisheries
- **National Agricultural Big Data Platform:** Development of integrated agricultural and rural data platforms, digital land maps, and foundational AI model infrastructure to support analytics and decision-making.
- **Open Foundational Model Platforms:** Establishment of shared AI model and algorithm platforms for crop growth prediction, livestock monitoring, production management, and agricultural SaaS tools.
- **Large-Scale AI Model Deployment:** Explicit promotion of "AI big models" for agricultural research, production management, and service delivery.
- **Field-Level Sensor Networks:** Expansion of meteorological, soil moisture, crop health, and pest surveillance systems — forming the data backbone for AI-enabled predictive analytics.
- **Phased Adoption Targets:** By 2026, agricultural informatization exceeding 30%; by 2028, broad digital transformation with production informatization surpassing 32%, supported by mature institutional promotion mechanisms.

India's Digital Agriculture Mission, AgriStack, Krishi-DSS, AIF financing, ICAR's AI initiatives, and progressive state policies collectively provide a foundational architecture. The above list of the international regulatory advances list those measures that could add unique insight to India's efforts so far.

Compared to healthcare, agriculture presents greater structural complexity: fragmented landholdings, heterogeneous agro-climatic zones, informal labour structures, and decentralised value chains.

The central policy question, therefore, is how India can translate its digital public infrastructure into a coherent regulatory flywheel that catalyses AI-driven agricultural markets — while simultaneously safeguarding livelihoods, environmental sustainability, and equitable growth.

Regulatory Flywheel

India has a significant regulatory foundation for agriculture, more recently digital agriculture. Still, building a regulatory flywheel for creating markets for innovation in general and AI in Agriculture in particular is a different undertaking than that for the healthcare sector. About 86% of Indian farmers are classified as small and marginal, meaning they operate landholdings of less than 2 hectares. On one hand, their need for improving livelihood through innovation is the greatest, but on the other, their risk appetite for experimentation is meaner. A large share of India's workforce is employed in agriculture. According to recent data from the Periodic Labour Force Survey and ILO estimates, about 43–46% of

India's total workforce is engaged in agriculture, forestry and allied activities. For India, transforming any other sector necessitates the transformation of the agriculture sector. As India constructs the regulatory flywheel, the objective function for the agriculture sector is different than those of the advanced nations:

- Like other advanced nations, India must maximise the agricultural productivity at the lowest environmental impact as AI transforms agriculture, but
- Unlike advanced nation, India must design regulations to protect is small and marginal farmers from economic risk and design interventions for them to transition their livelihoods as agriculture becomes more efficient.

India's institutions for modern agritech to find a pathway to farms of markets are not as robust as those for healthcare, defence, fintech, and e-commerce. Consequently, building a regulatory flywheel for AI in agriculture requires work at three levels as shown in the diagram below.

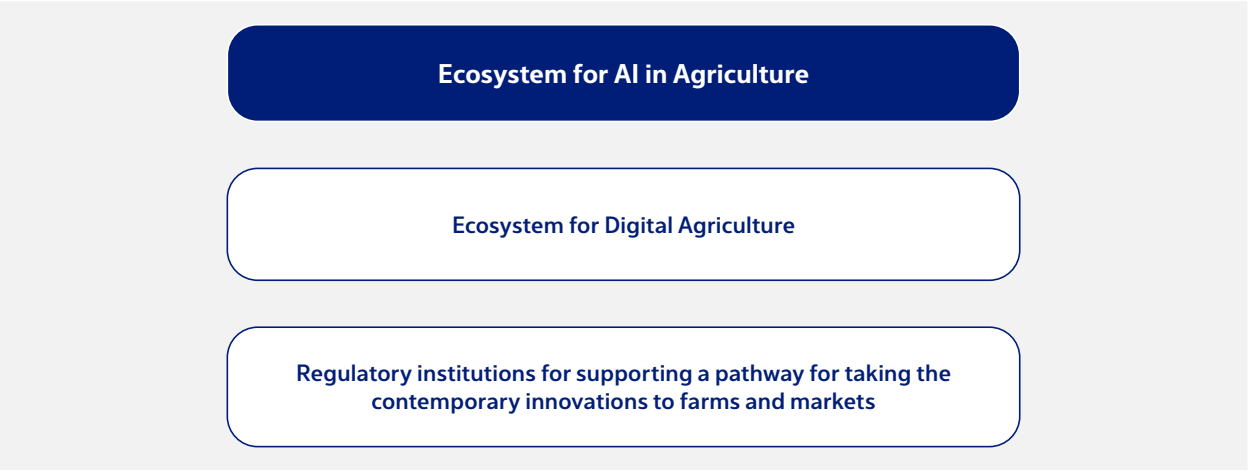


Figure 3. Three Layers of the Regulatory Flywheel for Agriculture

At the base, there is a need to create a set of institutions with a clear articulation of who will evaluate, approve, and procure agritech innovations and how. Just like, healthcare, the rubric for which innovations related to agriculture are regulated and which ones are not must be clarified. For the regulated innovations, what must innovators prove and by which rubric will they be evaluated must be clear. Such strengthening of institutions will help both digital and AI agriculture.

There is much work in India underway to enable digital agriculture. The innovations that usher AI in agriculture need additional work. A Regulatory Flywheel must provide clarity to the four stakeholders without whom a market cannot be created:

- Producers of technology solutions (innovators and entrepreneurs, both new and existing)
- Consumers of technology solutions (farmers, end consumers, agriculture extension)
- Investors (individuals and institutions)
- Regulators (regional, national, and global)

To Build the Regulatory Flywheel for AI in agriculture the regulatory apparatus of India must take the following steps

Goal Setting

1. *Embrace AI in Agriculture and Build Awareness:* India must first explicitly and publicly embrace AI as an important part of the agriculture policy for its future food safety and security. It must build an awareness campaign appropriate to familiarise the farmers and the public to allay fears and seek participation.
2. *Set Explicit Goals and Tracking Mechanisms:* India must set goals for how much of its targeted increase in agriculture production and farmer income as well as reduction in environmental impact can come from AI-drive innovation in agriculture by years 2035 and 2047 (the Viksit Bharat deadline). This exercise necessarily requires visualising in detail the role of AI-drive innovation in agriculture inputs, process, output management. The figure below shows a way to set such goals and make measurements.

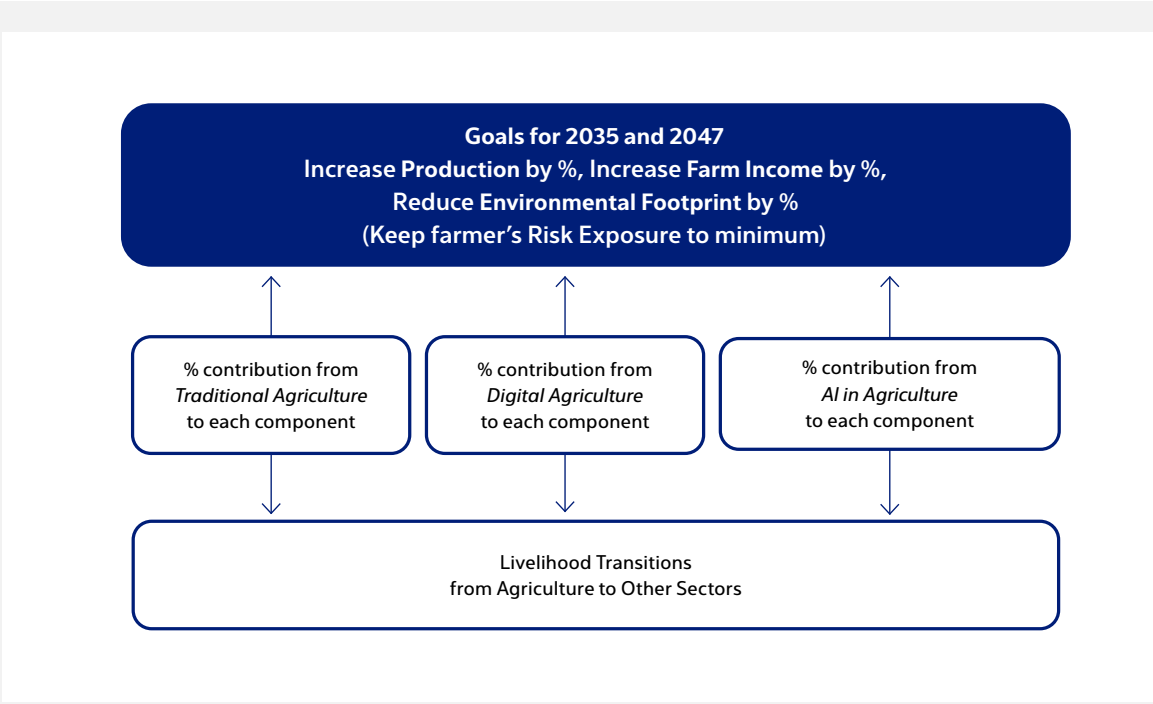


Figure 4. Goal Setting for Technology (Conventional, Digital, AI) in Agriculture

Enablers for AI in agriculture

3. *Establish a Privacy Protection Plan Specific to Agriculture Data:* Built upon the principles of the DPDP Act, determine which rules apply for the collection, use and dissemination of agricultural data.
4. *Establish Public Datasets for Innovation:* Keeping in mind India's agricultural diversity, develop appropriate slices of anonymised public datasets for innovators to innovate. Balance privacy protection and AI-drive innovations.
5. *Establish National-level AI-driven Models:* Establish models to analyse national level data to drive policy decisions on farm productivity, agriculture markets and farmer incomes, environmental footprint, and labor transitions.

6. *Establish Model AI Farms*: Establish farms where AI in agriculture can be proven and piloted. Such a farm could offer innovators a testbed for demonstrating their innovations before they can be considered for scaling.

Regulatory Pathways

7. *Institutions:* for evaluating, approving, and certifying agritech
8. *Rubric:* for approving the use of AI in agritech from the perspective of risk to small and marginal farmers, fair and ethical use.

Ecosystem Integration

9. Integrate the research, translation, innovation and startup ecosystem of India for AI-driven agritech innovations to get from opportunities to new markets. Such integration may start from challenge-based sourcing of innovations and commercialisation.

National-level Models and Analytics

10. Build and host national-level AI-driven models for data analysis and policy decisions regarding the highest objectives of farm productivity, farmer income, agricultural supply chains, environmental footprint, livelihood transitions, and risk exposure to small and marginal farmers.

Conclusion

India has laid a strong regulatory foundation for moving in the direction of AI in healthcare and agriculture sectors. The time now is to build the Regulatory Flywheels, a set of rules that will induce action towards market creation, in this case the creation of a market for AI in Healthcare and Agriculture. The fundamental difference between foundation and flywheel is in creating the *ingredients for the enabling environment vs. offering a recipe for action.*

Significant global market growth is projected for both AI in healthcare and AI in agriculture. India is still at the beginning of creating such markets for itself, both investment and intellectual property creation are at the early stages.

Given how closely India's use cases for AI in healthcare and agriculture resemble those of the so called "global south", and having developed a sound regulatory foundation many nations aspire to build, the regulatory flywheels India will create will sure place it as a leader in these segments for many emerging nations.

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From Integration to Impact: Risk Management in Enterprise AI

By Nishith Desai Associates*

Introduction

Indian enterprises are rapidly integrating AI across sectors, transforming operations and driving economic growth. Today, almost every enterprise is either actively deploying AI or planning to do so. From startups to large incumbents, organisations increasingly view AI as essential infrastructure for productivity, scale and competitiveness. Third-party AI models are embedded into internal workflows, customer-facing products, developer tools, analytics pipelines and decision-support systems, more often through rapid integrations rather than long build cycles.

This momentum is neither accidental nor speculative. AI systems can compress time-to-output, automate cognitive tasks and increase efficiency in a way that traditional software cannot. Additionally, for developers and technical teams, the barriers to adoption are low as pre-trained models, APIs and cloud-based platforms allow enterprises to deploy AI quickly and iterate continuously. In many sectors, choosing not to adopt AI now carries strategic risk. However, while some organisations appear to be deploying AI aggressively, others appear hesitant due to uncertainty around legal exposure, opaque model behaviour, vendor dependencies and the difficulty of anticipating downstream consequences once such systems operate at scale.

As AI systems become more capable, agentic and deeply embedded in enterprise operations, it can substantially improve productivity. But it also introduces a new risk profile that traditional compliance and governance models were not designed to handle. Hallucinations, bias, training-data leakage, insecure integrations and excessive reliance on automated outputs can translate into real-world harm. These harms may surface as privacy violations, discrimination claims, intellectual property disputes, cybersecurity incidents or contractual and tortious liability, when employees, customers or business partners rely on AI-generated decisions.

India's regulatory stance so far reflects a pragmatic adaptation of existing laws and guidance rather than a standalone AI statute. Companies deploying AI are currently governed through a combination of data protection requirements, sectoral regulations, consumer protection laws and government advisories.

Against this backdrop, this article examines the key legal and operational risks associated with enterprise AI deployment in India at a high level and proposes practical risk-mitigation strategies aligned with how AI systems are actually built, integrated and scaled.

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The Rise of Enterprise AI and the New Risk Paradigm

Enterprise AI adoption has moved decisively from experimentation to production. Early pilots focused on limited use cases such as chatbots, document tagging and basic analytics. Today, organisations embed AI directly into core workflows, including customer support, document review, risk assessment, software development, marketing and strategic decision making. Generative AI has accelerated this shift. For many Indian firms, AI now functions as everyday digital infrastructure. Enterprises can adopt and scale AI quickly by integrating Application Programming Interfaces (APIs), copilots and Software as a Service (SaaS) tools, without needing to build models in house.

However, AI systems behave differently from traditional software. With traditional software, if you give it the same input, it produces the same output every time. When it fails, it usually fails in a linear and traceable way, which means that engineers can point to a specific bug, input or system state and fix it. The impact of that failure is often contained. However, with AI systems, they do not always give the same output for the same input, because their responses are based on probabilities rather than fixed rules. When something goes wrong, the failure is often shaped by context and by how the system was trained, rather than by one clear coding error. This makes it hard to identify a single mistake or "bug" to fix. In addition, AI systems are usually used at large scale and across many users or systems, so one error can quickly amplify and affect many decisions or outcomes at the same time.

In practice, the risk for an enterprise using AI can manifest across several dimensions, including:

- **Errors and hallucinations:** AI systems can generate confident but incorrect outputs, potentially spreading misinformation and misleading users.
- **Bias and discrimination:** AI-driven tools for functions such as hiring or screening may replicate or amplify biases in training data, exposing companies to legal claims and reputational damage.
- **Privacy and confidentiality breaches:** Poor access controls, prompt logging or insecure integrations can leak sensitive personal or business data, triggering violations under India's data protection regime.
- **Intellectual property exposure:** Vendor models may train on enterprise data without clear contractual restrictions, or employees may input proprietary material into third-party tools, leading to loss of confidentiality or infringement claims.
- **Automation harm:** Once integrated, AI errors can scale instantly. A single flawed output can affect thousands of users before detection.

These risks require enterprises to rethink governance. Managing AI is not merely a technical exercise; it demands legal, organizational and contractual controls aligned to real world impact.

Breaking Down the AI Risk Landscape

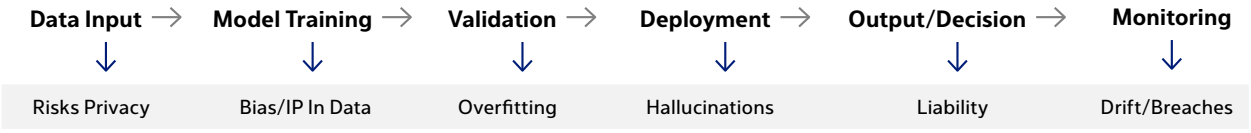
Categories of AI Use

Indian enterprises typically deploy AI across four categories, each with distinct risk profiles: B2B deployment, B2C deployment, internal use and external deployment. This classification helps organisations align controls with business context and potential harm.

- *B2B Deployment:* Business-to-business deployment covers AI systems used by companies in their dealings with other businesses, including SaaS products, outsourcing arrangements, supply chain platforms and automation tools. These systems often operate across organisational boundaries and draw on multiple data sources. For example, a company may use an AI-enabled procurement tool that ingests internal procurement data, real-time supplier performance data from vendors and third-party ESG or financial risk scores to automate supplier selection or contract approvals. While these deployments improve efficiency and consistency, they create three key risks. First, complex data flows make it harder to track how information moves across vendors and sub-processors. Second, accountability becomes fragmented when one entity builds the model, another integrates it and a third uses it. Third, disputes may arise when AI performance falls short or causes downstream losses.
- *B2C Deployment:* Business-to-consumer deployment uses AI systems that interact directly with consumers or shape consumer outcomes. Businesses deploy tools such as chatbots, recommendation engines, automated fraud detection and dynamic pricing systems. These tools scale quickly and reduce operating costs, but they also increase legal and reputational risk. Consumer-facing AI tools can generate misleading or inappropriate responses and can treat users inconsistently because of biased training data or proxy variables. These risks become more serious in regulated sectors such as financial services, where automated decisions determine access to credit or pricing. Even unintended discrimination can attract regulatory scrutiny, prompt customer complaints and cause long-term damage to brand trust.
- *Internal Use:* Internal deployments use AI to support productivity and decision-making within the organisation. Common examples include HR screening tools, performance analytics, internal copilots, and operational dashboards. Organisations often view these systems as lower risk, but they can have significant impact. HR use cases raise particular concerns. AI-assisted shortlisting or performance evaluation can introduce bias and create perceptions of unfairness, even when humans retain nominal oversight. Internal copilots also create confidentiality risks, as employees may enter sensitive business information into tools that the organisation cannot fully control or audit. As adoption grows, internal deployments may increasingly become a point of unmanaged AI risk.
- *External Deployment:* External deployment involves offering AI features as part of products or services used by customers, such as AI-enabled software features, decision tools or APIs. This type of deployment carries the highest level of combined business and legal risk. Customers often rely on AI outputs for compliance, safety or commercial decisions, which increases potential liability. As a result, contracts typically require stronger warranties, audit rights, and indemnities, and cross-border customers may also impose additional regulatory requirements.

AI Life Cycle and Risk Points

Across all four categories, the same lifecycle applies: data enters the system, the model processes it, an output is generated, and the output informs action. Each stage introduces predictable risk points. It can be illustrated as follows:



As Indian enterprises move from adoption to scale, the central question is no longer whether they can deploy AI, but whether they can do so with clear accountability across data flows, decision points and real-world impact.

Legal and Regulatory Framework

India's AI regulatory landscape is evolving but it has not yet consolidated into a single statute. Instead, regulators oversee AI through existing laws, sector-specific regulation and policy guidance. This hybrid approach reflects a deliberate attempt to balance innovation with risk mitigation.

Governing AI Through Existing Laws

In the absence of dedicated AI legislation, Indian authorities regulate AI applications rather than the technology itself. Officials at the Ministry of Electronics and Information Technology ("**MeitY**") have stated that existing frameworks, such as the Digital Personal Data Protection Act, 2023 ("**DPDPA**"), intellectual property laws and sector-specific regulations, already address many AI-related risks.[1] With the proposed Digital India Act still pending, sectoral regulators continue to shape near-term expectations for responsible AI.

Key legal developments thus far include:

- The Reserve Bank of India (RBI) issued the *Master Direction on Information Technology Governance, Risk, Controls and Assurance Practices*[2] (RBI Direction), to strengthen IT governance and operational resilience among regulated entities, including banks, NBFCs and payment system participants. The RBI Direction requires regulated entities to establish robust IT governance structures, assign clear accountability at the board and senior management level and implement comprehensive IT and cybersecurity risk management frameworks. It also emphasises incident response preparedness, third-party risk management, business continuity, disaster recovery planning, access controls and independent assurance through IS audits, with the objective of ensuring systemic stability in an increasingly digital financial ecosystem.

1 See,: https://www.theweek.in/wire-updates/business/2025/12/16/dcm25-biz-meity-ai-regulations.html (last accessed on February 05, 2025).

2 See,: https://fidcindia.org.in/wp-content/uploads/2023/11/RBI-IT-MASTER-DIRECTIONS-07-11-23.pdf (last accessed on February 05, 2025).

- Separately, the RBI has published a report on the *Framework for Responsible and Ethical Enablement of Artificial Intelligence (FREE-AI)*[3] developed by an expert committee for the financial sector. The framework sets out non-binding principles and recommendations on the responsible use of AI, including fairness, explainability, governance oversight, bias mitigation, consumer protection and continuous monitoring of AI systems (often referred to as the "seven sutras"). While the framework does not constitute enforceable regulation, it signals regulatory expectations and provides guidance for financial institutions adopting AI in banking, payments and fintech.

- The Securities and Exchange Board of India *(Intermediaries) (Amendment) Regulations*, 2025[4], notified in February 2025, introduced Chapter IIIB into the Securities and Exchange Board of India *(Intermediaries)* Regulations, 2008 (SEBI Regulation) to specifically regulate the use of AI by SEBI-regulated intermediaries[5]. Under this, regulated entities that use AI or machine-learning tools, whether developed internally or sourced from third parties are required to remain fully responsible for compliance with all securities laws. SEBI may take enforcement action for violations, including under Chapter V, which empowers SEBI to investigate breaches and impose disciplinary measures such as suspension, cancellation of registration, or market restrictions.[6] These amendments hold such intermediaries accountable for AI-driven outputs, risks and decisions regardless of the origin of the tools, marking SEBI's first explicit AI governance framework aimed at safeguarding market integrity and investor protection.

- MeitY released the India *AI Governance Guidelines*[7] (AI Governance Guidelines) in November 2025 to ensure safe, inclusive and responsible AI use across sectors. The guidelines set out seven core principles: Trust, People First, Innovation over Restraint, Fairness & Equity, Accountability, Understandable by Design, and Safety and Resilience & Sustainability, as the ethical foundation of India's AI governance framework. They also propose governance mechanisms, including an AI Governance Group, regulatory sandboxes and structured approaches for reporting incidents and implementation through short, medium and long-term action plans. While the guidelines do not create binding legal obligations, they signal the Government's policy direction and are likely to shape regulatory expectations, sectoral guidance and enterprise AI governance practices over time.

- MeitY also released proposed amendments to the Information Technology Rules, 2021 (Proposed SGI Amendments) to include provisions around labelling of synthetically generated information and intermediary due diligence for content generated by digital tools, requiring greater clarity on platform responsibilities for deepfake labelling and content moderation.[8] The draft amendments were released to invite public comments in late 2025 and are expected to be finalized in 2026.

- The Department for Promotion of Industry and Internal Trade (DPIIT) released a *Working Paper on Generative AI and Copyright*[9] to examine how India's copyright framework applies to AI-generated content and the use of copyrighted works in training AI models. The paper highlights key issues such as authorship and ownership of AI outputs, liability for infringement, and the legality of using copyrighted material for model training without permission.

3 See,: https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/FREEAIR130820250A24FF2D4578453F824C72ED9F5D5851.PDF (last accessed on February 05, 2025).

4 See,: https://www.sebi.gov.in/legal/regulations/feb-2025/securities-and-exchange-board-of-india-intermediaries-amendment-regulations-2025_91809.html (last accessed on February 05, 2025).

5 Here, an "intermediary" means a person or entity regulated by SEBI under sections 11 and 12 of the SEBI Act, 1992, which empower SEBI to regulate the securities market and require registration of market participants. The term includes entities such as asset management companies, clearing members, foreign portfolio investors, and derivatives trading members, but excludes mutual funds, collective investment schemes, and venture capital funds.

6 Regulation 16C, SEBI Regulation.

7 See,: https://static.pib.gov.in/WriteReadData/specificdocs/documents/2025/nov/doc2025115685601.pdf (last accessed on February 7, 2026).

8 See,: https://nishithdesai.com/default.aspx?id=15467.

9 See,: https://www.dpiit.gov.in/static/uploads/2025/12/ff266bbeed10c48e3479c941484f3525.pdf (last accessed on February 7, 2026).

- While the paper does not propose immediate legislative changes, it signals the Government's intent to reassess existing copyright principles in light of AI development and invites stakeholder feedback. Its outcomes are likely to influence future policy reforms and shape how enterprises manage training data, licensing practices, and IP risk in AI deployments.

- Data Protection Regime: AI systems often rely on vast amounts of data, making data protection a critical concern. At present, India's data protection framework consists of the IT Act read with the SPDI Rules. Together, they govern the processing of sensitive personal data or information SPDI[10] in India. Section 43A of the IT Act allows affected individuals to seek compensation for negligence in implementing reasonable security practices. Penal provisions also apply to unauthorized disclosure of personal information, including by non-Indian entities with sufficient technological nexus to India[11]. Compliances under the SPDI Rules are only applicable to Indian entities.[12]

  India's data protection landscape is poised for change with the notification of the Digital Personal Data Protection Act, 2023[13] and rules issued thereunder[14] DPDPA. The DPDPA forms India's first comprehensive statutory framework governing the collection, usage, storage and transfer of all digital personal data, which is expected to come into full force in May 2027[15]. Under the DPDPA, data fiduciaries[16] must provide clear notice[17], obtain informed consent (unless the processing falls under narrowly defined 'legitimate use' exceptions)[18], ensure robust security safeguards[19], and report breaches promptly[20]. Data principals[21] enjoy rights including access[22] , correction and erasure[23], and grievance redressal[24]. The DPDPA also establishes the Data Protection Board of India to adjudicate disputes and oversee enforcement[25].

  For AI deployments, the DPDPA introduces new challenges. Rights such as erasure and correction are difficult to implement for models like large language models, where personal data is embedded across parameters rather than stored in discrete records. Complying may require anonymization, retraining or redesigning consent and data management processes. Overall, the DPDPA enforces accountability

10 Rule 3, SPDI Rules list out the categories of personal information that falls under SPDI. With respect to an individual's personal information, these are (i) password, (ii) financial information such as Bank Account or Credit Card or Debit Card or other payment instrument details, (iii) physical, physiological and mental health condition, (iv) sexual orientation, (v) medical records and history and (vi) biometric information. SPDI also includes (i) any details related to the above-mentioned six categories provided to a body corporate for the provision of services and (ii) any information related to the above-mentioned six categories received by a body corporate under a lawful contract or otherwise.

11 The IT Act has extra-territorial reach and applies to offences or contraventions committed outside India by any person (irrespective of nationality), if the act or conduct constituting the offence or contravention involves a computer, computer system or computer network located in India. This is typically where an India-based device, system, server, or network is used, accessed, affected, or targeted.Under the IT Act:
(a) "computer" means any electronic, magnetic, optical or other high-speed data processing device or system which performs logical, arithmetic and memory functions by manipulations of electronic, magnetic or optical impulses, and includes all input, output, processing, storage, computer software or communication facilities which are connected or related to the computer in a computer system or computer network.
(b) "computer network" means the inter-connection of one or more computers or computer systems through--(i) the use of satellite, microwave, terrestrial line, wireless or other communication media; and (ii) terminals or a complex consisting of two or more interconnected computers or communicated device whether or not the inter-connection is continuously maintained.
(c) "Computer resource" means computer, computer system, computer network, data, computer data base or software.

12 Rule 2, SPDI Rules.

13 See,: https://www.meity.gov.in/static/uploads/2024/06/2bf1f0e9f04e6fb4f8fef35e82c42aa5.pdf (last accessed on February 7, 2026).

14 See, https://www.meity.gov.in/static/uploads/2025/11/53450e6e5dc0bfa85ebd78686cadad39.pdf (last accessed on February 7, 2026).

15 Timeline for enforcement of the DPAPA : https://www.meity.gov.in/static/uploads/2025/11/c56ceae6c383460ca69577428d36828b.pdf (last accessed on February 7, 2026).

16 "Data Fiduciary" means any person who alone or in conjunction with other persons determines the purpose and means of processing of personal data.

17 Section 5, DPDPA.

18 Section 4, DPDPA.

19 Section 8(5), DPDPA.

20 Section 8(6), DPDPA.

21 Data Principal" means the individual to whom the personal data relates.

22 Section 11, DPDPA.

23 Section 12, DPDPA.

24 Section 13, DPDPA.

25 Section 18, DPDPA.

across the data lifecycle, protects individual rights, and imposes regulatory oversight without restricting innovation. Enterprises deploying AI must design and operate systems responsibly, as penalties for violations can reach USD 30 million.[26]

Legal Gaps AI Deployment is Exposing

Despite regulatory progress, AI deployment exposes gaps across intellectual property, data protection, competition law, cybersecurity, consumer protection, labour law, contractual risk allocation and liability attribution. Addressing these gaps will be critical as AI systems become more autonomous and influential.

- *Intellectual Property Rights*

  Enterprises deploying AI in India must navigate complex intellectual property (IP) issues, which do not fully address AI-specific challenges.

  Under the Indian Copyright Act, 1957 (Copyright Act), only natural persons or legal entities can be recognized as authors[27]. AI-generated works, including text, art or music, cannot hold copyright independently. The law currently attributes authorship to the person or entity that directs or controls the AI's output[28] , but it offers limited guidance for collaborative human-AI works, outputs generated by third-party AI tools or commercial use of generative AI creations. Additionally, the Copyright Act does not explicitly regulate the use of copyrighted material in AI training datasets, creating potential liability for infringement. These issues are currently under judicial consideration in *ANI Media Pvt. Ltd. v. OpenAI*[29] , widely regarded as India's first generative AI copyright case. The matter is being heard in the Delhi High Court, but the case remains pending, and no definitive legal clarity has yet emerged on how Indian law applies to AI training, content use and related copyright issues.

  Separately, when an enterprise is deploying a third-party AI tool for its internal or external use, the vendors may reuse enterprise data for model training. Enterprises often share prompts, documents, source code, customer communications or datasets with AI vendors via APIs or SaaS platforms. If contracts do not clearly confirm that the enterprise owns its inputs, prevent vendors from training on them and restrict reuse or derivative datasets, proprietary material can enter the vendor's training datasets. This creates trade secret risks and possible copyright or contractual infringement, especially if the enterprise does not fully own the input data. Employee use of such third-party AI tools adds more risk. Employees may upload confidential documents, code or creative assets into public or semi-public AI systems. If the AI vendor retains or trains on these inputs, the enterprise can lose control over proprietary information, weakening trade secrets and breaching confidentiality obligations.

  The Indian Patents Act, 1970 (Patents Act) allows patents for inventions that are novel, involve an inventive step and are capable of industrial applicability.[30] Inventorship must be attributed to a natural person, meaning AI cannot be named as an inventor, even when it autonomously generates inventions. The law also lacks guidance on how to credit contributions from AI-assisted processes, leaving ambiguity for enterprises commercializing AI-driven innovations.

  Additionally, software, algorithms, and business methods are generally not patentable[31]. In practice, AI inventions are more likely to be patentable in India if they show a concrete technical improvement, such as by improving how a computer system, device or technical process actually works, rather than merely implementing abstract software logic. For example, an AI-driven medical device may have

26 Section 33 read with the Schedule, DPDPA.

27 Section 2(d), Copyright Act.

28 Id.

29 CS(COMM) 1028/2024, Delhi High Court.

30 Section 2(j), Patents Act.

31 Section 3(k), Patents Act.

stronger patent prospects where the AI contributes to a technical function of the device, such as improved signal processing or control, even if the underlying hardware is conventional. Separately, the underlying software code and algorithms may be protected through copyright and trade secret regimes.

Current Indian law does not clearly address ownership of AI-generated outputs, inventorship in AI-assisted inventions or remedies for AI-induced trade secret leaks. Until courts or legislation clarify these issues, enterprises must rely on strong contracts, internal policies, employee training and operational safeguards to protect data and IP when deploying AI.

- *Data Protection*

India's current data protection regime under the IT Act and SPDI Rules leaves several gaps for AI deployments. Under the SPDI Rules, only processing of SPDI is regulated and obligations apply only to Indian entities 32 . Further, the framework does not address AI-specific risks such as model training, data reuse or output accountability. The rules also lack clarity on derivative datasets and enforcement mechanisms for large-scale automated processing.

The DPDPA provides broader statutory rights and regulatory oversight but it still faces practical limitations for AI. Data principal rights such as erasure, correction and data portability are premised on personal data being stored as identifiable and retrievable records. In AI systems, particularly large language models, personal data may be absorbed into model parameters during training in a diffuse and non-identifiable manner. Once embedded in this way, personal data cannot be readily isolated, corrected or deleted without retraining the model, making full compliance with these rights technically challenging. The law also does not prescribe technical standards for data minimisation in AI training or auditability of automated decision-making. It presently also lacks guidance on liability when AI systems produce outputs that violate privacy or data rights, leaving enterprises uncertain about compliance in complex AI workflows.

Together, these gaps highlight the need for supplementary contractual, technical and governance measures to ensure AI systems respect privacy while enabling innovation.

- *Competition Law*

AI deployment is reshaping market structure and competitive dynamics across sectors. In 2025, the Competition Commission of India released its market study on AI and Competition Law 33 , recognizing the rapid integration of AI in sectors such as banking, insurance, e-commerce, and healthcare 34. The report serves as India's first comprehensive analysis of how AI shapes market dynamics, while also reviewing global regulatory actions addressing anti-competitive conduct enabled by AI. Although AI deployment can improve efficiency, reduce costs, increase customer engagement, and enhance service provision, it also creates structural imbalances within the ecosystem.

A small number of global technology firms increasingly control access to critical AI inputs, including high-quality data, computing infrastructure and foundational models. This concentration can raise barriers to entry for smaller Indian firms and distort downstream markets. At the deployment level, AI systems may also enable anti-competitive outcomes without explicit intent. Algorithmic pricing tools can facilitate tacit coordination, hub-and-spoke arrangements or sustained parallel pricing, even where firms do not directly communicate. These may promote collusive outcomes 35 . In the United States,

32 Rule 2, SPDI Rules.

33 See,: https://www.cci.gov.in/images/marketstudie/en/market-study-on-artificial-intelligence-and-competition1759752172.pdf (last accessed on February 7, 2026).

34 Market Study on Artificial Intelligence and Competition', CCI and MDI (2025). Available at: https://cci.gov.in/economics-research/market-studies/details/47/0 (last accessed on February 7, 2026).

35 'Algorithmic Competition' OECD (2023).: See,: https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/05/algorithmic-competition_2be02d00/cb3b2075-en.pdf (last accessed on February 7, 2026).

multiple litigations are currently underway where algorithmic pricing tools have violated antitrust laws. 36 Global AI-related mergers also face heightened scrutiny, particularly when consolidation risks limiting access to data, talent or computing resources.

After analyzing AI's potential effects on the Indian competition landscape, especially given the absence of digital competition legislation, the CCI recommends a soft regulatory approach. This approach encourages self-audits and proactive compliance, promotes public infrastructure such as open-source technologies and shared data repositories for smaller businesses and advocates for broader awareness and best practices in AI deployment.

- *Cybersecurity Risks*

Existing cybersecurity framework in India, including CERT-In's 2022 Directions 37 primarily on incident reporting, primarily addresses traditional system and network-level security risks, such as unauthorised access, malware and data breaches. These obligations extend to AI systems within digital infrastructure but remain technology-neutral, and do not address AI-unique threats such as adversarial inputs, model poisoning or prompt-injection attacks which target the behaviour and integrity of machine learning models rather than underlying IT systems.

Without clear statutory standards for AI threat modelling, red-teaming or model resilience testing, enterprises deploying AI systems may be exposed to operational, security and reputational risks. Expansion of conventional cybersecurity programmes to incorporate AI-specific safeguards is imperative. Unlike traditional IT systems, AI models can be manipulated through their inputs or training data, behave unpredictably or fail silently over time. Businesses therefore need to go beyond standard cybersecurity practices and actively test how their AI systems behave under stress, misuse or attack, and put safeguards in place to protect both their operations and reputation.

- *Consumer Protection*

The framework under India's Consumer Protection Act, 2019 prohibits misleading representations and unfair trade practices 38 , but its enforcement framework assumes that such representations are made or approved by identifiable human actors. AI-generated outputs challenge traditional enforcement mechanisms. Automated systems can produce inaccurate, manipulative or opaque responses without a clear human author or decision-maker. As a result, consumers harmed by such outputs may struggle to identify who is at fault or seek redress.

Current law does not require algorithmic transparency, explainability or disclosure of automated decision-making in consumer interactions. Consequently, enterprises may face reputational damage and regulatory scrutiny, even when legal liability is uncertain. Companies deploying consumer-facing AI must therefore implement proactive governance, including monitoring outputs, establishing human fallback mechanisms and clearly communicating system limitations to users.

- *Labour and Employment Risks*

AI-driven hiring, performance evaluation and workforce management tools introduce new labour law risks. Automated screening or scoring systems may replicate bias embedded in historical data, exposing employers to discrimination claims under existing labour statutes like the Industrial Disputes Act, 1947 or constitutional protections against discrimination (Article 14). Indian courts have not yet ruled extensively on algorithmic bias, but general anti-discrimination principles apply, exposing employers to litigation.

36 'AI and Algorithmic Pricing: 2025 Antitrust Outlook and Compliance Considerations', Morgan Lewis (2025). See,: https://www.morganlewis.com/pubs/2025/02/ai-and-algorithmic-pricing-2025-antitrust-outlook-and-compliance-considerations (last accessed on February 7, 2026).

37 See,: https://www.cert-in.org.in/PDF/CERT-In_Directions_70B_28.04.2022.pdf (last accessed on February 7, 2026).

38 Section 10 and Section 18, Consumer Protection Act, 2019.

There are no statutory requirements for transparency, explainability or appeal mechanisms in AI-assisted employment decisions. As algorithmic management expands across services and platform-based sectors, these gaps increase the likelihood of disputes and reputational harm. Enterprises should therefore treat AI in HR as a high-risk use case requiring human oversight, documentation and internal grievance mechanisms.

- *Contractual Allocation of Vendor Risk*

  Contracts remain a key tool for allocating risk in enterprise AI deployments. However, many were drafted before current AI practices emerged. As a result, agreements may not clearly address issues such as data use in training, responsibility for AI-generated outputs or liability for infringement. To mitigate these risks, companies should negotiate AI-specific contract clauses, including (i) commitments that vendors will not use enterprise data for model training or improvement without permission, (ii) audit rights to verify data handling, model use, and compliance, (iii) clear definitions of ownership over outputs generated by the AI, (iv) provisions for bias mitigation, accuracy standards, and service-level commitments, (v) termination or exit rights in case of non-compliance or regulatory issues.

  In regulated sectors, such as banking or finance, contracts should also align with ethical AI frameworks endorsed by regulators, for example, the RBI's FREE-AI principles or MeitY's AI Governance Guidelines. Strong contractual protections ensure that enterprises can deploy AI safely while retaining accountability for data, IP, and operational risks.

- *Liability and Attribution Gaps*

  India's existing criminal and civil liability frameworks assume human intent, control and foreseeability; elements that autonomous AI systems may not clearly exhibit. Under the Bharatiya Nyaya Sanhita, 2023 (India's substantive criminal law) and the IT Act, offences generally require a culpable mental state or identifiable action by a person. When AI systems generate or act on outputs at scale, such as spreading harmful content, enabling fraud or exposing private data, it becomes difficult to attribute fault to a specific individual or entity in a way that aligns with these traditional doctrines. Current law does not provide clear standards for attributing liability to AI deployers or vendors based on the level of autonomy, oversight or foreseeable risk. It also lacks formal mechanisms such as graded deployer responsibility, output traceability requirements or statutory safe harbours for organisations that implement robust governance and oversight. As a result, enterprises face uncertainty about when they can be held criminally or civilly liable for harms caused in part by AI behaviour that they did not explicitly programme or control.

  This legal gap leaves enterprises exposed when AI enabled systems cause widespread harm, including misinformation campaigns, financial loss or breaches of privacy. Addressing these challenges will require future legal reform to establish clear accountability tiers, criteria for foreseeability and control and defensible standards for responsible AI deployment.

- *Ethical and Societal Implications*

  Companies must also consider the societal impact of their AI applications, particularly in areas like employment, privacy and algorithmic bias. AI systems can inadvertently perpetuate or exacerbate biases present in training data. For instance, facial recognition technologies have been criticized for inaccuracies in identifying darker-skinned individuals, leading to potential discrimination. Companies must proactively implement fairness checks and diverse datasets to mitigate such biases.

Practical Risk Mitigation Strategies for Indian Enterprises Deploying AI Tools

Effective AI risk management requires enterprises to integrate legal compliance, technical safeguards and organisational oversight. Companies should start by building an AI risk management framework tailored to their specific use cases. They should not only comply with existing laws but also design processes that anticipate future regulations and evolving standards. Decisions should be guided by ethical principles, ensuring that the organisation can adapt and remain compliant as new laws and expectations emerge. Some key practical risk mitigation steps that enterprises can implement are as follows:

- **Build an AI Risk Management Framework:** Enterprises should inventory all AI systems and classify them by deployment type and risk level. They should prepare incident response playbooks addressing misinformation, bias, privacy leaks, automation errors and define escalation pathways, communication protocols, and rollback procedures.
- **System Design**: They should embed privacy and compliance controls directly into system design, such as minimizing personal data use, obtaining verifiable consent, and logging decisions for audit purposes. Outputs should be monitored for errors, bias or unfair outcomes, and processes should include mechanisms to correct or override automated decisions. Companies should also establish governance procedures that allow them to adapt systems quickly to new or emerging regulations, ensuring both legal compliance and ethical operation.
- **Governance, Monitoring, and Documentation**: Organisations should actively track how AI models perform over time, including changes in accuracy, fairness, and behavior (model drift), and record any security incidents or failures. They should keep detailed logs, audit trails, risk assessments, and policy documentation to demonstrate accountability and ensure they are prepared for regulatory reviews or investigations.
- **Vendor Due Diligence and Contract Protections**: Enterprises should evaluate AI vendors thoroughly, reviewing their data handling practices, security measures, and transparency around model design and performance. They should include contract provisions that give them audit rights, indemnities for breaches or IP violations, and clear ownership of data and AI-generated outputs. Due diligence should be repeated regularly as vendor systems or deployment contexts change, ensuring ongoing compliance and risk management.
- **AI Output Labelling**: Enterprises should clearly label AI-generated outputs so that users can distinguish between human-created and machine-generated content. Proper labeling helps manage expectations, reduces the risk of misleading information, and supports compliance with transparency and consumer protection obligations.
- **Logging and Escalation**: Companies should log all AI inputs, outputs, decisions and system changes in a structured and secure manner. They should also establish clear escalation protocols so that any errors, biases or incidents can be addressed promptly, ensuring accountability and supporting regulatory compliance.
- **Insurance and Risk Transfer**: Enterprises should consider AI-specific liability insurance to cover regulatory penalties or third-party claims and use enforceable contractual indemnities to shift risk to vendors where possible.

- **Organisational Culture and Training**: Employees must be trained in safe AI usage and IP/data handling policies, while organisations should foster ethical decision-making and proactive reporting of incidents.

By following these steps, enterprises can manage AI risks proactively, maintain compliance and embed accountability into AI systems, positioning themselves to adapt to emerging laws, ethical standards and operational challenges.

Conclusion

Enterprise AI adoption in India has come moved rapidly from whether to adopt AI to how it should be adopted. But within that approach, an important question which demands more consideration whether AI is being deployed in a way that is legally sustainable, ethically grounded and future ready. Legal standards around transparency, accountability, explainability and harm are still evolving through regulation, judicial interpretation and international efforts. Hence, for AI systems which are embedded into core business functions, risk mitigation cannot only be limited to meeting current compliance requirements alone. Systems that merely satisfy today's legal thresholds are likely to become outdated quickly, requiring costly redesigns and upgrades.

At the same time, ethical considerations are increasingly inseparable from legal risk. Bias, opacity and over-automation can undermine trust, distort outcomes and create harms that existing legal frameworks struggle to attribute or remedy. This makes it essential for law and ethics to be operationalized within AI systems themselves. Governance should be embedded into system design through technical and organizational measures such as logging, escalation protocols and clearly defined decision pathways. Enterprises which design and adopt AI with anticipatory legal and ethical constraints will be best positioned to innovate responsibly and sustainably in a rapidly evolving regulatory environment.

The Patents Landscape in India's Deep Tech Sector

By IPpro & Nishith Desai Associates*

Introduction

Deep tech companies work on scientific breakthroughs and technological advancements trough research and innovation. Given the nature of their activities, they have long gestation periods, high level of research and development intensity, and need for long-term capital. Due to their disruptive nature, they have the potential to solve India's most pressing societal issues.

However, the ecosystems that foster deep tech companies can establish only if the intellectual outcomes of companies' research and developments are given strong legal protections under the intellectual property rights laws, specifically patents. Having the exclusive rights to commercialize the intellectual property create reward mechanisms, including revenue generation and valuation, attract all enabling entities to the ecosystem.

In this paper, we are evaluating patent landscape of four most important deep tech sectors: Advanced Computing & AI; Industrial, Autonomous & Intelligent Robotics; Biotech, Life Sciences & Medical Devices; Climate Resilience & Environmental/Energy Technologies. Since the patent databases are not neatly divided into specific and evolving sector definitions, we have painstakingly segregated data based on related keyword searches. In some cases, despite our best efforts, there could be overlap of patents across sub-sectors. Our intent here is provide a larger picture of patent landscape to help innovators, entrepreneurs, investors, and regulators to make appropriate decisions.

Figure 1 shows the broad landscape of patent applications filed and patent granted in India in the four key sectors of deep tech technologies. Here, one should note that there is a time lag between an application for a patent and the granting of a patent. In India, the time lag typically ranges from 2 to 5 years for the normal rout and 1 to 1.5 years for the expedited route. In addition, the patent office does not disclose the searchable information about the patent for 18 months. So, the remaining percentage from the patent granted include patent applications rejected as well as patent applications currently under review and patents granted but currently under the mandatory "secret" stage.

*Varun Kumar, Leader, IPpro; Abhay Porwal, Lead, IPpro; and Dr. Mihir Parikh, Futurist and Strategic Thought Leader, Nishith Desai Associates.

Patents Landscape in India in the Key Deep Tech Sectors

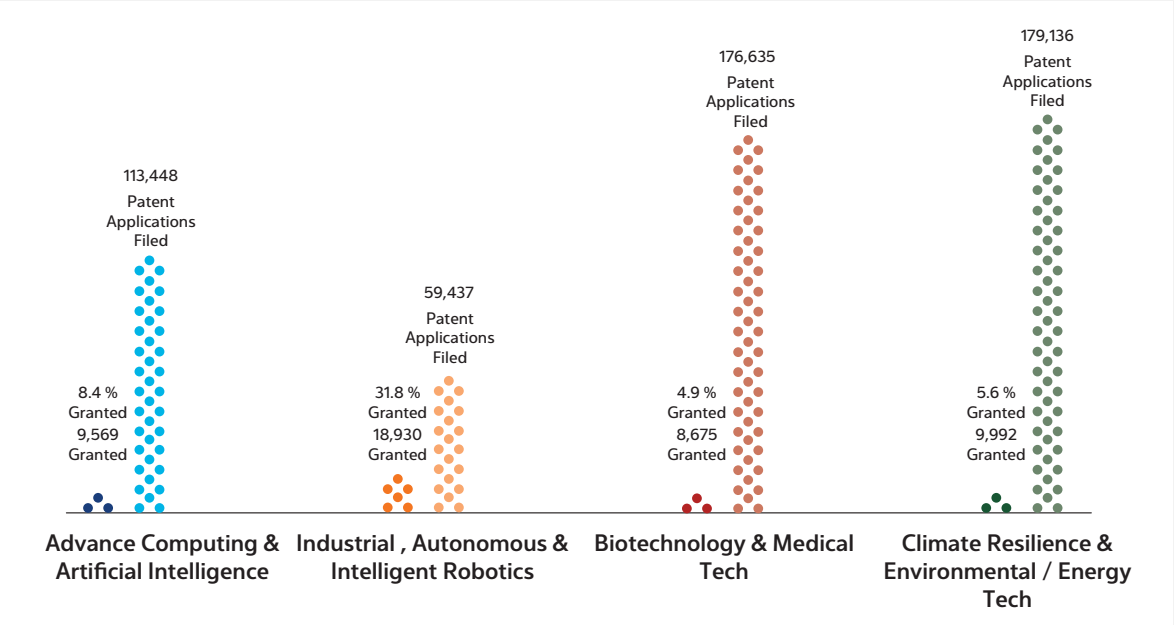


Figure 1: Patents Landscape in India in the Key Deep Tech Sectors

The Decadal Surge in India's Deep Tech Momentum (2015-2025)

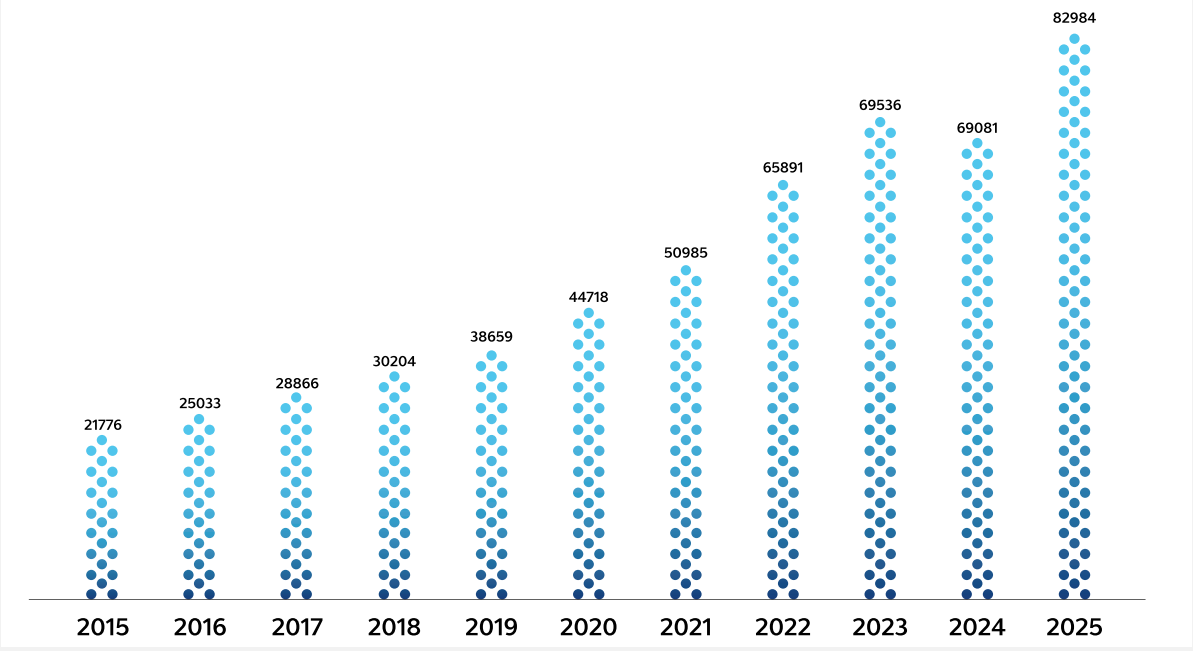


Figure 2: The Decadal Surge in India's Deep Tech Momentum (2015–2025)

Figure 2 tracks the total volume of patent applications filed annually across the four identified deep tech sectors from 2015 to 2025. The data reflects a consistent upward trend in filing activity, with the most substantial growth occurring in the latter half of the decade. Total filings reached their highest recorded levels in 2025, driven largely by significant surges in Advanced Computing and Climate Resilience technologies. This aggregate growth indicates a broad-based intensification of research and development activities across the Indian deep tech landscape

Advanced Computing & Artificial Intelligence

This sector covers core AI technologies and advanced computational systems. India has 9,569 patents granted in this domain. And till 2025, 113+ thousands of patent applications have been filed.

The field of Advanced Computing & Artificial Intelligence has seen rapid increase of patent application from 888 applications in 2015 to 28,396 applications in 2025, an increase of almost 32 folds.

Number of Indian Patent Applications Filed in Advanced Computing & Artificial Intelligence

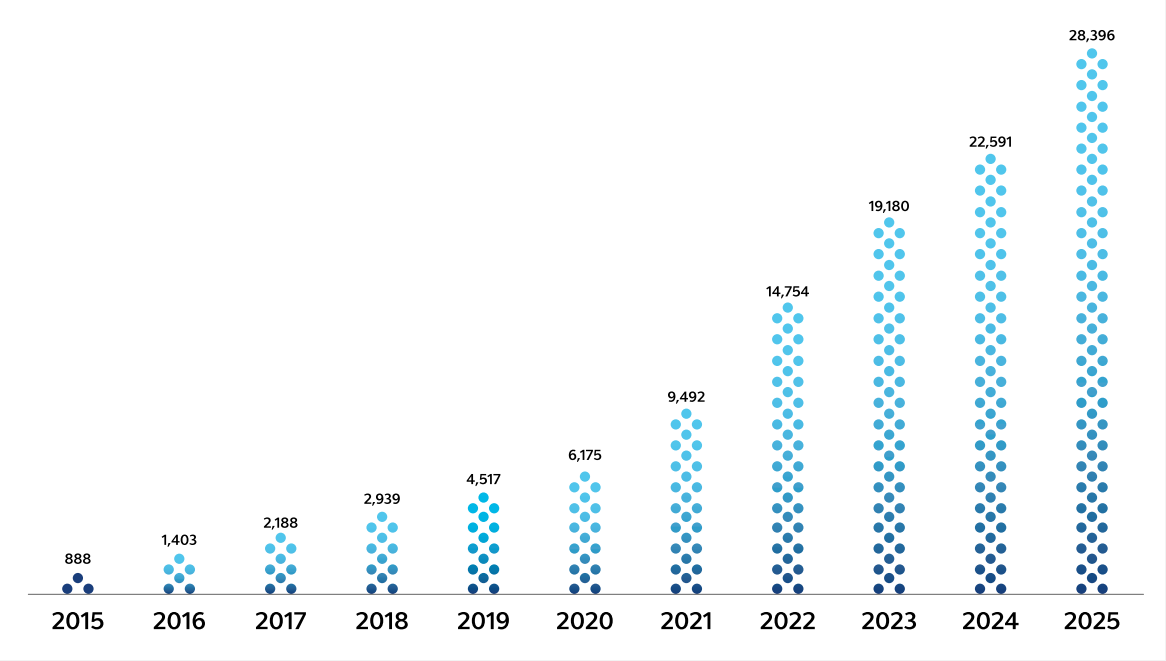


Figure 3: Number of Patents Applications Filed Since 2015 in the field of Advanced Computing & Artificial Intelligence.

The top five organizations who are granted patents in the field of Advanced Computing & Artificial Intelligence are Samsung Electronics, Tata Consultancy Servies (TCS), Google, Wipro and Microsoft. Together they have received 25% of the patents granted.

The presence of TCS and Wipro in the top five proves that Indian giants have the capacity to build core technical moats, even in a sector historically dominated by Silicon Valley and East Asian hardware leaders.

Leading Assignees of the Granted Patents in Advanced Computing & Artificial Intelligence

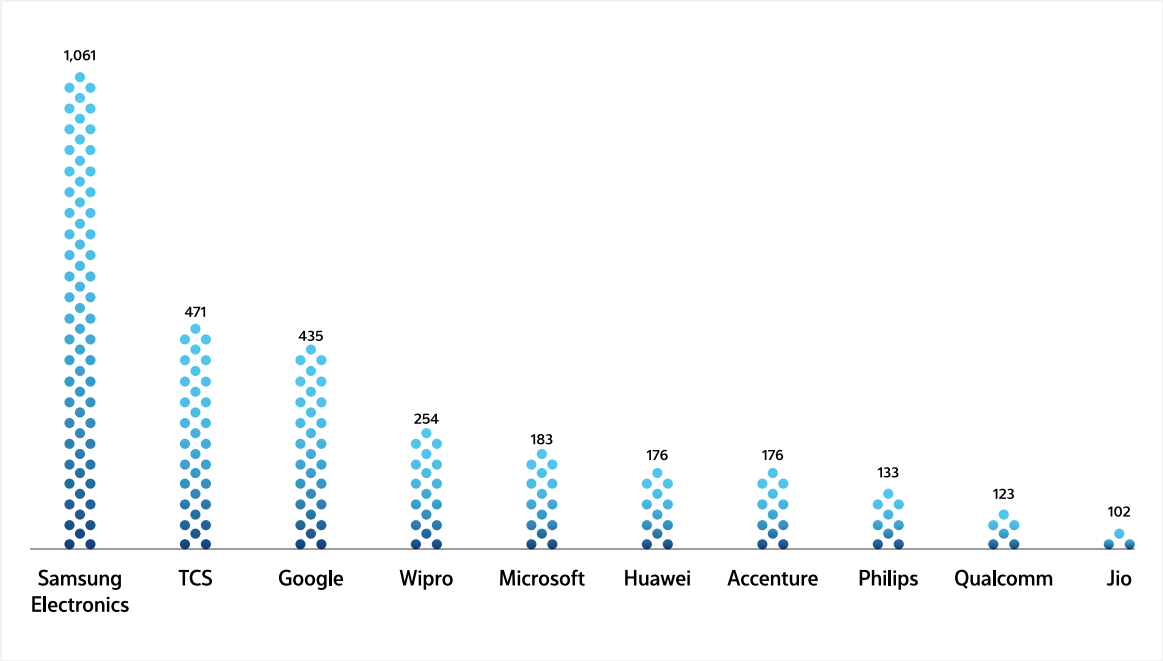


Figure 4: Top Patent Receiving Organizations in the field of Advanced Computing & Artificial Intelligence.

India is a signatory of the Patent Cooperation Treaty (PCT) which allows an organization to seek patent protection in over 150 countries simultaneously through a single "international" application. Among the patents granted in the field of Advanced Computing & Artificial Intelligence, about 62% patents are of Indian origin whereas 38% patents granted were filed through the PCT/National Phase.

Indian Origin versus PCT/National Phase Patent Grants in Advanced Computing & Artificial Intelligence

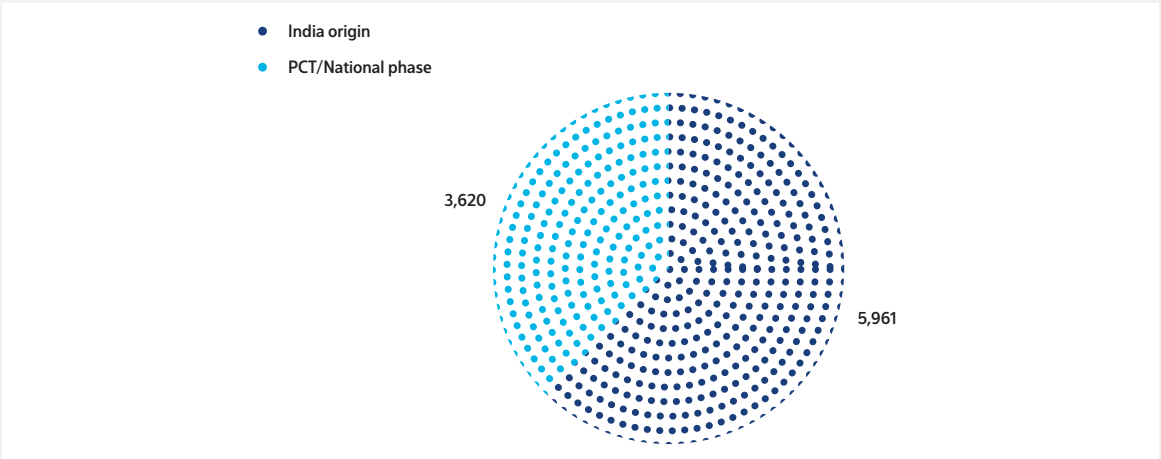


Figure 5: Indian Origin versus PCT/National Phase Patent Grants in the field of Advanced Computing & Artificial Intelligence.

We deep-dived further into the patents granted in five important sub-sectors in Advanced Computing & Artificial Intelligence.

1. Computer Vision – 2,897 patents granted.
2. Natural Language Processing / Conversational AI – 2,123 patents granted.
3. Generative AI – 672 patents granted.
4. Edge AI – 491 patents granted.
5. AI Model Optimization – 2,685 patents granted.

Patents Granted in India in Key Sub-Sectors of Advanced Computing & Artificial Intelligence

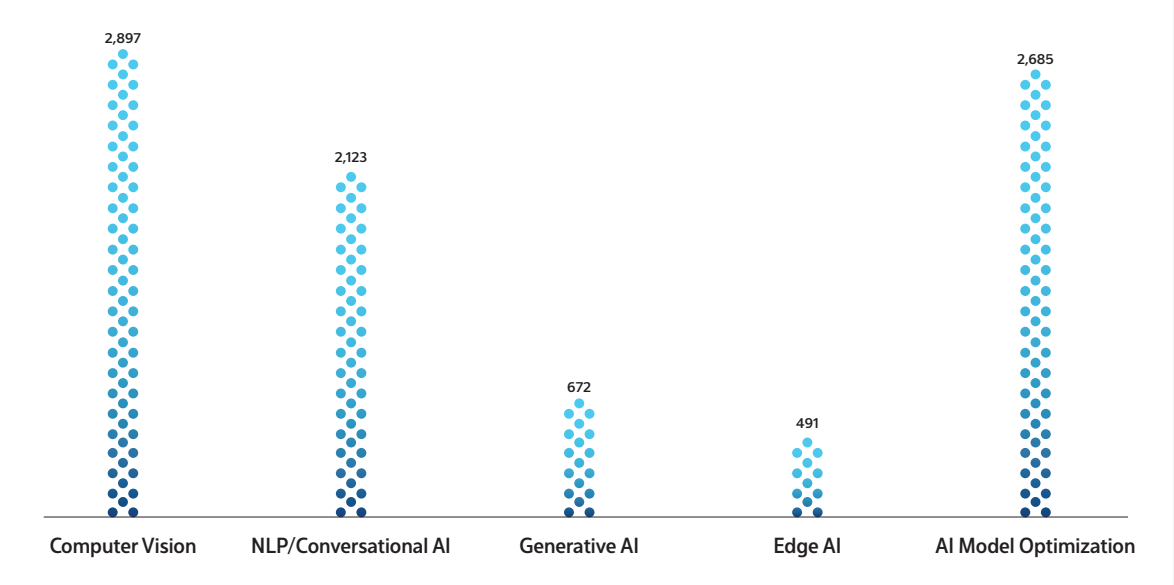


Figure 6: Patents Granted in India in Key Sub-Sectors of the field of Advanced Computing & Artificial Intelligence.

While India demonstrates dominance in AI Model Optimization, a critical vulnerability exists in the field of Generative AI. This is the only sub-sector where PCT/National Phase (foreign) filings outpace Indian origin filings. To avoid becoming merely a 'consumer' of global Large Language Models (LLMs), Indian policymakers and investors must urgently direct capital toward indigenous Generative AI R&D.

Indian Origin versus PCT/National Phase Patent Grants in Advanced Computing & Artificial Intelligence

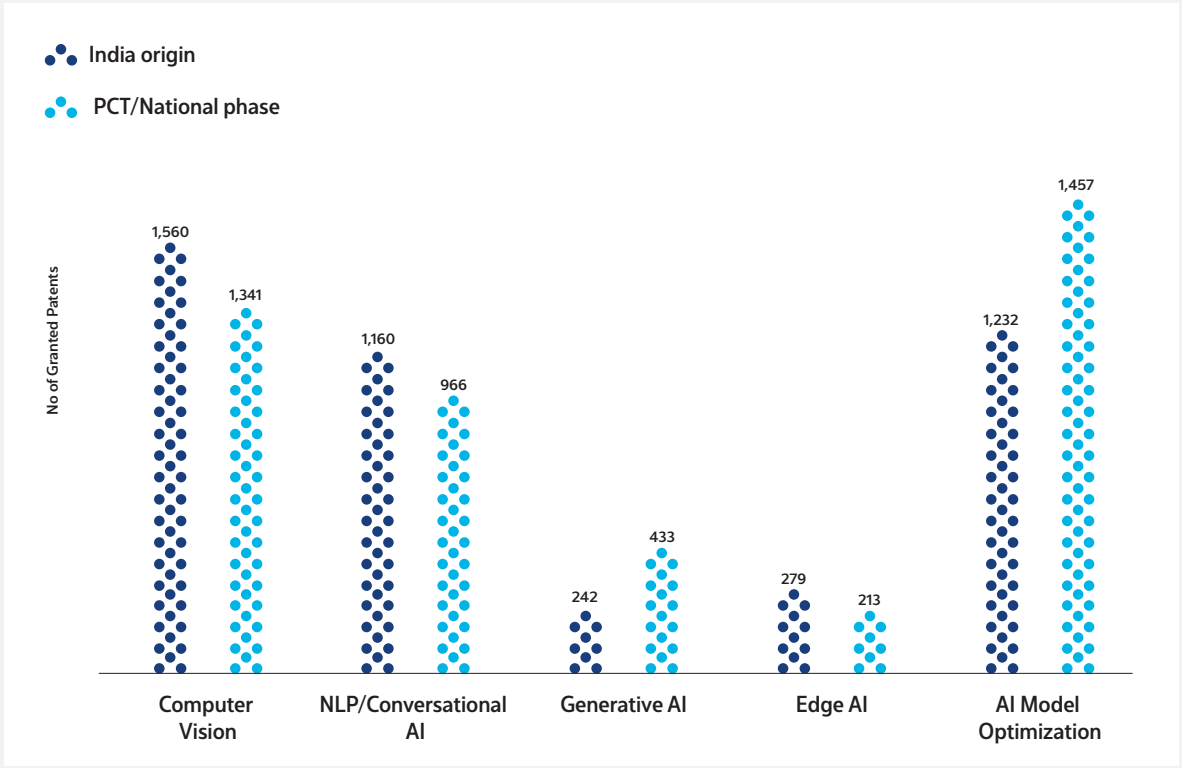


Figure 7: Indian Origin versus PCT/National Phase Patent Grants in Key Sub-Sectors of the field of Advanced Computing & Artificial Intelligence.

Robotics & Autonomous Systems

Robotics innovation reflects progress in automation, autonomy, and intelligent robotic machines. India has 6013 patents granted in directly in robotics and autonomous systems. However, many additional related patents are filed and granted for robots useful in specific sector (cross-sector applications). When we include them, the number increases to almost 19 thousand patents.

The field of Industrial, Autonomous & Intelligent Robotics has seen consistent increase in patent application till 2022, but afterward it has become somewhat tepid. However, still over 8,000 applications have been filed each year.

Number of Indian Patent Applications Filed in Industrial, Autonomous & Intelligent Robotics

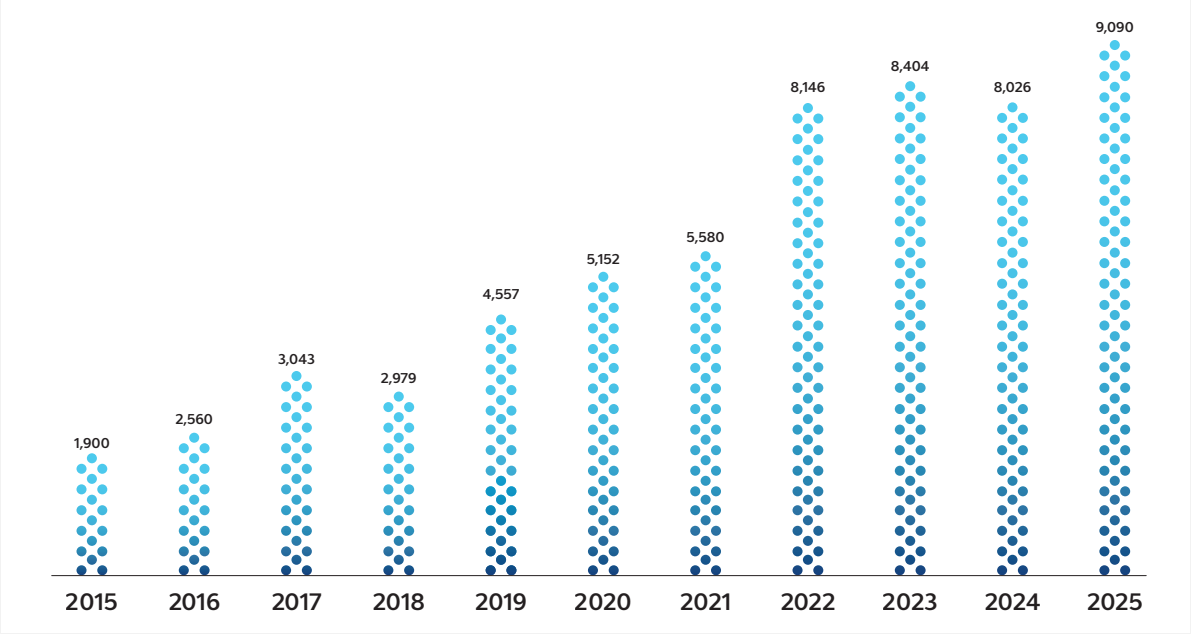


Figure 8: Number of Patents Applications Filed Since 2015 in the field of Industrial, Autonomous & Intelligent Robotics.

The top five organizations who are granted patents in the field of Industrial, Autonomous & Intelligent Robotics are Qualcomm, Samsung, Ethicon Tata Consultancy Services and Google. Together they have received 40% of the patents granted in this field.

Leading Assignees of the Granted Patents in Industrial, Autonomous & Intelligent Robotics

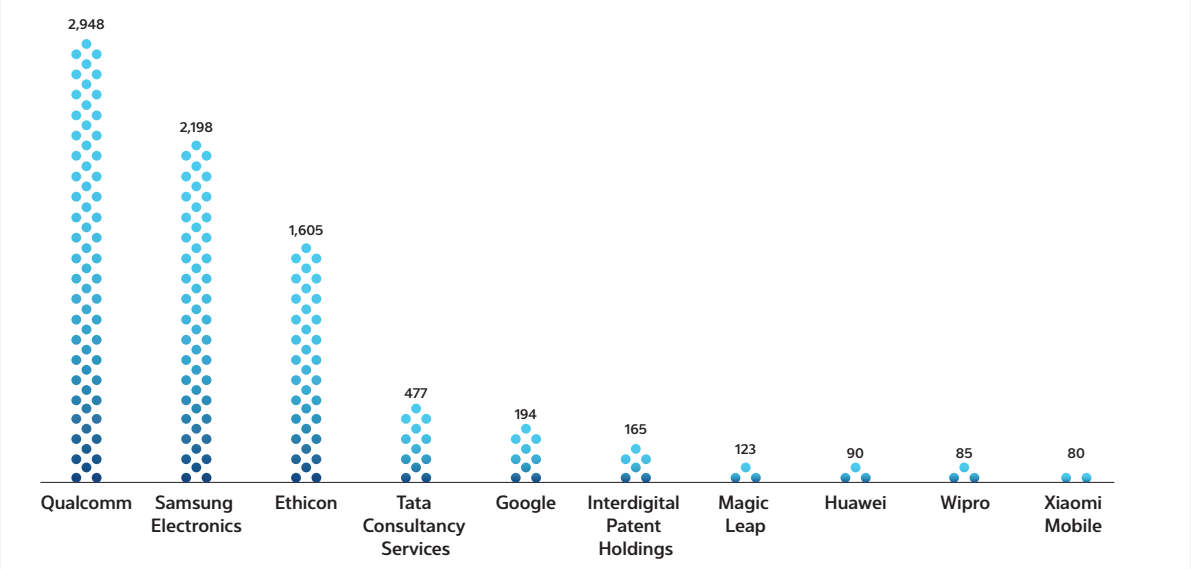


Figure 9: Top Patent Receiving Organizations in the field of Industrial, Autonomous & Intelligent Robotics.

Among the patents granted in the field of Industrial, Autonomous & Intelligent Robotics, about one-third patents are of Indian origin whereas two-third patents are granted were filed through the PCT/National Phase.

Indian Origin versus PCT / National Phase Patent Grants in Industrial, Autonomous & Intelligent Robotics

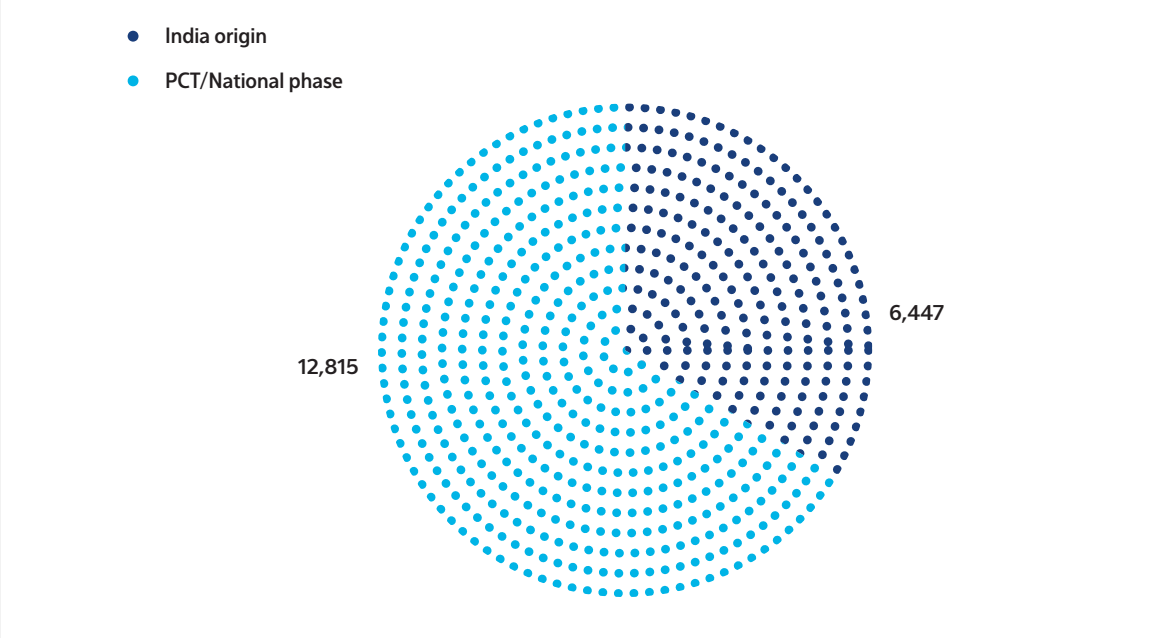


Figure 10: Indian Origin versus PCT/National Phase Patent Grants in the field of Industrial, Autonomous & Intelligent Robotics.

We looked further into the patents granted in five important sub-sectors in the field of Industrial, Autonomous & Intelligent Robotics. The breakdown is:

- Autonomous Vehicles – 632 patents granted.
- Drones / UAV Systems – 3319 patents granted.
- Industrial Robotics – 1033 patents granted.
- Robot Navigation / SLAM – 998 patents granted.
- Human–Robot Interaction – 34 patents granted.

Patents Granted in India in Key Sub-Sectors of Industrial, Autonomous & Intelligent Robotics

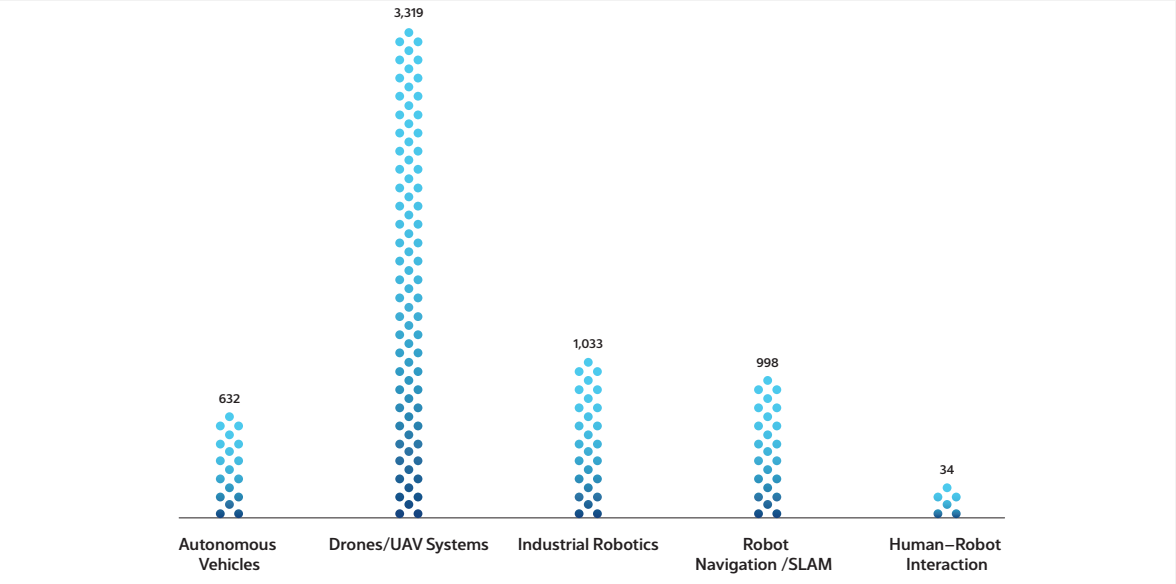


Figure 11: Patents Granted in India in Key Sub-Sectors of the field of Industrial, Autonomous & Intelligent Robotics.

The data suggests a 'Market Access' strategy by global players rather than indigenous capability building. With nearly two-thirds (66%) of granted patents secured through the PCT/National Phase route, international entities are aggressively fencing the Indian market for their hardware. The notable exception is Autonomous Vehicles, where Indian origin grants hold parity with foreign filings, indicating a nascent but competitive domestic auto-tech ecosystem.

Indian Origin versus PCT/National Phase Patent Grants in Industrial, Autonomous & Intelligent Robotics

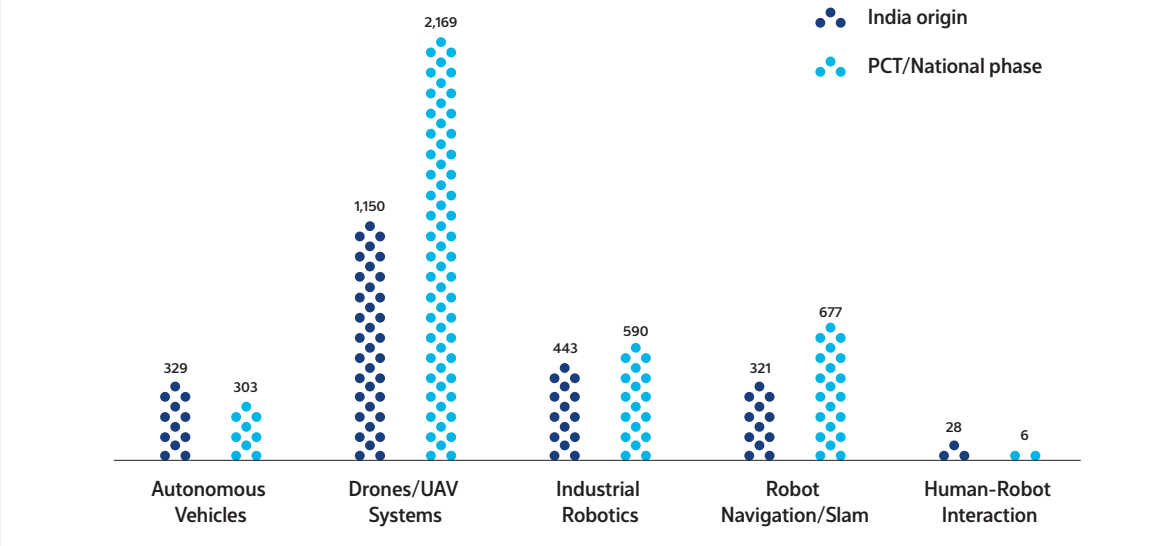


Figure 12: Indian Origin versus PCT/National Phase Patent Grants in Key Sub-Sectors of the field of Industrial, Autonomous & Intelligent Robotics.

Robotics related patents are often filed for applications specific to another sector. So, we did a further analysis of other important sectors where applications of robotics are going to be high. We found that robotics related cross-applications in other sectors are as follows:

- Advanced Materials & Nanotechnology – 159 patents granted.
- Electronics, Photonics & Sensing – 5513 patents granted.
- Industry 4.0 & Advanced Manufacturing – 40 patents granted.
- Semiconductor Technologies – 3147 patents granted.
- Space & Aerospace Technologies – 5454 patents granted.

The data suggests significant patent activity relevant to robotics is occurring within 'Space & Aerospace' (5,454 patents) and 'Electronics, Photonics & Sensing' (5,513 patents). This suggests India's robotics expertise is currently specialized in high-value strategic verticals (defense, space) rather than general manufacturing automation.

Patents Granted in India in Cross Sector Applications of Industrial, Autonomous & Intelligent Robotics

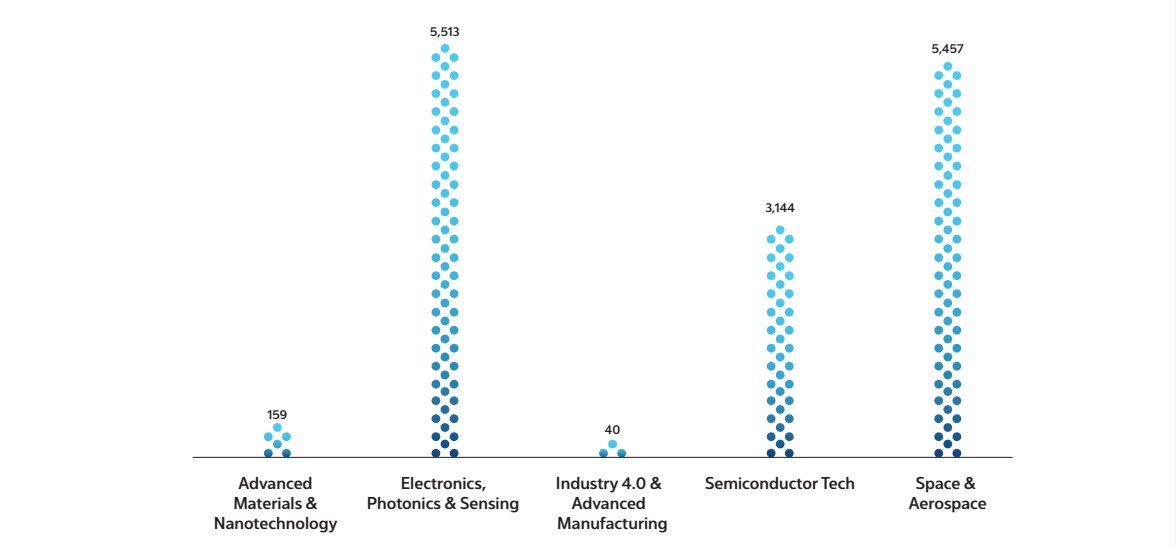


Figure13: Patents Granted in India in Cross Sector Applications of the field of Industrial, Autonomous & Intelligent Robotics.

Biotech, Life Sciences & Medical Devices

In recent years, India has made rapid progress in Biotechnology, Life Sciences and Medical Devices sector. India has granted 8675 patents in this domain. However, the number of applications has swollen to over 175,000.

The field of Biotech, Life Sciences & Medical Devices has seen consistent increase in patent application till 2022, but afterward it has decreased rapidly for two years before increasingly again in 2025. However, 2022 has set the high watermark.

Number of Indian Patent Applications Filed inBiotech, Life Sciences & Medical Devices

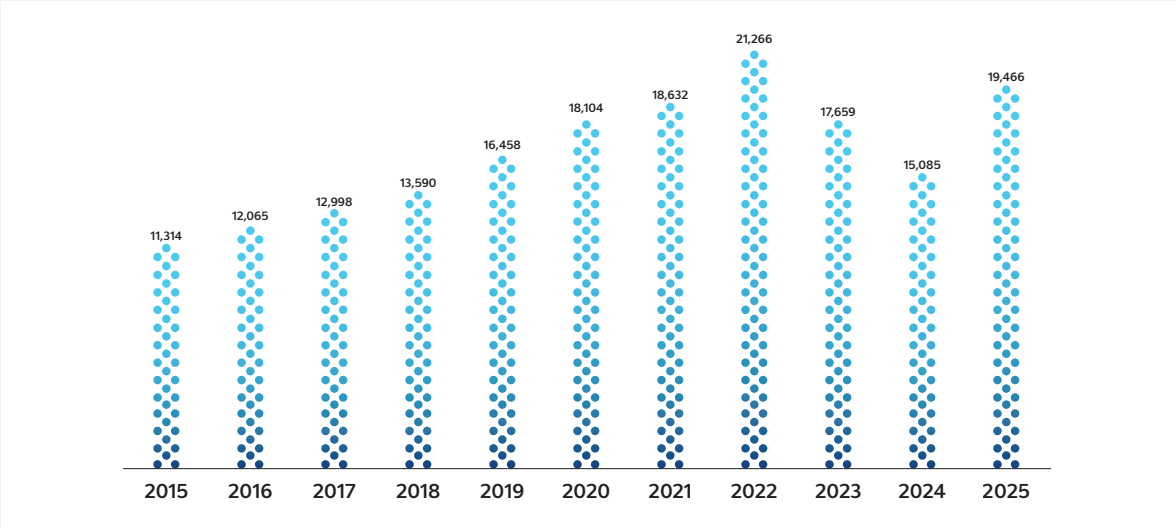


Figure 14: Number of Patents Applications Filed Since 2015 in the field of Biotech, Life Sciences & Medical Devices.

An analysis of the top patent assignees reveals a paradigm shift: 'Big Tech' is becoming the new 'Big Pharma.' The leaderboard is dominated not by traditional pharmaceutical conglomerates, but by technology giants like Samsung Electronics, Qualcomm, Beijing Xiaomi Mobile Software, Xiaomi, and Ethicon. Together they have received 26% of the patents granted. This correlates with the high volume of grants in 'Wearable Medical Devices' and 'Medical Imaging', signaling that India's MedTech revolution is being driven by the digitization and consumerization of healthcare

Leading Assignees of the Granted Patents in Biotech, Life Sciences & Medical Devices

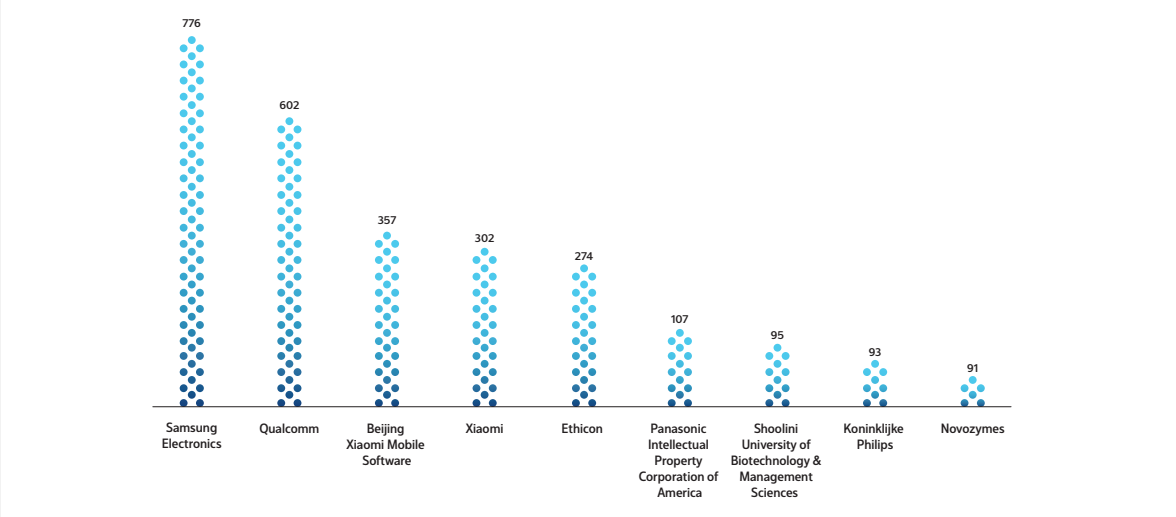


Figure 15: Top Patent Receiving Organizations in the field of Biotech, Life Sciences & Medical Devices.

Among the patents granted in the field of Biotech, Life Sciences & Medical Devices, about 31% patents are of Indian origin whereas 69% patents granted were filed through the PCT/National Phase. To serve the health-care needs of a massive population without heavy reliance on foreign licensing, India must bridge this gap through targeted R&D incentives.

Indian Origin versus PCT / National Phase Patent Grants in Biotech, Life Sciences & Medical Devices

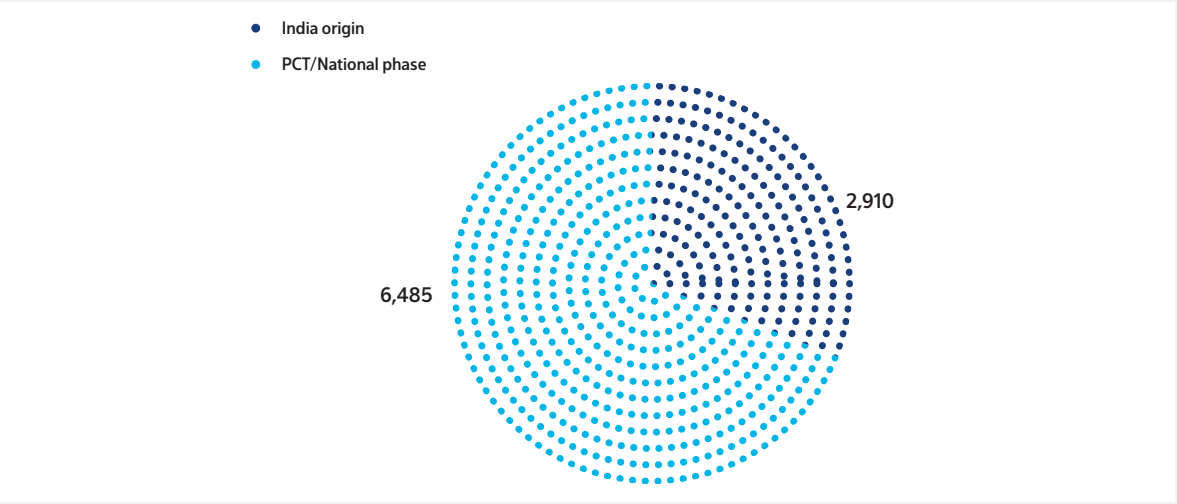


Figure 16: Indian Origin versus PCT/National Phase Patent Grants in the field of Biotech, Life Sciences & Medical Devices.

We scrutinized further into the patents granted in five important sub-sectors in the field of Biotech, Life Sciences & Medical Devices. The patents granted are:

- Molecular Diagnostics – 370 patents granted.
- Medical Imaging Devices – 2267 patents granted.
- Biosensors – 1101 patents granted.
- Wearable Medical Devices – 2929 patents granted.
- Drug Discovery using AI – 1655 patents granted.

Patents Granted in India in Key Sub-Sectors of Biotech, Life Sciences & Medical Devices

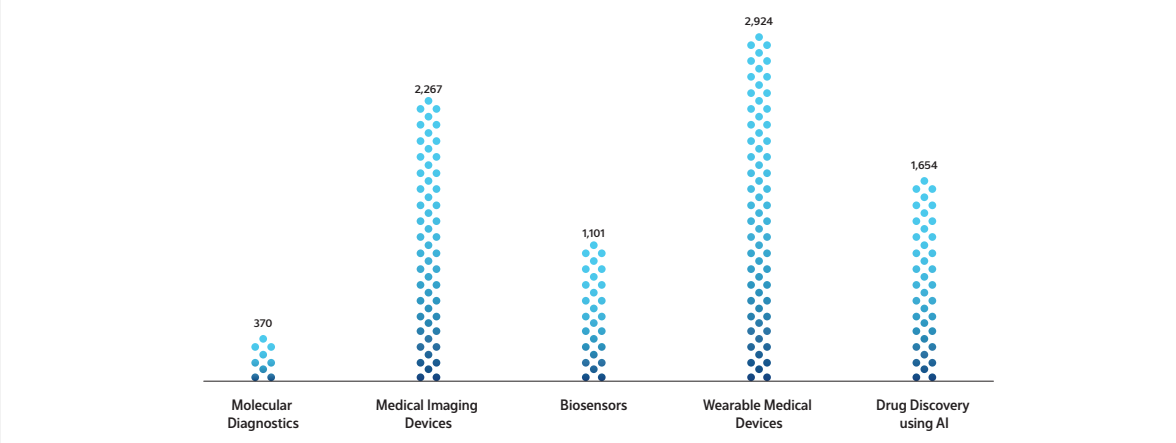


Figure 17: Patents Granted in India in Key Sub-Sectors of the field of Biotech, Life Sciences & Medical Devices.

Among these subsectors, in all five subsectors, PCT/National Phase patents are more than Indian origin patents. In some subsectors they are significantly more, almost as many as two times more. To serve the healthcare needs of its large, but still relatively young at this time, population, India needs to invest heavily into this field to avoid reliance on the foreign biotech, life sciences and medical devices companies.

Indian Origin versus PCT/National Phase Patent Grants in Biotech, Life Sciences & Medical Devices

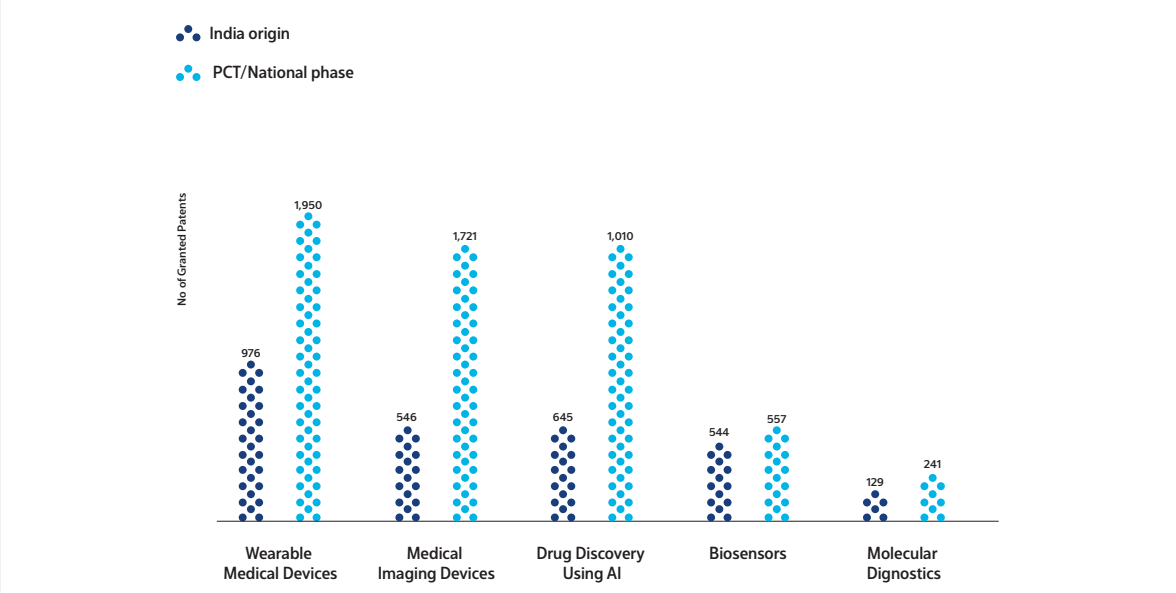


Figure 18: Indian Origin versus PCT/National Phase Patent Grants in Key Sub-Sectors of the field of Biotech, Life Sciences & Medical Devices.

Climate Resilience & Environmental / Energy Technologies

This sector covers a broader aspect of diverse technologies including those related climate monitoring, energy, carbon capture, water/air treatment, etc. India has granted 9992 patents in this domain. The number of granted patents in this sector reflect mature innovations supporting sustainability and energy transition. Also, almost 180+ thousand applications for patents have been filed.

The field of Climate Resilience & Environmental / Energy Technologies has seen consistent increase in patent application till 2023 before decreasing for the year 2024. However, 2025 has again seen the rapid rise to the highest level ever of more than 26 thousand patents filed.

Number of Indian Patent Applications Filed in Climate Resilience & Environmental / Energy Technologies

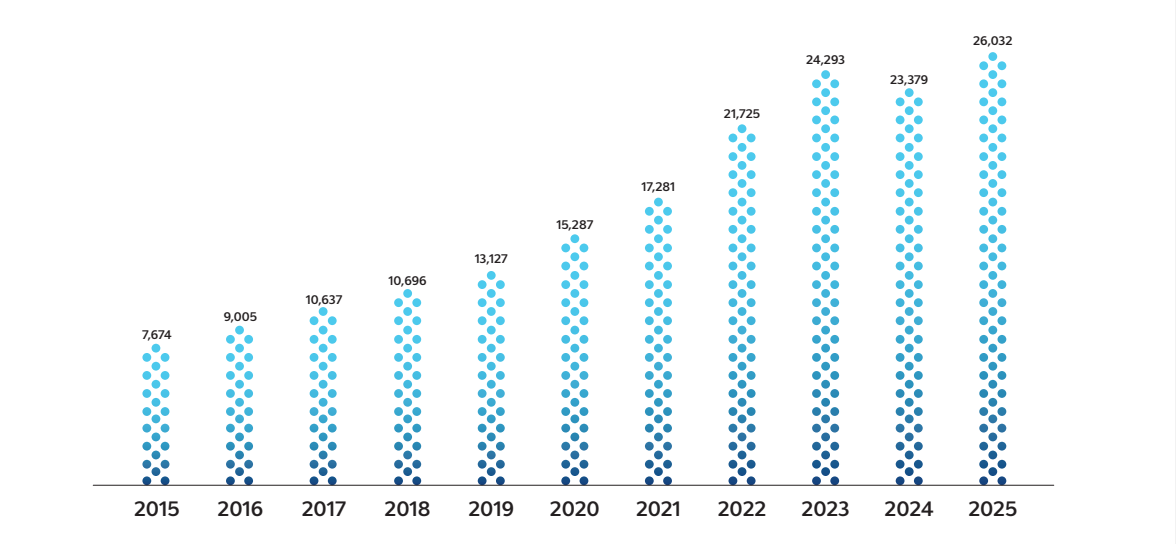


Figure 19: Number of Patents Applications Filed Since 2015 in the field of Climate Resilience & Environmental / Energy Technologies.

The top five organizations who are granted patents in the field of Climate Resilience & Environmental / Energy Technologies are LG Energy, Samsung Electronics, Honda Motor, TVS Motor, and Suzuki Motor. Together they have received only about 12% of the patents granted, indicating wide variety of deep tech companies involved in this field.

Leading Assignees of the Granted Patents in Climate Resilience & Environmental / Energy Technologies

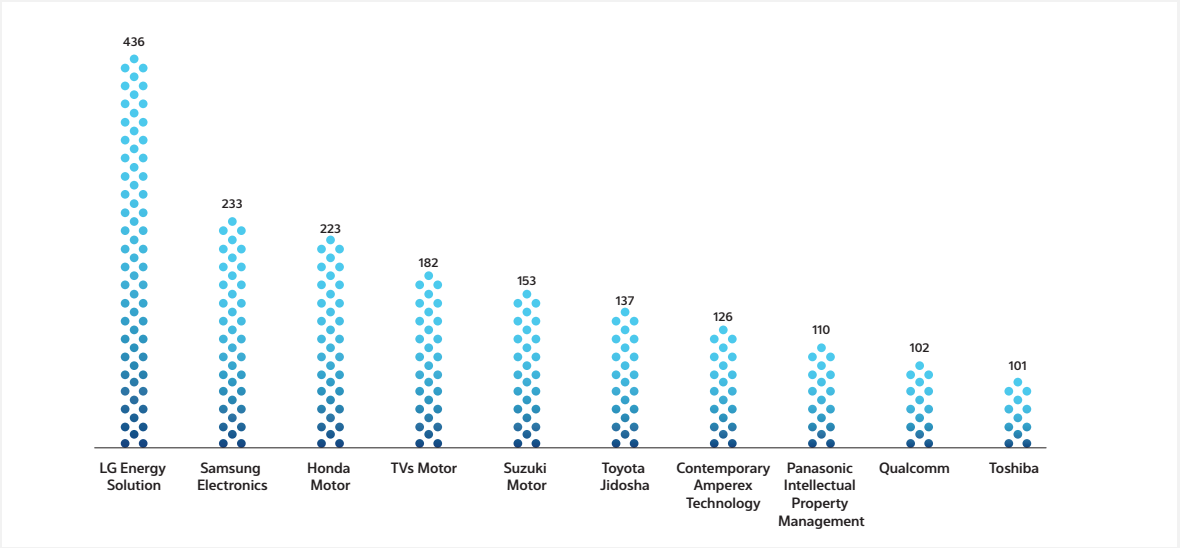


Figure 20: Top Patent Receiving Organizations in the field of Climate Resilience & Environmental / Energy Technologies.

Climate Resilience stands out as the most developed sector among the four sectors. It is the only sector analyzed where Indian origin grants (54%) surpass foreign filings. (46%). This indicates a healthy ecosystem for R&D in this field with a room to grow further.

Indian Origin versus PCT / National Phase Patent Grants in Climate Resilience & Environmental / Energy Technologies

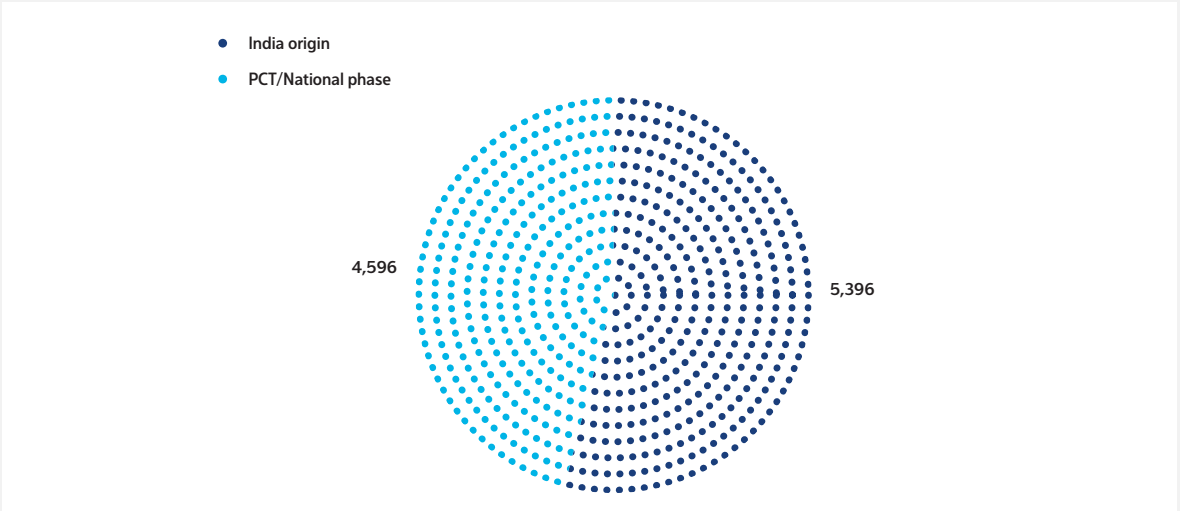


Figure 21: Indian Origin versus PCT/National Phase Patent Grants in the field of Climate Resilience & Environmental / Energy Technologies.

We analyzed further into the patents granted in five important sub-sectors in the field of Climate Resilience & Environmental / Energy Technologies. The patents granted are:

- Renewable Energy Optimization – 2379 patents granted.
- Energy Storage & Battery Systems – 1287 patents granted.
- Carbon Capture Technologies – 516 patents granted.
- Climate Monitoring Systems – 4267 patents granted.
- Water & Air Treatment Technologies – 1096 patents granted.

Patents Granted in India in Key Sub-Sectors of Climate Resilience & Environmental / Energy Technologies

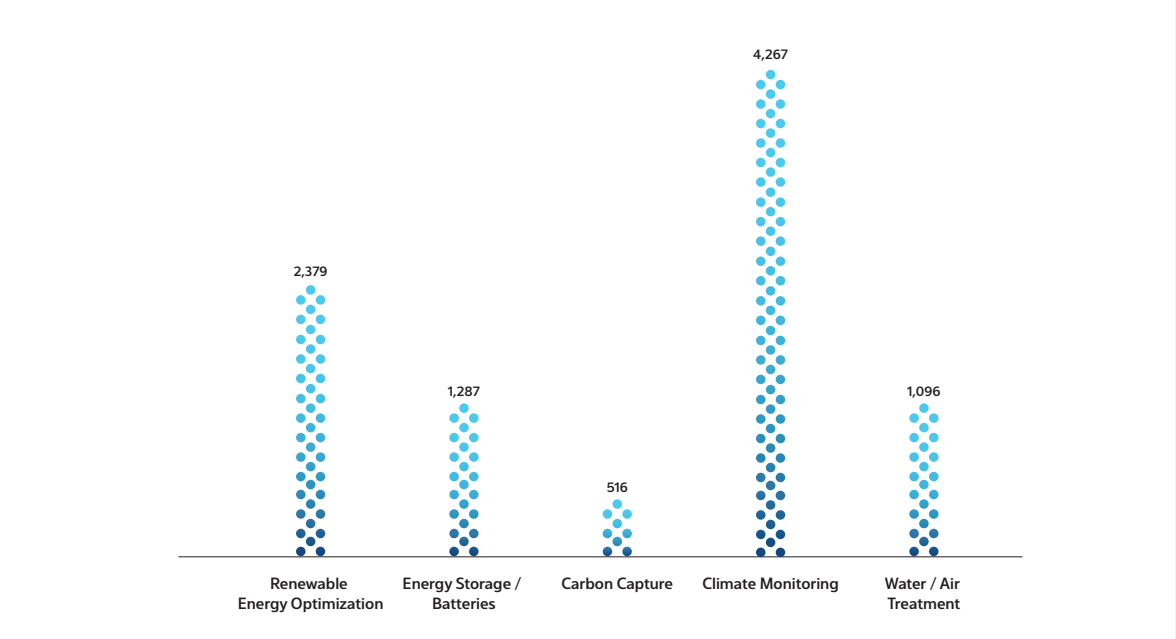


Figure 22: Patents Granted in India in Key Sub-Sectors of the field of Climate Resilience & Environmental / Energy Technologies.

Among these subsectors, only in two subsectors where PCT/National Phase patents are more than Indian origin patents. However, the differences are negligible suggesting an open window for Indian companies to seize global leadership if investments are timed correctly.

Indian Origin versus PCT / National Phase Patent Grants in Climate Resilience & Environmental / Energy Technologies

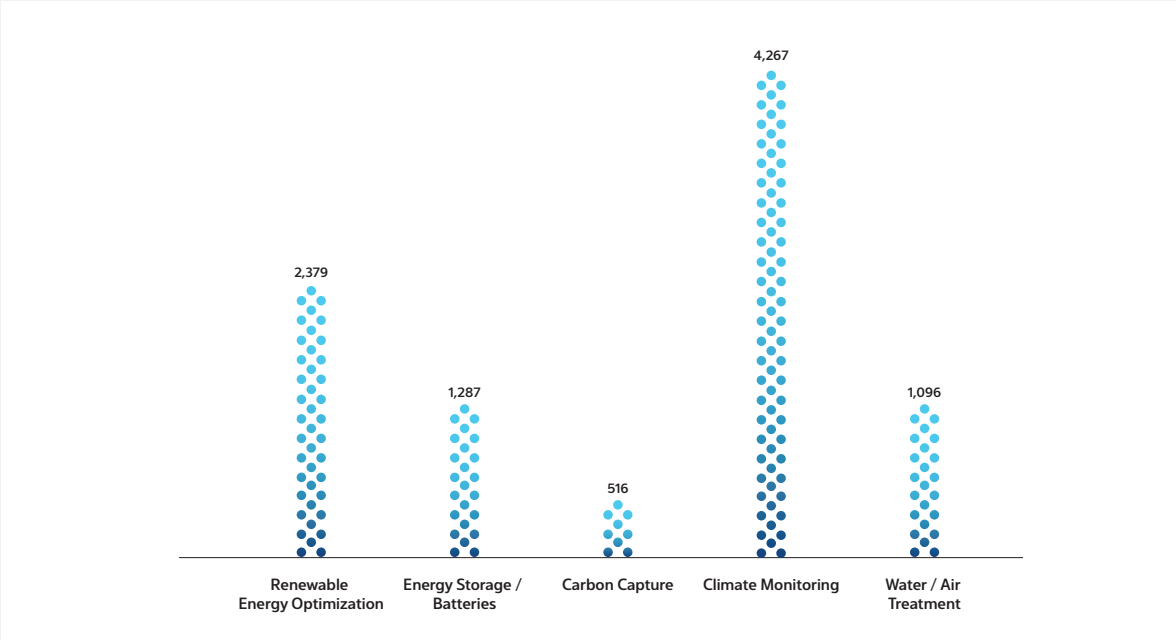


Figure 23: Indian Origin versus PCT/National Phase Patent Grants in Key Sub-Sectors of the field of Climate Resilience & Environmental / Energy Technologies.

Conclusion

We find that most deep tech sub-sectors, India has the need and potential to build self-reliance and high-quality global presence. However, that would require an escalation in R&D capital intensity, achievable only through public-private partnerships and aggressive co-investments models.

Methodology & Disclaimer

Data Source and Aggregation: The insights presented in this report are derived from a comprehensive analysis of patent grants and applications in India. This landscape was made possible through the efforts of the Team at IPpro, who aggregated the data from third-party patent databases using a proprietary keyword clustering approach to segregate patents into evolving deep tech sectors (e.g., 'Advanced Computing,' 'Climate Resilience').

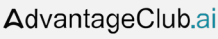
Data Latency & Completeness: Patent data is subject to mandatory publication delays (typically 18 months). Consequently, data for the most recent 18-24 months may be incomplete or subject to retrospective updates as the Indian Patent Office processes applications and moves them beyond the mandatory "secret" stage.

Interpretive Scope: The distinction between “Indian Origin” and “PCT/National Phase” is based on the applicant’s reported jurisdiction and may not fully reflect the location of the R&D activity.

Projections: Any forward-looking statements or trends identified (e.g., growth trajectories into 2026 and beyond) are based on historical filing patterns and may vary based on future regulatory shifts or changes in the economic landscape.

No Legal Advice: This report is intended for informational purposes to guide innovators, investors, and regulators and does not constitute legal or investment advice.

Section C – Illustrative List of Companies

Company Name	Logo	Description
1cell.ai		1Cell.ai is a precision oncology company using advanced artificial intelligence and single-cell multi-omics technology to transform cancer diagnostics and care. Its AI-powered platform analyses individual tumour cells and complex molecular data to deliver real-time, actionable insights for clinicians, researchers and biopharma partners, enabling earlier detection, personalized therapies, and more precise treatment decisions.
4baseCare		Precision oncology platform leveraging AI and genomics to deliver personalized cancer diagnostics and treatment recommendations tailored to Indian populations.
5C Network		5C Network is a Bangalore-based HealthTech company that uses artificial intelligence to enhance radiology diagnostics and reporting. Its AI-powered platform, including the Bionic suite, streamlines medical imaging interpretation and accelerates delivery of clinical reports to support faster, more accurate patient care.
AbleCredit		AI-driven credit underwriting and risk assessment platform enabling lenders to extend credit to underbanked MSMEs using alternative data.
Accelequant		Accelequant is a pioneering deep tech startup operating at the intersection of quantum computing and artificial intelligence. They develop proprietary quantum-based optimization algorithms designed to overcome the hardware bottlenecks of classical computing, delivering up to 100x speed-up and 1000x scalability over traditional methods for large-scale optimization. Accelequant is utilizing quantum computing for AI model training and launching a specialized suite of model training products, designed to process complex neural architectures with unprecedented efficiency. By leveraging quantum-enhanced gradients and optimization, these products will allow enterprises to train high-performance AI models that were previously restricted by the cost and time constraints of classical infrastructure.
AdvantageClub		AI-enabled employee engagement and rewards platform helping enterprises drive retention, productivity, and benefits optimization.
AgentR		AgentR is an AI Hiring Assistant designed to automate and streamline the recruitment process. Unlike traditional Applicant Tracking Systems (ATS) that rely on keyword matching, AgentR uses "easoning-driven" AI to analyze a candidate's career trajectory, achievements, and patterns. It acts as an autonomous agent that can pre-screen candidates, rank talent, and even predict candidate success, aiming to reduce the manual workload for HR teams.

Aqqrue	aqqrue	Aqqrue is a "Finance-as-a-Service" startup that functions as an outsourced, full-stack finance team for growing US businesses (typically with 3M–50M in revenue). Instead of hiring in-house staff, companies use Aqqrue to handle bookkeeping, payroll, controller services, and CFO-level financial planning. They combine human expertise (CPAs/CFOs) with a software layer to provide daily P&L updates and real-time cash flow forecasting
Atomicwork		Atomicwork is an AI-native, agentic service management platform that modernizes internal IT, HR, and workplace support for enterprises. It utilizes a Universal AI Agent, Atom, with multi-modal capabilities to deliver proactive and instant support right in the flow of work across channels like Slack and Teams. The platform automates routine processes and manages enterprise services (ITSM/ESM) to boost employee productivity and efficiency.
Bluecopa	bluecopa	Bluecopa is a Finance Operations Automation platform built specifically for high-growth companies. It helps finance teams automate complex workflows like revenue recognition, commission management, and financial forecasting. The platform unifies financial data and provides real-time insights, driving efficiency and better strategic decision-making.
CargoFL	CARGOFL	CargoFL is an AI-powered logistics operating system that enables seamless collaboration across transporters, suppliers, and distributors, delivering 4–7% cost savings and productivity gains. It offers a unified, end-to-end platform to address enterprise supply chain challenges.
Clientell	Clientell AI	Clientell is a SaaS company that provides AI-based revenue operations and sales execution solutions. They offer an autonomous AI agent that acts as a Salesforce administrator, automating tasks like building custom flows, maintaining CRM data hygiene, and generating reports. This service helps RevOps and sales teams streamline processes, reduce manual work, and improve forecast accuracy.
Composio		Most loved Agentic Infrastructure platform globally by developers, started by IIT B CS graduates. Raised 25M from Lightspeed US.
Confido Health	CONFIDO HEALTH™	Confido Health is an AI-driven platform that automates healthcare operations and patient communications. It uses Voice AI Agents (like Sara, Lily, and Ryan) to handle tasks such as scheduling, payments, and care coordination by integrating directly with EHR and practice management systems. This service helps providers reduce staff administrative workload, increase patient access, and streamline complex front and back-office workflows.
Contiinex	Contiinex	Contiinex provides a Unified Communication as a Service platform that automates end-to-end customer engagement, with real-time speech-to-text (up to 96% accuracy) and AI-driven interaction analytics. It converts customer conversations into actionable insights to improve customer experience, compliance, quality, and agent performance.

Coreworks	COREWORKS	AI for business finance, started by serial entrepreneurs (Previous sold Unbxd to Netcore for 100M)
DreamTeam	DREAMTEAM Technologies Pvt. Ltd.	AI-native CRM, started by product & business leaders from Freshworks with experience of scaling Freshworks to 700M ARR. Raised 12M to disrupt the 100B CRM market globally.
Educational Initiatives	Ei	Leading AI Learning Software Platform offering a comprehensive product suite (summative assessments, formative assessments, personalised adaptive learning) to drive proven and tangible learning outcomes for 1Mn + paying students
Eka Care	eka.care	Eka Care is a connected healthcare platform building a digital backbone for patients and doctors in India. It is a government-approved PHR (Personal Health Record) app and one of the leading platforms for creating ABHA (Ayushman Bharat Health Account) IDs. For Patients: It acts as a digital health locker to store lab reports, scan documents, and track health vitals (like heart rate) using the phone's camera. For Doctors: It provides an AI-powered Clinic Management System (CMS) that helps write digital prescriptions in less than a minute.
Emergent	emergent	Vibe coding platform for non-technical users, started by ex-Founder/CTO of Dunzo. One of fastest growing AI companies globally - 50M ARR in 6 months of product launch, raised 100M from global VCs including Khosla.
Fractal Analytics	fractal	Fractal Analytics is a leading global player in Data Analytics and AI Services (DAAI), with a presence spanning 18 locations worldwide. It delivers data-driven insights and AI solutions across multiple industry verticals — including consumer goods & retail, technology, media, telecom, healthcare & life sciences, and BFSI (banking, financial services and insurance).
Gooru	gooru	Gooru Learning offers an AI powered personalized learning platform called MyGooru that adapts to each learner's knowledge, mindset, interests and abilities in real time. Its deep AI engine uses a proprietary polyline model and large scale learner data (5.3 million+ learners across 110 + projects) to map learner "skyline" to "hi line" mastery pathways and recommend next step resources, nudges and interventions.
H2LooP	H2LooP	H2LooP develops Specialized Language Models (SLMs) and an AI co-pilot for system software engineers. These models are purpose-built for C/C++ legacy code in safety-critical embedded systems across industries like Automotive and Healthcare. The platform accelerates code comprehension, architectural visualization, and auto-generates compliance-ready documentation (e.g., ISO 26262, DICOM).
Helium	Helium	Helium is an agentic AI commerce-intelligence platform for e-commerce brands that optimizes product curation, audience retargeting, and landing-page personalization to maximize conversions.

Hunar		Leading Voice AI solution for frontline hiring in India, used by Swiggy, Flipkart and large banking enterprises. Proprietary AI stack purpose built for Indian context and languages.
Immunito AI		ImmunitoAI is an India-based TechBio company developing novel antibody therapeutics using its proprietary Generative-AI platform. It specializes in AI-driven antibody discovery and design, aiming for high efficiency and success even for difficult targets. The platform's products, imRANK and imEVOLVE, screen and optimize antibody sequences, accelerating the drug development process. The company is currently in the pre-clinical/discovery phase.
IRIS (Intelligent Responsive Information System)		India's 1st 100% indigenous AI system—IRIS is a fully autonomous, sovereign AI agent platform where all data resides securely within India, ensuring complete data sovereignty and compliance. IRIS orchestrates multi-tool workflows to deliver end-to-end solutions across diverse tasks—from generating research-backed PDFs and dynamic presentations to creating images, videos, websites, and production-grade software code. By seamlessly integrating across the broader AI ecosystem with enterprise-grade security, IRIS empowers users to accomplish complex, multi-step projects with natural language commands, transforming fragmented tools into a unified intelligent operating system—all while keeping India's data safe, sovereign, and secure.
Jhana		Building legal AI for Indian judicial ecosystem. Founded by Harvard graduates, and in use by leading high courts in India including Karnataka High Court and Madras High Court.
LambdaTest		LambdaTest, recently rebranded to TestMu AI, is an AI-powered continuous quality testing cloud platform. It enables developers and testers to perform manual and automated cross-browser and mobile app testing at scale across over 3,000 real browsers and devices. The platform leverages AI agents and orchestration tools like HyperExecute to accelerate test execution, streamline workflows, and ensure quality releases.
Latentforce		LatentForce.ai is an AI startup that builds agentic AI solutions to automate codebase modernisation and enterprise workflow automation. Its flagship platform and tools use vision language models (VLMs) and large language model (LLM) agents to convert scanned images, invoices and legacy code into structured, editable formats with audit ready workflows.
Leadsquared		LeadSquared is a multi-vertical AI-powered CRM and automation platform that delivers end-to-end solutions mapping the entire customer journey across marketing, sales, onboarding, and service. Its Service Cloud and Lending Cloud products leverage machine learning and predictive analytics to optimize lead scoring, automate workflows, and personalize engagement at scale. By embedding AI into core processes, LeadSquared enables organizations to enhance sales velocity, improve conversion outcomes, and drive operational efficiency across high-growth industries.

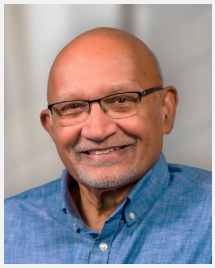
MapMyCrop		MapMyCrop is an AgriTech platform that leverages satellite imagery, AI, and ML to deliver real-time, actionable insights for improving crop yields, soil health, and farm productivity. It supports sustainable farming through a multilingual, user-friendly interface accessible even to non-technical farmers.
Mason		Mason is an AI powered commerce platform designed for direct to consumer brands, enabling hyper personalised shopping experiences and dynamic merchandising across online stores. Its Deep AI engine analyses shopper behaviour, real time intent, inventory signals and promotional mechanics to auto generate product recommendations, personalised landing pages, smart “flash sale” events and one to one shopper journeys.
Metaforms		Automating market research operations for leading enterprises globally. Raised 10M to disrupt the 100B market research market with purpose built multi-modal AI agents.
Mihup		Mihup is a conversation-intelligence and voice-AI platform built on proprietary speech-to-text, natural-language processing, and multilingual understanding technologies with initial focus on automotives and contact center industries. Its Deep AI engine analyses 100% of customer interactions—across voice, chat and email—in real time to surface sentiment, compliance issues, agent guidance, and business-insights.
Miko AI		Miko is a consumer robotics company that builds AI-powered companion robots to make learning fun and interactive for children worldwide.
NeoSapien		Building the operating system layer for Personal AI Assistants, starting with an AI-native wearable that captures and processes conversations in real time for contextual memory and recall.
Nyayanidhi		Nyayanidhi is a legal technology startup building an AI-powered "litigation operating system" for India. It combines Generative AI with a "human-in-the-loop" network of advocates to automate and verify complex legal tasks including legal research, multilingual drafting, translation, and case filings. Their goal is to reduce the time for legal groundwork from weeks to hours and digitize the infrastructure of Indian litigation.
Pando AI		Pando.ai is a logistics technology company that uses AI agents to automate freight and transportation operations for manufacturers, distributors, and retailers, helping them increase agility and control freight costs.
Pixis.ai		Pixis.ai is an AI-driven advertising technology company providing a comprehensive platform that helps brands optimize ad performance, automate creative production, and improve campaign efficiency. Its tools combine performance analytics and generative creative capabilities to boost ROI and streamline marketing workflows.

Portkey		Portkey is a Generative AI platform that acts as a "universal gateway" for building and managing AI applications. It allows companies to connect to any Large Language Model (like OpenAI, Anthropic or Mistral) through a single interface. It provides Observability (logs of all AI requests, costs and latency), Reliability (automatic fallbacks if one model fails) and Prompt Management. It essentially helps engineering teams move AI apps from "prototype" to "production" securely.
Presage		Presage provides AI-driven predictive maintenance solutions for industrial equipment, using advanced signal processing to anticipate failures. This helps reduce downtime and optimise maintenance costs.
Presentations.AI		ChatGPT for presentations. Raised 10M to disrupt the multi-Bn content generation space. Company has scaled to millions of users and revenues and highly profitable
Questt		Questt is an AI platform that develops and deploys autonomous AI agents that can independently execute critical financial tasks, respond to changing conditions, and improve financial workflows all while bringing industry-specific context to the decision-making.
RapidClaims		AI Platform for healthcare revenue cycle management, started by IIT KGP graduates. Raised 11M to disrupt the medical coding marketing using AI and recognized as a category leader globally
Runable		General purpose AI agents for knowledge workforce, built by IIT Roorkee graduate, with user love from thousands of users globally
SiftHub		SiftHub is an AI sales response platform that acts as a central hub to collate and sift through enterprise content scattered across multiple repositories and tools. It empowers sales and pre-sales teams by using AI to discover up-to-date information and automatically generate accurate, tailored responses to RFPs, vendor assessments, and security questionnaires. This functionality helps boost sales productivity and accelerate deal closures.
Signzy Technologies Private Limited		Signzy is a category-leading digital banking infrastructure platform that enables full-stack digital transformation for BFSI institutions in India and globally. Its AI-powered, no-code, multi-modal cognitive platform provides plug-and-play financial modules and pre-integrated APIs for rapid deployment, while its advanced AI-biometric identity layer delivers visual intelligence for secure and seamless customer and merchant onboarding. In addition, Signzy offers workflow automation and capabilities across fraud and risk management, underwriting, and contract lifecycle management, supporting comprehensive, compliant and scalable digital operations.

Smallest.AI		Smallest AI is a deep tech startup building state-of-the-art Voice AI models that are lightweight, low-latency and privacy-focused. Unlike massive generic models (LLMs), they focus on Small Language Models (SLMs) specifically designed for enterprise needs like contact center automation. Their Lightning Text-to-Speech (TTS) engine claims to be the fastest in the world, generating 10 seconds of audio in under 100 milliseconds (faster than human response time). They power real-time AI agents for the Banking and Finance sectors (handling collections, sales and support calls) that sound hyper-realistic and can interrupt/converse naturally.
SpotDraft		SpotDraft is an AI-powered Contract Lifecycle Management platform that helps businesses streamline and automate their entire contract lifecycle. It provides a single operational layer for creation, negotiation, execution, and secure storage of contracts. By embedding AI into workflows, SpotDraft enables legal and business teams to move faster, reduce risk, and make data-driven decisions. The platform supports compliance and operational efficiency for organizations of all sizes.
Spry Health		System of record for Physiotherapy clinics, started by ex-CTO at Ola. They are top two players in their category globally with 25M raised from global funds including Fidelity/8roads.
Squadstack AI		SquadStack.ai is India's leading conversational AI platform, automating sales, support, and collections with human-like Voice AI agents.
Unbox Robotics		Unbox Robotics is a supply chain robotics technology company that provides AI-powered, software-defined systems for warehouse automation and logistics. Its flagship product, UnboxSort, uses proprietary Swarm Intelligence and vertical robotic sortation to efficiently sort parcels. The modular solution reduces required floor space by 50-70% and increases personnel productivity by 3-5 times. It serves e-commerce, retail, and logistics operators globally to enable faster, smarter, and more reliable order fulfillment.

Section D – IDTA Members

Executive Committee Members



Arun Kumar (Chair)
Celesta Capital

Sanjeev Bikhchandani
Info Edge

Anand Daniel
Accel

Anuj Golecha
Venture Catalysts

Gopal Jain
Gaja Capital

Vani Kola
Kalaari Capital

TK Kurien
Premji Invest

Pranav Pai
3one4 Capital

Rachit Parekh
Accel

Sudhir Sethi
Chiratae Ventures

Dr. Apoorva Ranjan Sharma
Venture Catalysts

Vibhore Sharma
Info Edge

Ravi Kiran Vadapally
Premji Invest

Sriram Viswanathan
Celesta Capital

Nishith Desai
Nishith Desai Associates, Special Invitee

General Council Members

3one4 Capital		Premji Invest	
Accel		Qualcomm Ventures	
Activate		Singularity AMC	
Blume Ventures		Tenacity Ventures	
Celesta Capital		Together Fund	
Chiratae Ventures		Venture Catalysts	
Gaja Capital		WaterBridge Ventures	
GrowthCap Ventures		YourNest Venture Capital	
Ideaspring Capital			
InfoEdge			
Kalaari Capital			
Merak Ventures			

Strategic and Technical Advisor

Nvidia

Strategic Partners

Applied Materials

CG Power

Lam Research

Larsen & Toubro

Micron

Section E – Appendix

Notes on India's Emerging Deep Tech Champions

1. 5C Networks

Building the World's Most Intelligent Radiology AI from India

A. State of the Art & Global Competitiveness

I. Global Benchmarking

5C Network's Bionic Vision AI achieves a 0.93 F1 score across 234 pathologies, placing it among the world's most accurate radiology AI systems. The company processes over 10,000 scans daily across 1,500+ healthcare facilities with 400+ radiologists. Unlike global competitors who rely on classification-based AI trained on limited public datasets, 5C uses a retrieval-based architecture trained on 3 billion+ images across 20 million+ studies. This approach mirrors how expert radiologists actually work: comparing current scans against a vast library of prior cases

II. Beyond cloud deployment

5C's AI is now embedded directly inside X-ray machines through a partnership with BPL Medical Technologies. This 'Intel Inside' approach for radiology represents a new deployment paradigm where AI operates at the point of image capture, not just interpretation.

III. IP & Defensibility

5C's moat is its proprietary dataset, the world's largest annotated medical imaging database, built entirely in India. The company's unique insight: use teleradiology operations as a continuous data acquisition engine. Every scan processed improves the AI. This creates a compounding advantage that no competitor can replicate without operating at a similar scale for years. Replicating 20 million studies with expert annotations would cost hundreds of millions of dollars and take a decade. The entire technology stack, from annotation pipelines to the Bionic Suite (Vision, Voice, LM, Flow, On Point, Prodigi, evo), is India-developed.

IV. Innovation Type

This is a first-in-the-world innovation. No other company globally has combined teleradiology operations with AI development at this scale. 5C's unit economics of 70-90% gross margins compared to industry standard of 20-30%, demonstrate a fundamentally new business model for healthcare AI.

B. Current Maturity & Market Validation

I. Technology Readiness Level

The platform has achieved Commercial scale (TRL 9) and is fully deployed and battle-tested across diverse clinical environments.

II. Commercial Status

Scaling rapidly. 5C serves India's largest hospital chains, including Apollo, Fortis, and Manipal. The company processes over 1 million scans quarterly and employs 190+ people, including a 90-person annotation team that continuously refines AI accuracy through operational feedback loops. 5C recently completed its first international acquisition (NDI, a US teleradiology company with $8.3M revenue), demonstrating technology transferability across markets.

III. Deployment

The primary customer base is domestic (India), with active international expansion underway. In India, deployment extends beyond cloud services to hardware-embedded AI inside BPL Medical Technologies X-ray machines operating across facilities nationwide. Revenue target: 100 CR by March 2027 in India alone, with US operations scaling in parallel.

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ India's CDSCO framework for AI medical devices is fundamentally sound and improving. 5C is pursuing CDSCO MD-5 approval for over 100 AI models. However, two challenges remain: First, approval timelines could be further accelerated to match the pace of AI innovation. Second, and more critically, CDSCO approval is not recognized internationally. Indian AI companies must pursue separate FDA (US), CE Mark (Europe), and other national approvals to export their products. A mutual recognition framework, or Indian leadership in establishing one for emerging markets, would dramatically accelerate the global competitiveness of Indian healthcare AI companies.
Capital & Infrastructure	▪ India has a unique opportunity in healthcare AI. We have the data (billions of real-world clinical images), we have the application layer expertise (decades of IT services domain knowledge), and we have validated AI deployments at scale. What's missing is strategic capital to turn this into a "from India, for India, for the world" success story. Beyond standard venture capital, Indian healthcare AI needs patient capital for long-duration R&D in foundation models, non-dilutive grants for clinical validation studies, and equipment financing for compute infrastructure. India already dominates the data and application layers of AI. Targeted funding can ensure Indian companies capture the value rather than becoming data suppliers to foreign platforms.
Ecosystem Multipliers	▪ Access to high-performance compute infrastructure through IndiaAI. Foundation models for medical imaging, particularly 3D volumetric analysis for CT and MRI, require significant GPU resources. Subsidized access to the national compute infrastructure would allow Indian startups to compete with well-capitalized US and Chinese competitors without diverting scarce capital from clinical deployment. ▪ Government procurement mandates recognizing AI-assisted diagnostics as essential healthcare infrastructure. India has 12,000 radiologists serving 1.4 billion people. AI is the only scalable solution. If Ayushman Bharat and state health programs mandated AI-assisted reporting for public hospitals, it would create reference deployments that validate Indian technology for global markets while directly improving care for underserved populations.

2. Agnit Semiconductors

A. State of the Art & Global Competitiveness

I. Global Benchmarking

The global shift towards compact, efficient, and high-power electronic systems in wireless communication and power conversion has driven strong adoption of Gallium Nitride (GaN)–based semiconductors. GaN significantly outperforms silicon in power density, efficiency, and high-frequency operation, making it critical for applications such as radar systems, 5G radios, drones, and fast chargers.

Agnit is one of only five companies globally with full vertical integration across GaN materials (wafers), proprietary semiconductor manufacturing processes, device design, and module development for radio-frequency applications. Its products are globally competitive on both performance and cost, positioning India alongside leading international GaN technology producers.

II. IP & Defensibility

Agnit's core IP is India-developed and originates from over 17 years of research at the Indian Institute of Science (IISc), Bangalore. The company holds 18+ patents and is backed by 150+ peer-reviewed publications across GaN materials, processes, and device technologies. This deep, vertically integrated IP base creates strong defensibility in a domain where GaN technologies are export-controlled and strategically sensitive.

III. Innovation Type

Agnit represents an India-first realization of globally competitive GaN semiconductor product capabilities across materials, devices, and modules. While GaN technology exists globally, Agnit is among the very few companies worldwide to achieve this level of end-to-end integration using indigenous technology.

B. Current Maturity & Market Validation

I. Technology Readiness Level

Agnit's GaN wafers and radio-frequency components are at advanced pilot and field-trial stages (TRL 6–7), with multiple products undergoing validation in real-world use cases.

II. Commercial Status

The company has transitioned from research to early commercialization, with products being evaluated by Indian and international customers. Volume production is planned to begin by late 2026, marking the transition toward commercial-scale manufacturing.

III. Deployment

Agnit's products are currently undergoing field trials with both domestic and international customers across strategic applications such as drone communication links, jammers, and radio handset systems.

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ The absence of long-term, assured procurement frameworks for indigenous semiconductor components limits scale-up and global competitiveness. Clear policies that prioritize domestic sourcing for strategic and telecom applications are critical.
Capital & Infrastructure	▪ Non-dilutive product development funding is essential to support high-capex semiconductor R&D, pilot manufacturing, and yield optimization. Patient capital aligned with long semiconductor development cycles is also required.
Ecosystem Multipliers	▪ Government-led procurement programs where the state acts as the first customer, combined with long-term supply contracts, would provide critical demand assurance. Access to advanced fabrication, testing infrastructure, and continued support for indigenous semiconductor manufacturing would enable Agnit to scale into a globally competitive GaN product company.

3. Educational Initiative

Educational Initiative (EI) was founded in 2001 by three IIM Ahmedabad alumni. EI is a leading AI Learning Software Platform offering a comprehensive product suite (summative assessments, formative assessments, personalised adaptive learning) to drive proven and tangible learning outcomes for 1Mn + paying K-12 students. Educational Initiatives represents a rare Indian success story: a deeply research-led, globally competitive education software company with a sustainable business model, scale, and a defensible AI moat built in India.

A. State of the Art & Global Competitiveness

I. Global Benchmarking

- EI operates at the global frontier of education technology, comparable to leading international institutions. Unlike many EdTech platforms that prioritise content delivery, EI's core technology is grounded in measurement science, cognitive diagnostics, and longitudinal learning analytics.
- EI Mindspark, a personalised adaptive learning platform, has undergone multiple independent third-party evaluations from reputed and leading global institutions like MIT-JPAL, IDinsight, and Gray Matters, demonstrating 3-5x gains in student learning.
- EI's assessment and adaptive learning systems are designed to detect deep conceptual understanding and student misconceptions, a capability that remains rare globally and is typically confined to advanced education systems.

II. IP & Defensibility

EI's competitive moat is anchored in India-developed intellectual capital, including proprietary datasets spanning 20+ years, comprising billions of student interaction and response data points, with uniquely labelled misconceptions across grades, subjects, and geographies, and indigenous diagnostic algorithms and learning progression models refined through continuous deployment in real classrooms. This data and knowledge base, built organically over two decades, constitutes a durable, non-replicable moat that is both Indian and globally competitive.

III. Innovation Type

EI represents an India-first, globally leading innovation. While drawing on global advances in AI and learning science, its solutions are originally developed in India, for India and other emerging markets, and now compete at par with, and in several dimensions exceed, global benchmarks in education software.

B. Current Status & Market Validation

I. Technology Readiness Level

The platform operates at TRL 9 – Commercial scale deployment. EI's platforms are fully productised, continuously improved, and deployed in live learning environments.

II. Commercial Status

EI reported operating revenues of INR 150 Cr for the Financial Year ending 2025 and has a sustainable and profitable business model.

III. Deployment & Reach

EI's solutions are actively deployed across India and five international markets, serving top private schools, education authorities (CBSE, KHDA), state and central government, and universities. The primary customer base spans both domestic and international markets, demonstrating strong global relevance and scalability. EI's AI capabilities are already embedded in live products, including constrained Generative AI features designed for safe, ethical use in child-facing environments, such as personalised reading and engagement tools within its adaptive learning platforms.

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ Recognition of learning assessment, diagnostic platforms, and personalised adaptive learning as core digital public education infrastructure, not discretionary EdTech tools ▪ Clear national frameworks for AI deployment in school education, especially around data sharing, evaluation standards, and public procurement
Capital & Infrastructure	▪ In line with the Economic Survey of India 2025-26, the introduction of PISA-like assessment for school-going students for large-scale measurement of student learning levels, benchmarking at the state and global level. This should be further complemented by interventions to address these gaps. ▪ Government-backed grants for building next-generation foundation models and datasets for Indian curricula and languages

Ecosystem Multipliers	▪ In line with the New Education Policy, implementation of a robust system of continuous formative/ adaptive assessment to track and thereby individualize and ensure each student's learning. ▪ Structured access to public education systems for large-scale pilots and procurement ▪ Access to school-level infrastructure, including computer labs, tablets for students, and internet connectivity. ▪ National repositories and compute support for education-focused AI research. ▪ Talent pipelines combining AI, cognitive science, and education research to sustain global leadership.

4. Gooru

Gooru is a sovereign Indian AI innovation that has built GPS for Human Development — an infrastructure that actively senses users through conversations, voice, and camera, develops beliefs based on domain science, and formally reasons over those beliefs to generate mathematically certain, explainable pathways that assure measurable outcomes across learning, health, and finance.

A. State of the Art & Global Competitiveness

I. Global Benchmarking

Current global approaches to personalization fall into two camps: prescriptive ML systems that pattern-match from historical data, and LLM-based systems that generate plausible next steps without structural validation. Gooru's breakthrough is a fundamentally different architecture. MyGooru digitizes domains into computable mathematical structures, then uses Active Sensing — gathering real-time data from conversations, voice, and camera in any Indian language, including mixed-language contexts like Hindi+ English — to develop precise beliefs about each user across thousands of attributes. Proprietary Polyline Algebra then formally reasons over these beliefs to generate pathways that are mathematically validated, not statistically guessed. This delivers 36% faster time-to-mastery compared to control groups. No global competitor combines active multimodal sensing, domain digitization, belief systems, and algebraic pathway validation into a single infrastructure.

II. IP & Defensibility

Gooru possesses a strong defensible moat through three provisional patents covering the Polyline Model for Complex Systems, Navigated Learning Technology, and Universal N=1 Personalization. The technology is validated across 5.3 million users through $35M in funded research conducted over 13 years. The entire technology stack is India-developed, with a 22-person engineering team based in India, led by CEO Dr. Prasad Ram (IIT Bombay, former Director of Research at Google Maps, former CTO of Yahoo India) and CPO Srinivasan HP (IISc alumnus, former co-founder of Samyog Software), with advisory support from IIIT-Bangalore and a distinguished board spanning Stanford University, University of Utah, and Hong Kong Polytechnic University.

III. Innovation Type

This is a first-in-the-world innovation. Gooru is the only platform that operationalizes domain science through formal reasoning to guarantee valid personalized pathways — rather than predicting the next likely step from patterns. The architecture is universal and domain-agnostic: the same Active Sensing and formal reasoning infrastructure that today personalizes primary school instruction in Marathi for a government school teacher also generates upskilling pathways for manufacturing workers at Bosch, and is architected to generate financial wellness plans and health behavior change pathways. This is a category-defining platform built entirely in India.

B. Current Maturity & Market Validation

I. Technology Readiness Level

Gooru is at TRL 9 (actual system proven in operational environment). The technology has been validated through 5.3 million users and $35M in research over 13 years through Navigator Labs, the research nonprofit. Gooru Learning Inc. was established as a commercial entity in April 2024 to scale this proven infrastructure and has achieved rapid market traction.

II. Commercial Status

Gooru has successfully moved from Lab to Market and is in the Scaling phase. The company has $400K in collected annual revenue from 9 customers with 96% retention, $600K in committed revenue from enterprise customers, including Tata Electronics, Blueprint, Government of Barbados, and 2456.ai (Sweden), and $200K+ in active pipeline — providing $1.2M in revenue visibility within 12 months. The company has a clear path to profitability by mid-2026 and is positioning for a $5M seed round.

III. Deployment

The solution is actively deployed in live environments across multiple sectors and geographies, with a strong India footprint.

In India, India Education Collective and Gyan Prakash Foundation deploy MyGooru in government schools where 45,000 teachers use the platform to deliver personalized instruction in Hindi and Marathi for primary school education — in classrooms where only the teacher has a device. Active Sensing through voice and conversation enables personalization even in the most resource-constrained environments. Lernern uses MyGooru to upskill 22,000 workers as they are placed in jobs across KFC, Hyundai Automotive, Bosch, Schneider Electric, and Royal Enfield. Tata Electronics has committed to deploying MyGooru to increase productivity and minimize attrition among 90,000 manufacturing employees, with a process replicable across Foxconn and other Tata plants.

Internationally, Global Education has deployed a white-labeled version across Lebanon, the UAE, and Saudi Arabia for K-12 education. Tennessee State Mental Health uses MyGooru for statewide mental health worker certification. The Great Courses achieved 40% increase in content discovery and 25% improvement in trial-to-paid conversion. The Government of Barbados is deploying MyGooru nationally for lifelong learning to support industrial economy transformation. 2456.ai in Sweden is integrating MyGooru for enterprise productivity — validating the platform's applicability beyond learning.

The multilingual, multimodal Active Sensing capability — working in any Indian language in voice and script — positions Gooru uniquely for Bharat-scale deployment while simultaneously serving global markets.

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ Outcome-Verified Procurement. Current Digital India tenders for education (DIKSHA) and health focus on content volume and platform access rather than measurable efficacy. India should establish a National Outcome Registry where technology vendors must demonstrate verified outcome improvements — not just content delivery — to qualify for public procurement. Gooru's architecture is uniquely positioned for this because its formal reasoning produces explainable, auditable pathways where every recommendation can be traced to domain science. This shifts the regulatory conversation from "unregulated GenAI" to "Certified Explainable AI," a standard that India can define globally.
Capital & Infrastructure	▪ Patient Capital for deep tech AI Infrastructure. Gooru's hybrid algebraic-statistical architecture required 13 years of research and $35M in funding before reaching commercial scale — a timeline incompatible with standard venture capital expectations. India needs dedicated patient capital mechanisms for deep tech AI infrastructure: non-dilutive government grants for frontier AI R&D through programs like iDEX or MEITY's AI initiatives, outcome-linked funding where government disbursements are tied to verified results (e.g., measured mastery improvements in government school deployments), and bridge capital programs that help proven technologies cross the gap between research validation and commercial scale. Gooru's founders currently work without compensation to sustain operations — a pattern common across India's deep tech startups that patient capital would directly address.
Ecosystem Multipliers	▪ Data Sandboxes and Procurement Mandates. Scaling N=1 personalization for 1.4 billion people requires two ecosystem enablers. First, access to anonymized public datasets through the India Data Management Office (IDMO) to calibrate belief models across India's diverse linguistic, cultural, and economic contexts — Gooru's Active Sensing already works in any Indian language, but richer public data would accelerate domain digitization for health and finance verticals. Second, mandate that 10% of state-level skill development budgets (PMKVY) be allocated to Navigated Learning platforms that can demonstrate measurable outcome improvements — a benchmark Gooru has already exceeded with 36% faster mastery globally and 22,000 workers successfully placed through Learners in India. These interventions would not only accelerate Gooru but also establish India as the global standard-setter for outcome-verified AI personalization infrastructure.

Regulatory OpportunityOutcome-Verified Procurement. Current Digital India tenders for education (DIKSHA) and health focus on content volume and platform access rather than measurable efficacy. India should establish a National Outcome Registry where technology vendors must demonstrate verified outcome improvements — not just content delivery — to qualify for public procurement. Gooru's architecture is uniquely positioned for this because its formal reasoning produces explainable, auditable pathways where every recommendation can be traced to domain science. This shifts the regulatory conversation from "unregulated GenAI" to "Certified Explainable AI," a standard that India can define globally.

Capital & InfrastructurePatient Capital for deep tech AI Infrastructure. Gooru's hybrid algebraic-statistical architecture required 13 years of research and $35M in funding before reaching commercial scale — a timeline incompatible with standard venture capital expectations. India needs dedicated patient capital mechanisms for deep tech AI infrastructure: non-dilutive government grants for frontier AI R&D through programs like iDEX or MEITY's AI initiatives, outcome-linked funding where government disbursements are tied to verified results (e.g., measured mastery improvements in government school deployments), and bridge capital programs that help proven technologies cross the gap between research validation and commercial scale. Gooru's founders currently work without compensation to sustain operations — a pattern common across India's deep tech startups that patient capital would directly address.

Ecosystem MultipliersData Sandboxes and Procurement Mandates. Scaling N=1 personalization for 1.4 billion people requires two ecosystem enablers. First, access to anonymized public datasets through the India Data Management Office (IDMO) to calibrate belief models across India's diverse linguistic, cultural, and economic contexts — Gooru's Active Sensing already works in any Indian language, but richer public data would accelerate domain digitization for health and finance verticals. Second, mandate that 10% of state-level skill development budgets (PMKVY) be allocated to Navigated Learning platforms that can demonstrate measurable outcome improvements — a benchmark Gooru has already exceeded with 36% faster mastery globally and 22,000 workers successfully placed through Learners in India. These interventions would not only accelerate Gooru but also establish India as the global standard-setter for outcome-verified AI personalization infrastructure.

5. IRIS Intelligence

IRIS Intelligence is the first platform in the world which envisions to create a fully autonomous intelligence in the hands of the common man who can use natural language to access knowledge in specialized fields currently inaccessible in existing ecosystem and transcend that knowledge to deep research documents, websites, slide decks and 100+ output formats in one unified platform instead of going to 100+ different tools in the fragmented market that the AI ecosystem currently is. Today, the power to create and train AI is concentrated in the hands of a few large tech companies, and that too is not deep enough for fields like medical, semiconductors, etc. This has created a massive gap between the knowledge of domain experts and the ability of AI tools to leverage that knowledge for providing autonomously intelligent solutions. A doctor with 100 research papers or a semiconductor expert with decades of experience holds invaluable wisdom, but they lack the means to translate that into AI intelligence.

IRIS will become the central intelligence hub of the world and unlock a new era of democratized AI knowledge, where deeper intelligence in niche fields is available freely and shared via global community of domain experts using IRIS platform, fostering a more intelligent and equitable world, making powerful AI accessible to the student in a village, the Kirana store owner, and the first-generation entrepreneur.

A. State-of-the-Art and Global Competitiveness

Iris focuses on Agentic AI (integrating multi-modal, multi-domain tools for target completion) while most existing AI tools are Gen AI focused (conversational output).

I. US Big Tech LLMs (ChatGPT, Gemini, Claude)

Dominate conversational AI but remain simple input -> output chatbots at core. They respond, not execute. No multi-format outputs. Little domain depth. All data flows to US servers. Users still need 10 other tools after using them.

Competitive strategy of IRIS

IRIS delivers fully autonomous execution across 50+ formats, unified in one sovereign platform. Give capabilities that big LLM companies are not focusing on. 100% India-based processing, production-ready reliability, and expert-contributed knowledge depth intelligence.

II. Manus AI (Chinese)

Manus is a form of an agent system that performs tasks, but it is of Chinese origin, with data flowing to foreign servers, raising massive privacy and regulatory concerns. It is an agentic AI with autonomous execution, but with the same level of generic information that LLMs can provide, and the speed of operation of Manus for the same task is currently much slower than IRIS.

Competitive strategy of IRIS

100% India-based processing, production-ready reliability, and expert-contributed knowledge depth intelligence.

III. Key aspects of MOAT

- First platform combining autonomous execution + expert depth + multi-format output + data sovereignty
- No global player offers this unified stack
- Manus AI (Chinese-origin) is the closest competitor, but raises significant data sovereignty and regulatory concerns, as well as having no domain expertise, network, or capability
- Supports Multiple Indian languages
- Proprietary agentic architecture — India-developed; handles complex multi-step autonomous execution, delivering various output formats
- Expert knowledge framework — Unique framework built by the IRIS Team to give normal users and domain experts the ability to train AI for the first time in history
- India-first data sovereignty — 100% processing within India; built-in regulatory compliance. All IP is Design-In-India and stored in India.

B. Current Maturity & Market Validation

I. Technology Readiness Level

TRL7+ (Pilot/Prototype Stage with Real Users)

II. Commercial status and deployment

- Stage: Pre-revenue, Beta testing with live users
- The platform is live for beta users.
- Primary user base: India (domestic), but the platform is available for anyone across the globe.

III. Immediate Roadmap

Aspect	IRIS	Global Competitors
Regulatory	India-compliant, local data	Not optimized for India
Language	Multiple Indian languages	English-primary
Enterprise GTM	Direct relationships, local teams	Remote-heavy
Pricing	20% cheaper than Perplexity/Manus	Premium pricing
Agent Capabilities	Domain-specific agents (Semiconductors, Finance, HR, legal)	Expert agents

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ Ambiguity in AI regulations: Unclear liability framework for AI-generated outputs creates hesitation in enterprise and government adoption. Recommendation: Clear AI governance framework needed — India-contextualized, startup-friendly. ▪ Data localization enforcement gaps: Policy exists, but enforcement is inconsistent; foreign AI players (ChatGPT, Manus) operate freely without compliance. Recommendation: Stronger enforcement of data sovereignty requirements for AI platforms handling Indian user data. ▪ No AI procurement mandate: Government departments default to foreign AI tools despite data sensitivity. Recommendation: Mandate preference for Indian AI platforms in governmental programs.
Capital & Infrastructure	▪ Patient capital for AI infrastructure: AI companies need 2-3 years to optimize costs and achieve profitability; traditional VCs expect faster returns. Needed: Government-backed patient capital funds specifically for AI infrastructure companies (5-7 year horizon). ▪ Non-dilutive grants for R&D: Early-stage AI startups dilute heavily for R&D capital; grants preserve founder equity. Needed: Expand MeitY TIDE grants; create a dedicated AI R&D grant pool in the ₹25L-1Cr range. ▪ Compute credits/subsidies: AI inference costs are prohibitive (₹42/task); Indian startups cannot compete with US companies receiving free Azure/AWS/GCP credits. Needed: National AI Compute Mission — subsidized GPU access and API credits for Indian AI startups. ▪ Equipment financing: Building proprietary AI models requires expensive GPU infrastructure (₹1-10Cr+). Needed: Low-interest equipment financing for AI hardware
Ecosystem Multipliers	▪ National AI Compute Infrastructure: Indian startups pay full price for cloud/GPU while competing against foreign companies with massive subsidies. Impact if addressed: Level playing field; 10x more Indian AI startups can scale. ▪ Government as First Customer: No structured pathway for IRIS and other AI startups to pilot with government departments. Impact if addressed: Fast-track pilot programs; procurement sandbox for Indian AI solutions. ▪ Testing & Certification Labs: No standardized way to certify AI accuracy, safety, and compliance. Impact if addressed: National AI Testing Infrastructure for credibility and enterprise adoption.

6. KBCols

Bridging the Pilot-to-Commercial Gap in India's Deep Tech Biotechnology Ecosystem

KBCols is a biotechnology studio pioneering sustainable material innovation. The company leverages advanced bioprocesses to engineer natural, vibrant bio-colors, offering a scalable, eco-friendly alternative to synthetic chemical dyes.

KBCols, our journey started with a simple but powerful question: Can India's microbial diversity help replace harmful chemical colors used across industries?

India is one of the most biodiverse regions in the world, yet much of this biological wealth remains underutilized in industrial innovation. At KBCols, we source and study diverse microorganisms from across India to develop microbial-based colors that are sustainable, scalable, and safe.

Our bio-colors are designed to reduce the dependence on synthetic chemical dyes in industries such as textiles, cosmetics, and food, where environmental impact and human exposure are long-standing concerns. Using microbial fermentation and bioprocess engineering, we are working to create alternatives that are not only greener but also consistent and industry-ready.

Today, KBCols is at a pre-commercialization stage. Most of our efforts have gone into strain development, process stability, and running pilots—many of which are now nearing completion. This phase has been both exciting and challenging. While building the science is hard, taking a deep tech solution from pilot to market in India is often harder.

One of the biggest challenges we face is the pilot-to-commercial gap. Startups like ours are expected to meet heavy compliance and regulatory requirements even before meaningful revenues begin, which slows down momentum. At the same time, industries are often cautious about adopting new bio-based solutions unless the startup absorbs most of the risk. Converting a successful pilot into a commercial deployment requires strong industry participation, shared risk, and faster decision-making.

From our experience, for India to become a global leader in deep tech and AI-enabled biotechnology, three shifts are critical. a) First, simpler, stage-appropriate compliance for startups transitioning from pilot to early commercialization, b) Second, greater industry involvement in validating and scaling indigenous technologies rather than waiting for fully mature solutions, c) Third, patient capital and long-term thinking, especially for biology-led innovations that take time but deliver durable impact.

India has the talent, biodiversity, and intent to lead in sustainable Deep Tech. With the right ecosystem support, startups like KBCols can ensure that innovation built in Indian labs scales into global, real-world solutions.

7. KreditBee

A. State-of-the-Art and Global Competitiveness

I. Global Benchmarking

KreditBee's core technology is tailored specifically for the Indian market, with exceptional adaptability towards "new to credit" and underserved populations. The breakthrough aspect does not stem from a single breakthrough technology/algorithm, but from the production-grade integration of disparate and proprietary data points, digital onboarding, real-time decisioning, and large-scale risk operations for India's existing and new-to-credit segment. The platform's ability to digitally and quickly execute the entire process from application to disbursement to collections at scale within India's regulatory, data, and behavioral context represents a competitive execution advantage.

II. IP & Defensibility

KreditBee's primary defensible 'moat' lies in its proprietary, in-house credit scoring algorithmic system, which includes proprietary datasets, feature engineering pipelines, decisioning frameworks, and continuous model learning loops. This system has been developed in India and is continuously refined using a vast and unique dataset gathered from millions of users and loan applications. The uniqueness and scale of behavioral and repayment data across millions of Indian customers, which create high replication barriers, is a core part of its IP. The defensibility is therefore a proven system that incorporates and integrates data, operational learning, and risk processes at scale.

III. Innovation Type

The solution represents an India-first platform innovation, combining digital onboarding, alternative data underwriting, real-time decisioning, and regulated lending partnerships into a seamless system for end-user credit access. While digital lending is a global concept, KreditBee's model is purpose-built for India's scale, data heterogeneity, and regulatory structure. The model is a pioneering application of data, science, and digital on a single platform to solve the problem of credit access for a large, untapped Indian market segment.

B. Current Status & Market Validation

I. Technology Readiness Level

The product is at Commercial Scale. KreditBee's platform is fully operational with millions of registered users and a significant volume of loans disbursed, indicating a mature and market-tested technology stack.

II. Commercial Status

KreditBee is well beyond the early stages and is currently scaling. It has a large, established commercial footprint with a substantial user base and is focused on growing its loan book and market share within India. The platform is not pre-revenue; it is an active, revenue-generating business.

III. Deployment

The solution is currently deployed in a live environment. The primary and exclusive customer base is domestic (India), as its entire business model and credit assessment framework are built around the Indian consumer profile and regulatory landscape.

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	The primary bottleneck is the evolving regulatory landscape for digital lending in India, specifically: ▪ The need for continued clarity and stability in the RBI's Digital Lending Guidelines. ▪ Navigating the framework for Lending Service Providers (LSPs) and their partnerships with regulated entities (Banks/NBFCs). ▪ Ensuring compliance with data privacy laws like the Digital Personal Data Protection Act (DPDPA), which impacts how customer data can be used for underwriting.
Capital & Infrastructure	▪ As a scaled venture, the primary need would be for growth equity and access to debt capital for its lending partners to expand their loan books. The key challenge is not the lack of venture capital, but ensuring that the regulatory environment remains stable to attract this large-scale institutional investment.
Ecosystem Multipliers	To become a global leader in this space, the following would be essential: ▪ A stable and predictable regulatory environment that encourages innovation while protecting consumers. ▪ Deeper integration with India's digital public infrastructure, such as the Account Aggregator framework, to enable more secure and consented access to data for underwriting. ▪ A continued pipeline of skilled talent in data science, machine learning, and financial technology to further refine its proprietary models and maintain a competitive edge ▪ If India's Digital Public Infrastructure (AA, UPI, eKYC) evolves into exportable regulatory-tech standards (e.g., UPI), companies like KreditBee could productize their underwriting and lending platforms for emerging markets in Southeast Asia, Africa, and LATAM.

8. Miko

A. State-of-the-Art and Global Competitiveness

For over a decade, IIT Bombay alumni at Miko (RN Chidakashi Technologies Private Limited) have been advancing a vision where emotionally intelligent, self-learning machines work alongside humans to enhance the quality of life across education, social development, and caregiving. By integrating proprietary advanced AI into safe, consumer-friendly platform products, Miko has demonstrated how responsible AI can nurture children's cognitive and emotional development and is being extended to enable dignified, human-centric care for the elderly and other vulnerable populations.

Anchored in indigenous innovation, Miko holds over 20 India-owned global patents across AI, robotics, and human–machine interaction. Guided by a strong national vision under the spirit of Make in India, for the World and Atmanirbhar Bharat, Miko has built foundational AI capabilities in India while protecting and scaling them globally. Designed, engineered, and manufactured in India for worldwide deployment, Miko reflects the country's deep tech maturity and commitment to ethical innovation—contributing to India's emergence as a trusted global leader in AI.

B. Current Maturity & Market Validation

- Commercially deployed and used by over 500,000 families across 140+ countries, demonstrating global relevance and cross-cultural adoption of Miko's AI platforms. Beyond TRL9 Proven Deployment. Through TRL-9 AI systems built in India and deployed globally, Miko advances IndiaAI's objective of positioning India as a trusted global hub for responsible, human-centric AI, combining technological leadership with measurable societal impact.

- Category-leading consumer robotics brand in North America, validating product-market fit in one of the world's most competitive technology markets, with Miko products being the sole AI-robotics offering selected in their category by leading global retailers such as Walmart, Costco, and Reliance Group.
- USD 100M+ in cumulative revenue and USD 70M+ in capital raised, reflecting sustained commercial viability, investor confidence, and long-term business resilience.
- Proven capability to deploy and scale AI systems in real-world home environments, operating continuously beyond controlled laboratory or pilot settings—meeting TRL-9 criteria for successful system operation.
- Trust, safety, and child-first compliance at scale, supported by 40+ global certifications across data protection, cybersecurity, and child safety standards.
- Sustainable monetization through subscription-led digital content and media offerings, demonstrating that responsible AI for children can be both socially impactful and economically scalable.
- Deep ecosystem partnerships with 25+ leading global media and content organizations, including Disney, Paramount, Oxford University Press, and iHeartMedia, strengthening content quality, cultural relevance, and global reach

I. Technology and AI Capabilities

- **Emotionally Intelligent, Culturally Aware AI:** Proprietary multimodal AI systems capable of real-time affect recognition and culturally configurable behavior, enabling empathetic, context-aware interaction across regions, languages, and age groups.
- **Domain-Specific, Edge-Native AI Systems:** Indigenous large language and speech models purpose-built for parenting, education, and family use cases, optimized for on-device inference, low latency, and privacy-preserving deployment.
- **Personalized Learning & Memory-Grounded Intelligence:** Adaptive learning architectures combining deep learning, reinforcement learning, and long-term memory frameworks to support longitudinal personalization, developmental progression, and content fidelity.
- **Multimodal Robotics & Embodied AI:** Integrated vision, speech, and language fusion with robot foundation models (LAMs), SLAM, and advanced sensing, enabling autonomous navigation, perception, and goal-oriented behavior in real-world environments.
- **Safety-First AI Architecture:** Multi-layered AI safety, moderation, and privacy frameworks incorporating child-safe internet layers, adversarial robustness, real-time content controls, and privacy-by-design enforcement.

II. India-Owned Intellectual Property, Filed and Protected Globally

- Core AI and robotics intellectual property conceived, developed, and owned in India, with strategic global patent filings to secure international protection and competitiveness.
- 20+ global patents across conversational AI, multimodal intelligence, embodied AI, AI safety, and human–AI interaction, with ownership retained by the Indian parent entity.
- Roadmap to 500+ patents by 2035, reinforcing India's leadership in next-generation AI, robotics, and responsible human-centric systems.

9. NAVANC

AI Infrastructure for Secured Lending

Navanc is building foundational AI infrastructure for India's secured credit expansion; converting manual collateral verification into scalable, data-driven risk intelligence.

Navanc is building an AI-native underwriting infrastructure for secured lending, enabling banks, NBFCs, and housing finance institutions to make faster, more reliable credit decisions on physical collateral. Its proprietary Property AI underwriting stack uses computer vision, geospatial intelligence, and automated risk modeling to digitize site assessments, validate collateral quality, and surface hidden risk signals in real time. By converting a manual, cost-heavy operations layer into a scalable intelligence layer, Navanc is strengthening risk control while enabling expansion of secured lending portfolios across India.

A. State of the Art & Global Competitiveness

I. Global Benchmarking

Globally, underwriting for physical collateral, including property and equipment, remains heavily dependent on manual inspections, third-party appraisals, and static documentation. While digital workflows have improved efficiency, AI-led collateral intelligence combining visual data, geospatial risk layers, and dynamic modeling is still an emerging frontier, not a global standard. Navanc operates at this frontier by embedding AI directly into collateral evaluation, positioning it alongside the most advanced global efforts in digitizing secured credit risk.

II. IP & Defensibility

Navanc's defensibility lies in its proprietary, India-trained datasets, computer vision models tuned to Indian property and asset conditions, and risk-scoring algorithms built on real underwriting outcomes from lender deployments. The system improves with scale, creating a data flywheel that is difficult to replicate. The core AI models, workflows, and underwriting intelligence have been developed and trained in India, forming localized deep tech IP with applicability across similar emerging markets.

III. Innovation Type

Navanc represents an India-first deep tech implementation in AI-native collateral intelligence. While elements of digital underwriting exist globally, a unified AI stack built for fragmented, low-standardization, document-light environments is still rare. India's complexity makes it a proving ground for solutions with export potential across emerging economies.

B. Current Maturity & Market Validation

I. Technology Readiness Level

The technology currently sits at TRL 7-8, moving from pilot to early commercial deployment in live underwriting workflows. The platform has officially transitioned from lab to market. It is now in the early scaling phase with institutional adoption.

II. Deployment

Navanc is currently deployed across more than 20 banks and NBFCs, including Vastu Housing Finance, APAC Financial, Ambit Finvest, Muthoot, and other secured lenders, generating more than 2000 monthly reports and MRR of more than INR 35 Lakhs.

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ Clear regulatory recognition of AI-led digital and remote collateral assessment methods ▪ Standardization and improved access to digitized property and asset records ▪ Strengthened public geospatial and infrastructure data layers usable for underwriting Funding Gaps
Capital & Infrastructure	▪ Non-dilutive R&D grants for applied AI in financial infrastructure ▪ Public support for the creation of shared, high-quality asset and land datasets ▪ Innovation-linked incentives encouraging lenders to adopt AI-based risk infrastructure
Ecosystem Multipliers	▪ Regulatory sandboxes for AI in credit risk and underwriting infrastructure ▪ Talent and research collaboration pipelines focused on applied AI for financial systems

10. NeoSapien

Building India's Conversation Intelligence Infrastructure

95% of human knowledge transfer happens in conversations, yet AI only accesses the 5% that's typed. NeoSapien captures, processes, and makes conversational intelligence accessible with privacy as a first principle, not an afterthought.

A. State of the Art & Global Competitiveness

I. Global Benchmarking

Capability	NeoSapien	Global Competitors
Audio Storage	Zero storage – process and delete	Store everything, encrypt later
Privacy Architecture	Hardware-anchored with cryptographic proof-of-deletion	Software-layer encryption

Language Support	Native Indic with code-switching (Hindi-English, Tamil-English)	English-first, limited multilingual
Platform Approach	Full Conversation OS + Enterprise SDK	Single-purpose recording devices

II. IP Portfolio

6 Patents (5 Filed, 1 Granted), All India-Developed: Hardware-anchored security framework, AI knowledge capture ("Second Brain"), adaptive coaching system (granted), biometric-conversational compatibility, emotion-sensitive wearables, and smart eyewear for personalized feedback.

III. Innovation Type

First-in-World. No global player offers zero-audio-storage with cryptographic deletion proofs, HSM integration for wearables, or a conversation OS approach. Similar to what Android did for mobile, we're building the operating system layer for conversation intelligence.

B. Current Maturity & Market Validation

I. Enterprise Deployments

- Sales analytics & CRM automation
- Healthcare: doctor-patient note-taking
- Mental health: therapist session documentation

II. Consumer Traction

- 1,000+ devices sold (11,999)
- 100,000+ conversations processed
- 3-day battery life hardware (Neo 1)

III. Product Suite

- The product suite consists of the Neo 1, a hardware product that is currently live. NeoCore SDK, an enterprise API, is in beta with 5+ clients. Enables conversation intelligence integration into existing workflows, Salesforce, Teams, and 50+ app connectors.
- Furthermore, the strategy includes Neo OS Licensing, where the team is in active discussions with OEM wearable manufacturers to embed conversational intelligence in smartwatches and devices, representing a 10M+ annual device potential.

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ India can lead globally in defining standards for privacy-first AI. A certification framework recognizing zero-audio architectures would create differentiation for Indian companies and align with DPDP Act data sovereignty objectives.
Capital & Infrastructure	▪ Deep tech patient capital for 18-24 month hardware R&D cycles, domestic AI compute capacity aligned with India AI Mission, and PLI-equivalent incentives for AI wearable manufacturing.
Ecosystem Multipliers	▪ Speech AI research collaboration with IITs/IISc on Indic languages (India's linguistic complexity is a moat), GCC partnership facilitation, and export support recognizing AI-as-infrastructure.

11. Questt AI

India-Built Decision Intelligence for Global Enterprise

A. State-of-the-Art and Global Competitiveness

Retail/CPG (Consumer Packaged Goods) enterprises are data-rich but decision-poor. Legacy planning stacks (e.g., Blue Yonder, o9, SAP IBP) are slow to deploy (6–15 months) and typically optimize in silos, while real operations require continuous, multivariate decisions (pricing inventory promotions supply constraints).

Questt's core breakthrough is a state-of-the-art enterprise knowledge graph architecture and build pipeline built for high-churn operational environments like retail/CPG. The platform treats the graph as a semantic operating layer, not an integration artifact: canonical domain ontology + identity graph, temporal/effective-dated semantics, and governed metric objects with lineage and reconciliation. This makes the graph reliable enough to power decision automation—constructing bounded decision contexts (context graphs) and running retrieve validate refine loops to deliver multivariate recommendations/actions with traceability.

I. Global Benchmarking

The implementation timeline is significantly accelerated at 4–8 weeks vs 6–15 months. The decision model utilizes multivariate optimization vs single-variable planning, supported by an architecture of agentic loops vs static rules / one-shot analytics. Ultimately, the outcome delivers execution-ready actions vs recommendation-only outputs.

II. IP & Defensibility

The company features a proprietary enterprise graph architecture built from the ground up in India, complemented by Retail/CPG ontologies developed through large enterprise deployments in India. The platform utilizes multi-agent orchestration, enabling autonomous decision chains, creating a significant moat through deep semantic and workflow integration into enterprise data estates, which results in switching costs.

III. Innovation Type

The foundation is built from the ground up to handle complex data relationships and continuous reasoning. It avoids the limitations of traditional legacy planning by ensuring AI is the engine of the decision infrastructure (including graphs, context compilation, and agentic loops), not just a cosmetic addition.

B. Current Maturity & Market Validation

I. Technology Readiness Level

The technology has reached TRL 9, with production deployments at scale, and is currently scaling with Fortune 500 revenue.

II. Commercial Status

The current live clients include PepsiCo, Nokia, Motherson Group, Herbalife, House of Anita Dongre, and Livspace. Furthermore, the company has established a strategic partnership with PwC India

III. Deployment

In terms of delivery, the platform is a cloud-native SaaS with enterprise-grade security. It maintains a global footprint across India, the US, and APAC, facilitating high-stakes operations across multiple regions

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ Clear liability/accountability norms for autonomous business decisions ▪ Pragmatic cross-border data guidance for global enterprise deployments ▪ Sector-level AI governance that enables innovation without compromising consumers
Capital & Infrastructure	▪ Patient growth funding aligned to enterprise sales cycles (6–12 months) ▪ Non-dilutive R&D support for agentic systems and decision intelligence infrastructure ▪ Expansion capital to compete globally against incumbents
Ecosystem Multipliers	▪ Talent depth in enterprise AI product + solution architecture (beyond pure ML) ▪ Faster procurement pathways for Indian AI vendors (without lowering security bars) ▪ India-backed benchmarks/credentialing to improve global enterprise trust

12. TestMu

A. State-of-the-Art and Global Competitiveness

LambdaTest, recently rebranded as TestMu, has emerged as one of the leading players in the global cloud testing space. The Noida-headquartered company now positions itself as the "world's first full-stack Agentic AI Quality Engineering platform".

Founded in 2017 by Asad Khan, Jay Singh, and Mayank Bhola, TestMu demonstrates that India can produce globally competitive deep tech platforms. With 2.8 million users across 130+ countries and enterprise clients including Microsoft, Apple, NVIDIA, and Cisco, the company has already built meaningful international scale. TestMu's core cloud testing infrastructure- browser grids, device farms, automation frameworks - represents an "India-first" adaptation of globally established technology.

I. Innovation Type

KaneAI represents TestMu's flagship innovation, positioned as the first GenAI-native testing agent where users write tests in natural language rather than code. The system processes requirements from multiple formats (text, JIRA tickets, PRDs, images, audio, video) and generates executable tests across all major automation frameworks. TestMu claims a 40-70% reduction in test script generation time with KaneAI.

HyperExecute, their test orchestration engine, claims 70% faster test execution than traditional cloud grids through smart workflows, auto-test grouping, and fail-fast techniques. This speed advantage addresses a critical pain point - test suite execution time directly impacts developer productivity and CI/CD pipeline efficiency.

B. Current Maturity & Market Validation

I. Technology Readiness Level

TestMu operates at TRL 9 (full commercial deployment) with robust production metrics. This level of maturity is demonstrated by a massive scale of operations, with 1.5+ billion tests executed annually across 18,000 enterprises.

II. Commercial Status

The platform's security posture is validated by comprehensive enterprise security certifications, including SOC 2 Type II, ISO 27001, ISO 27017, and ISO 27701. These certifications ensure that the high volume of enterprise testing meets the most stringent global standards.

III. Deployment

Regarding infrastructure, the platform offers extensive deployment flexibility to meet diverse corporate requirements. Organizations can choose between public cloud, dedicated cloud, and on-premise options to best suit their specific operational needs.

C. Taking India to the Forefront: What's Needed

Capital & Infrastructure	▪ Data centre infrastructure has improved but requires continued investment. TestMu operates on AWS and Microsoft Azure globally, but the company could benefit from India-based infrastructure subsidies as data localization requirements evolve. Government hyperscale data center incentives would reduce costs for Indian platforms serving global customers
Ecosystem Multipliers	▪ Talent pipeline presents mixed signals. India produces 2.5 million STEM graduates annually, with a large pool of IIT/NIT/BITS alumni, providing excellent engineering talent. However, a sizable skills gap exists in advanced areas (quantum computing, AI/ML), and brain drain pulls top researchers to US and European institutions. TestMu's Noida engineering center benefits from India's talent density, but competing for AI specialists against global tech giants and US-based startups with higher compensation remains challenging.

13. Unbox Robotics

A. State of the Art & Global Competitiveness

I. Global Benchmarking

Traditional warehouse sortation infrastructure is capital-intensive, space-consuming, and slow to deploy, with installation timelines extending several months and limited flexibility for expansion.

Unbox Robotics has developed a modular robotics platform powered by AI and swarm intelligence–led orchestration, designed for rapid deployment, high density, and scalable operations. System deployments can be completed in 2–4 weeks, require approximately 50% less floor space, and allow incremental capacity expansion without significant downtime or redesign.

Over 500 robots are operational across India, Europe, and the United States, delivering high-accuracy sortation for leading logistics, retail, and e-commerce enterprises.

II. IP & Defensibility

Unbox has built a vertically integrated technology stack encompassing fleet orchestration, motion planning, hardware design, and control systems. This full-stack architecture has been developed entirely in India and creates a defensible competitive position that is difficult for point-solution providers to replicate.

III. Innovation Type

The solution is among the first of its kind in automating package and item sorting inside warehouses. It has been engineered and productized in India and is now being deployed globally, strengthening India's deep tech IP base.

B. Current Maturity & Market Validation

I. Technology Readiness Level

The product is at Commercial Scale (TRL 9) and is fully market-ready, with proven performance in continuous operations across multiple customers and operating environments.

II. Commercial Status

Unbox has moved clearly from lab to market, with strong commercial validation across leading logistics and eCommerce operators. The company is currently in the scaling stage, expanding deployments and accelerating global expansion.

III. Deployment

The solution is deployed in live production warehouses across India and international markets. Performance has been validated across diverse infrastructure constraints, workflows, and operating standards, with the majority of the company's revenue driven by international sales.

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ India currently lacks an integrated framework for robotics companies to build, certify, and export at scale. Key gaps include the absence of standardized acceptance frameworks for autonomous systems aligned with global norms such as CE and UL, limited accredited testing infrastructure for EMC, safety, and battery validation with fast turnaround times, and fragmented certification pathways for simultaneous domestic deployment and export readiness.
Capital & Infrastructure	▪ Hardware robotics operates on development and scaling cycles that differ fundamentally from software. The current funding landscape does not adequately provide patient capital for multi-year hardware development and reliability validation, non-dilutive R&D funding for foundational systems and certification readiness, equipment financing to scale production capacity, or working capital solutions to support inventory, spares, and extended supply chain cycles.
Ecosystem Multipliers	▪ Key Ecosystem Multipliers include access to shared, large-scale warehouse automation testbeds with standardized configurations for performance, reliability, and safety validation against global benchmarks. Structured procurement pathways and pilot programs with public-sector logistics operators such as India Post, rail cargo, ports, defence logistics, and major PSUs would enable credible reference deployments at scale. Additional needs include expanded talent pipelines for robotics systems engineers through industry–academia collaboration, accelerated access to global certification pathways, and strengthened domestic manufacturing supply chains for precision components.

14. Videonetics

India's #1 Sovereign AI-Driven Video Computing Platform

Videonetics is a true "Make in India" deep tech success story, creating Intellectual property with its Video Computing Platform, Video AI analytics engines, and mission-critical software stack indigenously designed, architected, and fully developed in India, and deployed at scale across domestic and international markets. Built with AI at its core, Videonetics is pioneering next-generation vision-based intelligence to enhance operational excellence for law enforcement, traffic management, public safety, infrastructure, and enterprise management, optimized for India's scale, demographic diversity, and operational complexity.

Founded by Dr. Tinku Acharya, Fellow of IEEE, an internationally acclaimed technologist, Videonetics has emerged as a global leader in AI-powered video and business intelligence, delivering mission-critical solutions for law and traffic enforcement across 150 Smart Cities, 80+ airports, and numerous enterprises. The platform enables real-time situational awareness and actionable intelligence for law enforcement *agencies and enterprises.*

A. State of the Art & Global Competitiveness

While many AI use cases exist globally, Videonetics has delivered breakthrough engineering innovation by enabling these capabilities at extreme scale, high reliability, and significantly lower TCO, making state-wide and nation-wide deployments viable. Its sovereign vision AI models, trained on uniquely Indian demographic datasets, are optimized for India's diverse conditions—high crowd density, varied lighting, weather conditions, camera heterogeneity, and infrastructure constraints. The platform supports advanced video and AI analytics for identity intelligence, behavioural analysis, anomaly detection, safety monitoring, and real-time incident response across law enforcement and enterprise environments.

In traffic enforcement, Videonetics delivers highly accurate Automatic Number Plate Recognition (ANPR), red-light violation detection, over-speeding, helmet and seatbelt violation detection, wrong-way driving, and illegal parking, to improve road and highway safety and security.

Largest Deployment – State-wide Law Enforcement Platform:

A flagship example of Videonetics' scale is its state-wide AI-based law enforcement deployment in Andhra Pradesh, among the largest integrated AI surveillance implementations in India. Processing real-time feeds from thousands of cameras across cities, highways, and rural regions, the platform enables unified traffic enforcement, criminal identification, missing person tracing, crowd monitoring, and emergency response. Operating at massive scale with high availability and real-time performance, this deployment has positioned Videonetics as a reference architecture for next-generation digital policing platforms.

B. Current Maturity & Market Validation

Videonetics holds patents granted from the USA, UK, Israel, Canada, Singapore, and India, reflecting global recognition of its innovation. The platform is at TRL 9, with proven commercial deployments in mission-critical environments.

C. Taking India to the Forefront: What's Needed

Regulatory Opportunity	▪ Global champions scaled through close collaboration with national stakeholders and supportive procurement models that enabled sustained R&D investment—a mindset that Indian contracts must increasingly adopt. Preferential government procurement for indigenous AI platforms and Indian Intellectual Property will further strengthen India's position as a global hub for law enforcement AI innovation.
Capital & Infrastructure	▪ Targeted R&D tax credits, non-dilutive grants, and access to low-cost innovation financing independent of balance-sheet strength will be critical to accelerate deep tech innovation and long-term global competitiveness.

Acknowledgements

About Nishith Desai Associates (NDA)

At Nishith Desai Associates, we have earned the reputation of being Asia's most Innovative Law Firm — and the go-to specialists for companies around the world, looking to conduct businesses in India and for Indian companies considering business expansion abroad. In fact, we have conceptualized and created a state-of-the-art Blue Sky Thinking and Research Campus, Imaginarium Aligunjan, an international institution dedicated to designing a premeditated future with an embedded strategic foresight capability.

We are a research and strategy driven international law firm with Indian offices in Mumbai, New Delhi, Bangalore and GIFT City and foreign offices in New York, Palo Alto (Silicon Valley) and Singapore. Our team comprises of specialists who provide strategic advice on legal, regulatory, and tax related matters in an integrated manner basis key insights carefully culled from the allied industries.

As an active participant in shaping India's regulatory environment, we at NDA, have the expertise and more importantly — the VISION — to navigate its complexities. Our ongoing endeavors in conducting and facilitating original research in emerging areas of law has helped us develop unparalleled proficiency to anticipate legal obstacles, mitigate potential risks and identify new opportunities for our clients on a global scale. Simply put, for conglomerates looking to conduct business in the subcontinent, NDA takes the uncertainty out of new frontiers.

As a firm of doyens, we pride ourselves in working with select clients within select verticals on complex matters. Our forte lies in providing innovative and strategic advice in futuristic areas of law such as those relating to Blockchain and virtual currencies, Internet of Things (IOT), Aviation, AI, Privatization of Outer Space, Drones, Robotics, Virtual Reality, Ed-Tech, Med-Tech and Medical Devices and Nanotechnology with our key clientele comprising of marquee Fortune 500 corporations.

The firm has been consistently ranked as one of the Most Innovative Law Firms, across the globe. In fact, NDA has been the proud recipient of the Financial Times – RSG award 4 times in a row, (2014-2017) as the Most Innovative Indian Law Firm.

We are a trust based, non-hierarchical, democratic organization that leverages research and knowledge to deliver extraordinary value to our clients. Datum, our unique employer proposition has been developed into a global case study, aptly titled '**Management by Trust in a Democratic Enterprise**,' published by John Wiley & Sons, USA.

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About Venture Intelligence

Venture Intelligence, a division of TSJ Media Pvt. Ltd, is the leading provider of data on private company financials, transactions and their valuations. Our research is used extensively by PE-VC industry practitioners, entrepreneurs, CXOs of large corporations, financial and strategic investors, the media as well as government and regulatory agencies. Our customers include leading PE-VC Firms, Limited Partners, Investment Banks, Law Firms, HR Services Firms, Corporations and Consulting Firms.

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About IPpro

IPpro is a specialized firm dedicated to helping clients create, manage, and monetize their patent portfolios. With a seasoned team of patent agents, attorneys, engineers, pharmacists, biotechnologists, and IP consultants from premier institutions in India and the United States, we bring a unique blend of legal, technical, and industry expertise to every engagement.

Our research-driven and industry-focused approach ensures that we not only protect intellectual assets but also maximize their commercial value. We work closely with clients to identify and analyze their core IP assets, evaluate their lifespan and market coverage, and build tailored, future-ready patent portfolios.

By leveraging the diverse backgrounds of our professionals, we provide end-to-end support through every stage of patenting, from drafting and filing to prosecution, portfolio management, and enforcement. This holistic approach, coupled with robust systems and processes, enables us to deliver cost-effective, comprehensive, and high-quality patent solutions that empower our clients to focus on innovation.

Headquartered in Bangalore, with offices in Silicon Valley, and Mumbai, IPpro serves a truly global clientele. Founded in 2005 by internationally acclaimed attorney Nishith Desai, we continue to be a trusted partner for organizations seeking to safeguard and strategically unlock the potential of their innovations.

IPpro is an affiliated firm of Nishith Desai Associates.

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About Pencil Points Designs

Pencil Point Designs is a highly imaginative design consulting firm providing strategy+design services to our clients who are or want to be globally successful.

We are a trusted strategy and design consulting firm committed to helping our clients realize that *"good design is good business"* Since our inception in 2006, we have partnered with brands across industries, inspiring change and guiding them toward their business goals through the power of design. Our pursuit from nothing ignites our imagination. As a preferred design firm in India, our expertise in crafting innovative solutions has allowed us to launch products and services for our clients that has paved the way for future growth – national as well as global.

We do this by our continuous imagination & re-imagination, intense lateral research, meticulous execution, technology, organisational behaviour and achieving design excellence in everything we do.

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Special Thanks

Pranav Pai, 3one4 Capital

Aryan Mittal, 3one4 Capital

Divyam Dewan, Chiratae Ventures

Shiv Singhal, Nishith Desai Associates

Dhairya Jain, Nishith Desai Associates

Pintu Babu, Nishith Desai Associates

Ankit Mishra, Nishith Desai Associates

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